October 30, 2009

Experience Study 2004 - 2008
Teachers Retirement Association Fund

MERCER

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October 30, 2009

Ms. Laurie Hacking
Executive Director
Teachers Retirement Association of Minnesota
60 Empire Drive, Suite 400
St. Paul, MN 55103

Subject: 2008 Experience Study – Teachers Retirement Association Fund

Dear Laurie:

The results of each of our annual actuarial valuations are based on actuarial methods, procedures and assumptions adopted by the Legislative Commission on Pensions and Retirement (LCPR). These assumptions are used in developing employer contribution rates, in disclosing employer liabilities pursuant to GASB requirements and for analyzing the fiscal impact of proposed legislative amendments.
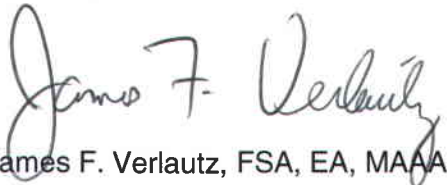
The purpose of this report is to present the results of our review of the actuarial methods and procedures, economic assumptions, and demographic assumptions used in the June 30, 2008 actuarial valuation. Our recommendations represent our best-estimate based on recent experience, future expectations and professional judgment.

The analysis in this study was based on data for the period from July 1, 2004 to June 30, 2008, as provided by the Fund. The Fund's actuary would not customarily verify this data. We have reviewed the information for internal consistency and reasonableness and have no reason to doubt its substantial accuracy.
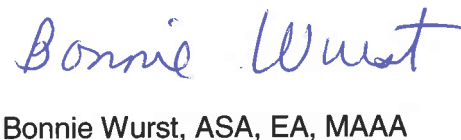
This report has been prepared exclusively for the Teachers Retirement Association Fund and the Legislative Commission on Pensions and Retirement. Mercer is not responsible for consequences arising from the use of this report for any other purposes.

We are available to answer any questions on the material contained in the report, or to provide explanations or further details as may be appropriate. The undersigned credentialed actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report.

Sincerely,

James F. Verlautz, FSA, EA, MAAA   Bonnie Wurst, ASA, EA, MAAA

The information contained in this document (including any attachments) is not intended by Mercer to be used, and it cannot be used, for the purpose of avoiding penalties under the Internal Revenue Code that may be imposed on the taxpayer.

Contents

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Executive Summary

This report has been prepared by Mercer for the Teachers Retirement Association Fund in order to analyze the Fund's experience from July 1, 2004, through June 30, 2008, and to develop recommendations for changes in valuation methods, allocation procedures, economic assumptions, and demographic assumptions.

A brief summary of our recommendations are as follows:

Actuarial Methods	No changes to current actuarial methods.
Economic Assumptions	Reduce the real wage growth assumption from 1.50% to 1.00%.
	Reduce the payroll growth assumption from 4.50% to 4.00%.
	Reduce the salary increase assumption and change to a service related table.
	Reduce the investment return assumption from 8.50% to 8.00%.
Demographic Assumptions	Make adjustments to several current assumptions to more closely match experience.

A valuation assumption which is outside the scope of this experience study is the Combined Service Annuity load factor. Currently, active liabilities are increased 1.4% and deferred vested liabilities are increased 4.0% to account for the effect of some members being eligible for a Combined Service Annuity. We recommend that actual Combined Service Annuity data be collected and reviewed in order to determine whether the current factors are appropriate.

Executive Summary

Overview of Recommended Changes

Actuarial Methods
We recommend no changes to the actuarial methods.

Economic Assumptions
Real Wage Growth

Based on our analysis of actual growth in real National Average Wages over the last 50 years, we recommend changing the current assumption from 1.50% to 1.00%.

Payroll Growth

Based on our recommended change in the Real Wage Growth assumption, we recommend changing the current assumption from 4.50% to 4.00%.

Salary Increases

We recommend changing the salary increase rates from a ten-year select basis to a service based table which reflects lower expected salary increases at later years of service.

Investment Return

Based on our analysis of anticipated returns for asset classes included in the target asset allocation, we recommend changing the current assumption from 8.50% to 8.00%.

Demographic Assumptions
Post-retirement Mortality for Healthy Lives

Mortality rates are used to project the length of time benefits will be paid to current and future retirees and beneficiaries. We recommend a change to a more recent mortality table to better anticipate current and future mortality patterns.

Post-retirement Mortality for Disabled Lives

In conjunction with our recommended change for healthy retiree mortality, we recommend a change to a more recent disabled mortality table.

Pre-retirement Mortality

In conjunction with our recommended change for healthy retiree mortality, we are recommending a change to a more recent mortality table.

Retirement from Active Status

Retirement rates are used to predict when active members will elect to begin receiving retirement benefits. We recommend lowering the retirement rates to reflect retirement patterns observed over the last four years and anticipated future changes in retirement patterns.

Executive Summary

Annuity Form Elections at Retirement

We recommend making minor adjustments to the assumed percentages of retirees who are married, the assumed age difference between retirees and beneficiaries and the assumed percentages of retirees electing the optional forms of benefit at retirement.

Disability Retirement

We recommend a change from separate disability rates for males and females to a unisex table which has the same rates as the current female disability table. This recommendation is a reduction in disability rates for males.

Termination Rates

We recommend changing the termination rates from a three-year select and ultimate basis to a service based table which reflects higher expected turnover.

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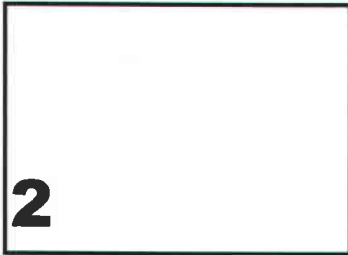
Actuarial Methods

Overview

Actuarial methods and allocation procedures are used as part of the valuation to determine actuarial accrued liabilities, to determine normal costs, to allocate costs to individual employers and to amortize unfunded accrued liabilities (UAL). We used the following objectives to recommend actuarial methods and allocation procedures:

- Transparency of costs and funded status
- Predictable and stable employer contribution rates
- Protection of the plan's funded status
- Equity across generations
- Actuarial soundness
- Compliance with GASB requirements

We recommend no changes to the fundamental actuarial methods at this time. Consistent with our analysis from earlier this year, we recommend continued consideration of a corridor, such as 80% to 120%, which would limit the actuarial value of assets to ensure that it does not get too far from actual market value in the event of significant investment gains or losses. The Actuarial Standards Board Actuarial Standard of Practice No. 44 describes acceptable smoothing methods for pension valuations. The standard requires that the actuarial asset values "fall within a reasonable range around the corresponding market values. For example, there might be a corridor centered at market value, outside of which the actuarial value of assets may not fall, in order to assure that the difference from market value is not greater than the actuary deems reasonable."

The actuarial methods used for the June 30, 2008 actuarial valuation are shown in the table on the next page.

Actuarial Methods

Method	June 30, 2008 Assumption	Recommended Assumption
Cost method	Entry Age Normal (see next page for full description)	No change
Asset valuation method	The assets are valued based on a five-year moving average of expected and market values (five-year average actuarial value) determined as follows:	No change
	▪ At the end of each plan year, an average asset value is calculated as the average of the market asset value at the beginning and end of the fiscal year net of investment income for the fiscal year;	
	▪ The investment gain or (loss) is taken as the excess of actual investment income over the expected investment income based on the average asset value as calculated above;	
	▪ The investment gain or (loss) so determined is recognized over five years at 20% per year;	
	▪ The asset value is the sum of the expected asset value plus the schedule recognition of investment gains or (losses) during the current and the preceding four plan years.	
	The Minnesota Post Retirement Investment Fund (Post Fund) has been recognized at full market value without smoothing. As of the date of this report, the Post Fund has been dissolved and its assets and liabilities reassigned to each applicable active fund. Beginning July 1, 2009, the Post Fund assets will be smoothed in a manner similar to the active fund assets, and 80% of the Post Fund investment gain or loss for the fiscal year ending June 30, 2009 will be deferred.	
UAL amortization method	UAL amortized as a level percent of payroll	No change
UAL amortization period	A closed period ending June 30, 2037. If there is a negative Unfunded Actuarial Accrued Liability, the surplus amount shall be amortized over 30 years as a level percentage of payroll.	
	If there is an increase in the unfunded accrued liability due to a change in the actuarial assumptions, plan provisions, or actuarial cost method, a new amortization period is determined. This new amortization period is determined by blending the period needed to amortize the prior unfunded actuarial accrued liability over the prior amortization period and the increase in unfunded actuarial accrued liability amortized over 30 years. If there is a decrease in the unfunded accrued liability, no change is made to the amortization period.	

Actuarial Methods

Actuarial Cost Method

The total cost of the Fund, over time, will always be equal to the benefits and expenses paid less investment earnings and is not affected directly by the actuarial cost method. The actuarial cost method is simply a tool to allocate costs among past, current or future years and, thus, primarily affects the timing of contributions.

Liabilities and contributions in this report are computed using the Individual Entry Age Normal Cost Method. This method is prescribed by Minnesota Statutes.

The objective under this method is to fund each participant's benefits under the Plan as payments which are level as a percentage of salary, starting at original participation date (or employment date), and continuing until the assumed retirement, termination, disability or death.

At any given date, a liability is calculated equal to the contributions which would have been accumulated if this method of funding had always been used, the current plan provisions had always been in place, and all assumptions had been precisely accurate. The difference between this liability and the assets (if any) which are held in the fund is the unfunded liability. The unfunded liability is typically funded over a chosen period in accordance with the amortization schedule.

A detailed description of the calculation follows:

The normal costs for each active participant under the assumed retirement age is determined by applying to earnings the level percentage of salary which, if contributed each year from date of entry into the Plan until the assumed retirement (termination, disability or death) date, is sufficient to provide the full value of the benefits expected to be payable.

The present value of future normal costs is the total of the discounted values of all active participants' normal cost, assuming these to be paid in each case from the valuation date until retirement (termination, disability or death) date.

The present value of projected benefits is calculated as the value of all benefit payments expected to be paid to the Plan's current participants, including active and retired members, beneficiaries, and terminated members with vested rights.

The accrued liability is the excess of the present value of projected benefits over the present value of future normal cost.

The unfunded liability is the excess of the accrued liability over the assets of the fund, and represents that part of the accrued liability which has not been funded by accumulated past contributions.

We believe this cost method is an appropriate way to determine funding requirements and see no reason to change it. However, it is important to note that the liability produced by this method is a by-product of a reasonable approach to funding and is not intended to represent the value of the "benefits currently earned" under the plan.

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Economic Assumptions

Overview

Actuarial Standard of Practice (ASOP) No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations,* provides guidance on selecting economic assumptions used in measuring obligations under defined benefit pension plans. ASOP No. 27 suggests that economic assumptions be developed using the actuary's professional judgment, taking into consideration past experience and the actuary's expectations regarding the future. The process for selecting economic assumptions involves:

- Identifying components of each assumption and evaluating relevant data;
- Developing a best-estimate range for each economic assumption; and
- Evaluating measurement specific factors and selecting a point within the best-estimate range.

A summary of the economic assumptions used for the June 30, 2008 actuarial valuation and recommended changes are shown below:

Assumption	June 30, 2008 Assumption	Recommended Assumption
Inflation	3.00%	No Change
Real wage growth (productivity)	1.50%	1.00%
Payroll growth	4.50%	4.00%
Salary Growth	Age related table	Service related table
Regular investment return	8.50%	8.00%

The recommended assumptions shown above, in our opinion, were selected in a manner consistent with the requirements of ASOP No. 27. Each of the above assumptions is described in detail below and on the following pages.

Economic Assumptions

Inflation

The assumed inflation rate is the starting point for all of the other economic assumptions. It affects other assumptions including payroll growth, investment return, and salary increase rates.
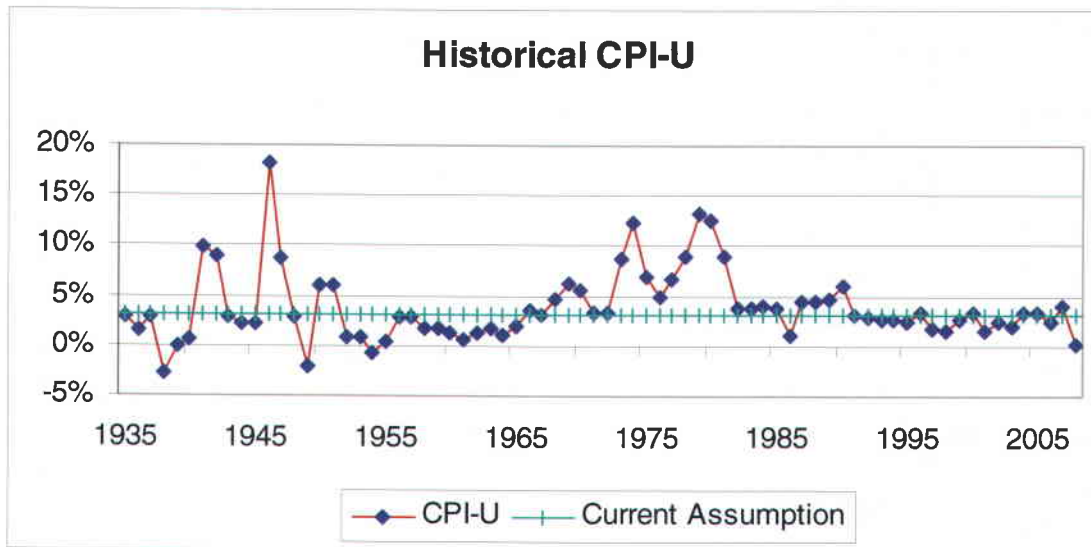
In selecting an appropriate inflation assumption, we consider both historical data and expected future inflation. The chart above shows the annual inflation rate for the years ending December 31 from 1935 through 2008 as reported by the Bureau of Labor Statistics. The mean and median annual rates over this period are 3.76% and 2.99% respectively.

Mercer Investment Consulting's best estimate of expected long-term inflation is currently a rate of 2.8%. We also considered Social Security's current intermediate inflation assumption of 2.8%, and SBI's current inflation estimate of 3.0%.

Using Mercer's 2.8% assumption as a starting point, our best-estimate range for the inflation assumption is from 2.3% to 3.3%. Based on the potentially inflationary effects of the very recent economic stimulus package, we believe that inflation will be on the higher side of that range, and recommend no change to the assumed annual inflation rate of 3.0%.

Real Wage Growth

Real wage growth represents the increase in wages above inflation for the entire group due to improvements in productivity and competitive pressures. Merit and longevity wage growth, in contrast, represent the increases in wages for an individual due to factors such as performance, promotion, or seniority.

Real wage growth combined with inflation represents the expected growth in total payroll for a stable population. Changes in payroll due to an increase or decline in the covered population are not captured by this assumption.

Economic Assumptions

The chart below shows the real growth in national average wages over the past fifty years based on data compiled by the Social Security Administration.

Historical Real Growth in National Average Wages

While the change in any one year has been volatile, the change over longer periods of time is more stable as shown in the table below.

Length of Period Ending June 30, 2008	Average Real Growth in National Average Wages
10 years	1.24%
20 years	0.94%
30 years	0.67%
40 years	0.56%
50 years	0.81%

Mercer's economic modeling suggests a reasonable expectation of average real growth in wages is from .50% to as much as 1.50%. Based on the table above, we recommend changing the current assumption of 1.50% to 1.00%.

Economic Assumptions

Payroll Growth

The payroll growth assumption is used to develop the annual amount necessary to amortize the unfunded actuarial liability as a level percentage of expected payroll.

Payroll growth is the sum of inflation and real wage growth. Since we are recommending a change in the real wage growth assumption, we recommend a corresponding change in the payroll growth assumption, from 4.50% to 4.00%.

Salary Increases

Using the building block approach described in ASOP 27, this assumption is composed of three components;

- Inflation
- Productivity
- Merit/promotion

The inflation and productivity components are combined to produce the assumed rate of wage inflation. This rate represents the "across the board" average annual increase in salaries shown in the experience data. The merit component includes the additional increases in salary due to individual performance, seniority, promotions, etc.

Our proposed salary increase table has rates that are less than the assumed payroll growth of 4% for service of 21 or more years, which implies a negative merit/promotion component. Actual experience for the past 4 years supports the negative merit/promotion, with consistent plan experience below the national wage increase at advanced age and/or service.

This assumption is typically correlated to years of service, especially at lower years of service, and the current age based table incorporates a 5 year select period. During the 5-year select period, $0.60\% \times (5-T)$ is added to the ultimate rate, where T is completed years of service.

We reviewed the annual salary increases for the period July 1, 2004 through June 30, 2008 by both age and service. The data group consisted of continuing active members with two consecutive full years of employment. For the salary analysis, we excluded some of the most dramatic salary changes. We excluded the lowest 2.5% and the highest 2.5% for a total of 5.0% of records excluded. While this was a relatively small group, their salary increases distorted the experience of the overall group of continuing active members. We also excluded members with less than one year of service.

Economic Assumptions

The following chart shows the actual and expected salary increases for 2004 to 2008 in 5-year age bands, for service in the 10-year select period and for service beyond the 10-year select period, and compares them with what would have been expected under the current assumptions.

Age Group	Service < 10 Years			Service >= 10 Years			Total		
	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average
19-24	3,021	14.10%	8.11%	0			3,021	14.10%	8.11%
25-29	28,081	8.81%	7.54%	0			28,081	8.81%	7.54%
30-34	28,691	7.54%	6.79%	3,456	7.16%	5.50%	32,147	7.50%	6.65%
35-39	16,117	8.11%	6.77%	17,490	6.34%	5.44%	33,607	7.19%	6.08%
40-44	11,487	8.15%	6.49%	19,888	5.15%	4.99%	31,375	6.25%	5.54%
45-49	10,787	7.75%	6.06%	22,768	4.43%	4.56%	33,555	5.50%	5.04%
50-54	8,799	6.54%	5.97%	32,569	3.83%	4.50%	41,368	4.41%	4.81%
55-59	5,655	5.44%	6.03%	28,933	3.55%	4.54%	34,588	3.86%	4.78%
60-64	2,210	5.61%	6.55%	6,733	3.58%	4.93%	8,943	4.08%	5.33%
65-69	598	6.98%	7.05%	685	3.91%	5.20%	1,283	5.34%	6.06%
70 +	213	4.32%	7.26%	109	3.92%	5.20%	322	4.18%	6.56%
Total	**115,659**	**7.95%**	**6.80%**	**132,631**	**4.48%**	**4.77%**	**248,290**	**6.20%**	**5.72%**

Economic Assumptions

The actual experience shows that the current assumption is too low during the 10 year select period for most ages. For service beyond 10 years, the current assumption is too high at later ages. The observed salary increases tended to correlate more closely to service than age. Therefore, we are recommending a service based table.

A summary of current and recommended salary increase assumptions is shown below:

Service	Exposures	Observed Average	Expected Average	Proposed Average
1	13,462	14.75%	7.98%	12.00%
2	16,357	8.97%	7.64%	9.00%
3	13,959	6.93%	7.34%	8.00%
4	13,023	7.15%	7.03%	7.50%
5	12,970	6.99%	6.73%	7.25%
6	12,440	6.86%	6.42%	7.00%
7	12,074	6.95%	6.10%	6.85%
8	11,322	6.74%	5.78%	6.70%
9	10,052	6.88%	5.44%	6.55%
10	9,356	6.64%	5.11%	6.40%
11	9,086	6.37%	5.08%	6.25%
12	8,659	5.77%	5.04%	6.00%
13	8,111	5.78%	4.99%	5.75%
14	7,612	5.47%	4.94%	5.50%
15	6,891	5.00%	4.87%	5.25%
16	6,415	4.61%	4.81%	5.00%
17	6,152	4.08%	4.76%	4.75%
18	5,796	4.31%	4.72%	4.50%
19	5,474	3.97%	4.68%	4.25%
20	5,054	4.34%	4.65%	4.00%
21	4,506	4.10%	4.62%	3.90%
22	4,023	3.76%	4.59%	3.80%
23	3,685	3.77%	4.57%	3.70%
24	3,626	3.67%	4.55%	3.60%
25	3,962	3.41%	4.54%	3.50%
26	4,247	3.29%	4.54%	3.50%
27	4,311	3.33%	4.54%	3.50%
28	4,370	3.25%	4.54%	3.50%
29	4,168	3.28%	4.53%	3.50%
30	4,025	3.15%	4.53%	3.50%
31+	13,102	2.93%	4.58%	3.50%
Total	**248,290**	**6.20%**	**5.72%**	**6.21%**

Economic Assumptions

Investment Return

The assumed rate of investment return is used to discount the future expected benefit payments from the retirement plan to the valuation date. As such, it is one of the most important assumptions used in valuing the plan's liabilities and developing contribution rates. The assumption is intended to reflect the long-term expected return on the portfolio of assets that fund the benefits.

Investment return assumptions can be calculated using an arithmetic or geometric approach. In any given year, the approaches produce the same result. But when viewed over a period of time, the difference in approach can become significant. For example, consider a pension plan that earned 16% in the first year, and then earned nothing in the second year. The arithmetic average return is calculated by adding 16% plus 0%, and then dividing by 2, to get 8%. But this result is misleading. If the plan started with $1,000, then at the end of the period it would have $1,160. But if it had actually earned 8% each year, it would have had $1,166 [$1,000 times 1.08 times 1.08.] The actual average return, calculated on a compound (geometric) basis is 7.7% [$1,000 times 1.077 times 1.077 equals $1,160.] Unless the assets earn the same rate of return every year, geometric return will always be less than arithmetic return. Because the actuarial investment return assumption is used to project compound growth in assets over many years, it needs to be a geometric return assumption.

To develop our recommended investment return assumption, we use Mercer Investment Consulting's long-term return assumptions for each of the asset classes in which the plan is invested. Each asset class assumption is based on a consistent set of underlying assumptions, including the inflation assumption, which is currently 2.8%. These assumptions are not based on historical returns, but instead are based on a forward-looking economic model.

We then increase the returns to reflect the difference between the 2.8% underlying inflation expectation and our 3.0% best estimate used elsewhere in the valuation. Although the recent potentially inflationary spending increases our expected long term inflation by 0.2%, the economic stimulus package's infusion of capital into the marketplace will increase the supply of funds and therefore reduce the cost of capital (i.e. investment returns). While predicting the exact effect of the increased supply is impossible, a reasonable estimate is that half the increase in the inflation rate will be realized in investment returns. As such the net increase in expected return for the additional inflation/capital supply is 0.1%.

The result of our best estimate investment return calculation is 8.1%, and we would be comfortable using that assumption. However, such an assumption implies far more precision than is possible. Rates are frequently rounded to the nearest quarter percent, and as such **we suggest that 8.0% be adopted as the investment return assumption**.

Economic Assumptions

Investment Return Risk

The assets of the plan are invested in non risk-free securities. As such, future taxpayers are taking the risk associated with deviation from expected returns. Using a median expected return assumption balances the likely upside and downside risk, but does not compensate those taxpayers for taking risk. Using an expected return assumption higher than the median shifts the balance so that future taxpayers are more likely to experience cost increases than decreases. Using an expected return assumption lower than the median shifts the balance so that future taxpayers are more likely to experience cost decreases than increases, although some of the decrease could be viewed as compensation for the risk being taken.

Details of our calculations are shown on the following pages.

Target Asset Allocation

We understand the plan's target asset allocation is as follows:

Target Asset Allocation

- ■ U.S. Equity
- ■ Alternative Investments
- ■ Cash
- ■ International Equity
- ■ Fixed Income
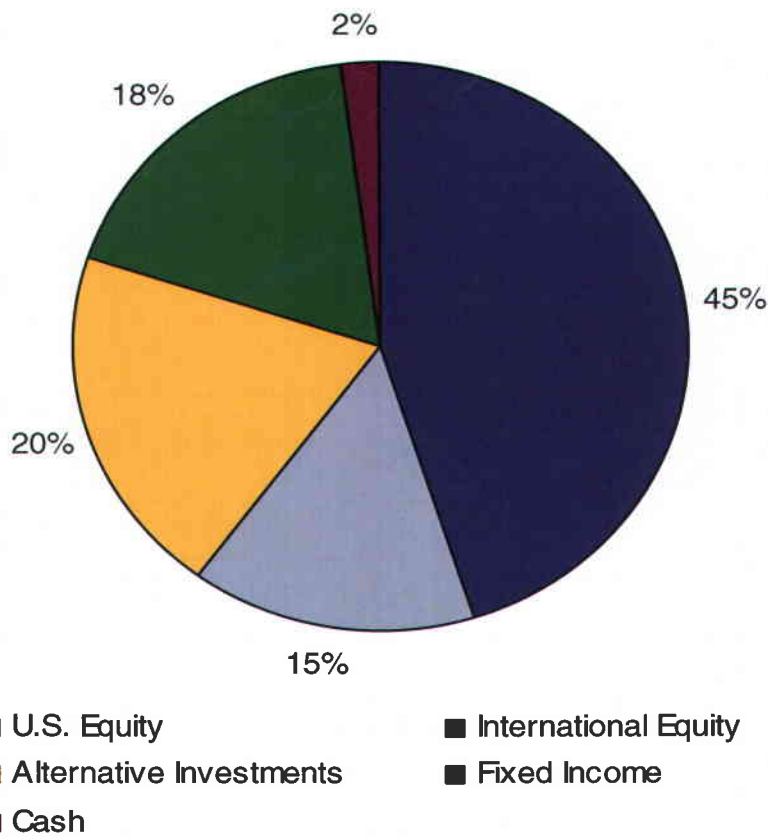
Economic Assumptions

Best Estimate Investment Return Development

Based on the target allocation and investment return assumptions for each of the asset classes, our best estimate assumption is developed as follows:

Asset Class	Target Allocation	Annual Geometric Return	Annual Arithmetic Return	Standard Deviation
U.S. Equity – Large Cap	42.6%	8.2%	9.6%	17.9%
U.S. Equity – Small Cap	2.4%	8.5%	11.0%	24.0%
Private Equity	10.6%	9.6%	13.0%	28.4%
Mezzanine Debt	4.1%	8.5%	10.2%	19.4%
International Equity	12.0%	8.4%	9.9%	18.4%
Emerging Markets Equity	3.0%	8.4%	11.3%	26.0%
U.S. Fixed Income	18.0%	4.7%	4.8%	5.5%
Real Estate	3.8%	7.4%	8.2%	13.7%
Resource	1.5%	4.6%	6.1%	18.0%
Cash	2.0%	3.5%	3.5%	1.3%
Portfolio – Gross	**100%**	**8.2%**	**9.0%**	**13.3%**

Based on capital market expectations developed by Mercer Investment Consulting as of January 1, 2009.

Gross Geometric Expected Return	8.2%
Increase in Expected Return from Net Inflation/Capital Supply Adjustment Described Above	0.1%
Assumed Investment Expenses	(0.2%)
Net Geometric Expected Return – Best Estimate	8.1%

Economic Assumptions

Best Estimate Range

At Mercer, once the actuary develops the expected return assumption in accordance with the requirements of ASOP No. 27, an independent verification is performed by comparing the expected return to the range of returns developed using Mercer's Portfolio Return Calculator and the asset class returns developed by Mercer Investment Consulting (MIC) as of January 1, 2009. Our best-estimate range under our assumptions is from 7.0% to 9.3% with a median expected return of 8.1%.

Percentile	Net Investment Return
35th	7.0%
40th	7.4%
45th	7.7%
50th	8.1%
55th	8.5%
60th	8.9%
65th	9.3%

Using MIC's asset class returns, the current assumption of 8.5% represents approximately the 55th percentile of expected returns for the portfolio. This means that there is a 55% probability that asset returns will be less than 8.5% and a 45% probability that asset returns will be greater than 8.5%.

Additional Details

Following are details of the development of our best estimate investment return assumption. The calculation is based on the following parameters:

- **U.S. Equity** – Based on target percentages of 94.7% large cap and 5.3% small cap[1].
- **International Equity** – 20% of the allocation is assumed to be emerging markets equity.
- **Fixed Income** – Based on a benchmark of the Barclays Aggregate[1].
- **Alternative Investments** – The current actual alternative investment allocation is as follows: 9.2% Private Equity, 3.3% Real Estate, 3.5% Mezzanine Debt, and 1.3% Resource, for a total of 17.3% alternative investments[1]. In our best estimate development, we use the target alternative investment allocation of 20% and assume the proportions of the types of alternative investments remain the same.
  - **Mezzanine Debt** – Mercer Investment Consulting does not develop capital market assumptions for Mezzanine Debt. We used the return and standard deviation assumptions for Mezzanine Private Equity as a proxy.
  - **Resource** – We used the return and standard deviation assumptions for Commodities for this asset class.
- **Expenses** – Plan expenses paid out of the trust need to be taken into account when determining plan costs, either through a reduction in the expected return on assets, or through an explicit load in the calculation of the plan's normal cost. Plan expenses fall into two categories, administrative expenses and investment management and trustee fees.

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[1] Information provided by Howard Bicker in a memo dated April 16, 2009.

Economic Assumptions

- **Administrative expenses** – These expenses are taken into account through an explicit load in the calculation of the plan's normal cost, so no adjustment needs to be made to the expected return on plan assets.
- **Investment management and trustee fees** – We assume 20 basis points in expenses based on passive investments. To the extent the plan is not invested in passive funds, we assume the alpha for active management is equal to the additional fees for active management above the typical fees for passive management.

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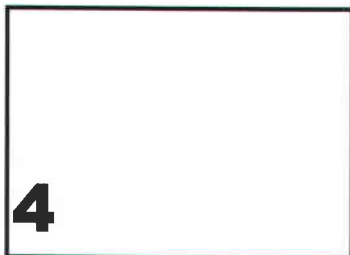
Demographic Assumptions

Overview

Actuarial Standard of Practice (ASOP) No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations,* provides guidance on selecting demographic assumptions used in measuring obligations under defined benefit pension plans. The general process for recommending demographic assumptions as defined in ASOP No. 35 is as follows:

- Identify the types of assumptions;
- Consider the relevant assumption universe;
- Consider the assumption format;
- Select the specific assumptions; and
- Evaluate the reasonableness of the selected assumption.

The purpose of the demographic experience study is to compare actual experience against expected experience based on the assumptions used in the most recent actuarial valuation. The observation period used in this study is July 1, 2004 through June 30, 2008, and the current assumptions are those adopted by the LCPR for the June 30, 2008 actuarial valuation. If the actual experience differs significantly from the overall expected experience, if the pattern of actual decrements by age, sex, or duration does not follow the expected pattern, or if experience is expected to change, new assumptions are considered.

Demographic Assumptions

The demographic assumptions used for the June 30, 2008, actuarial valuation and the recommended assumptions for the June 30, 2009, actuarial valuation are shown in detail in the following sections.

A summary of the recommended changes are as follows:

- Change in the healthy retiree mortality assumption to a more recent mortality table
- Change in the disabled retiree mortality assumption to a more recent mortality table
- Change in the healthy pre-retirement mortality assumption to a more recent mortality table
- Reduction in both Rule of 90 and regular retirement rates
- Adjustments to beneficiary age and option form election assumption
- Reduction in the disability incidence assumptions for males
- Change in the termination assumption to a service based assumption.

The recommended assumptions, in our opinion, were selected in a manner consistent with the requirements of ASOP No. 35.

Demographic Assumptions

Mortality Assumptions

Mortality rates are used to project the length of time benefits will be paid to current and future retirees and beneficiaries. The selection of a mortality assumption affects plan liabilities because the value of retiree benefits depends on how long the benefit payments are expected to continue. There are clear differences in the mortality rates among males and females, healthy retired members, disabled retired members and non-retired members. As a result, each of these groups is reviewed independently.

A summary of the current and recommended mortality rates is shown below:

Assumption	Current Assumption	Recommended Assumption
Post-retirement Mortality for Healthy Lives	1983 Group Annuity Mortality	RP2000 annuitant generational mortality, white collar adjustment
Males	Male rates set back 6 years	Male rates set back 2 years
Females	Female rates set back 3 years	Female rates set back 3 years
Post-retirement Mortality for Disabled Lives	1965 Railroad Retirement Board (RRB) rates through age 54. For ages 55 to 64, graded between 1965 RRB rates and the health postretirement mortality table. For ages 65 and later, the healthy postretirement mortality table.	RP2000 disabled retiree mortality, without adjustment
Pre-retirement Mortality for Healthy Lives	1983 Group Annuity Mortality	RP2000 non-annuitant generational mortality, white collar adjustment
Males	Male rates set back 12 years	Male rates set back 5 years
Females	Female rates set back 10 years	Female rates set back 7 years

Few pension plans are large enough to base the mortality assumption solely on actual plan experience. In most cases a standard published table is used as the basis for predicting future mortality experience.

A generational mortality table anticipates future improvements in mortality by using a different static mortality table for each year of birth, with the tables for later years of birth assuming lower mortality than the tables for earlier years of birth. The table contains built in mortality improvements; that is, a member that turns 65 in 2030 has a longer life expectancy than a member that turns 65 in 2000.

The RP2000 generation mortality table, published by the Society of Actuaries, has a number of adjustments that can be applied to match the mortality rates of TRA. In the past a "set back" was applied to adjust the mortality rates. A "set back" 1 year, for example, treats all members as if they were 1 year younger than they really are when applying the mortality table. In addition to a "set back", we have applied a collar adjustment as defined in the RP2000 table. Essentially, a "white collar" adjustment further reduces the rates of mortality while a "blue collar" adjustment increases the rates of mortality. Please note that "white collar" and "blue collar" are used in this context only to describe the adjustments made to the RP2000 generational mortality table and are not intended to classify any employees as either "blue collar" or "white collar".

Demographic Assumptions

Postretirement Mortality for Healthy Lives

Mortality assumptions for healthy retired members are separated based on gender.

Life expectancies are expected to improve in the future, and this increased longevity should be reflected in the actuarial valuation through lower mortality rates than indicated by current experience. To determine whether the current mortality assumption remains reasonable, we calculated the ratio of actual to expected (A/E) deaths during the experience study period for each of the gender groups. For a static mortality table such as the current assumption, A/E ratios are targeted at or near 110 percent, in order to provide a margin for future mortality improvement. For a generational mortality table that incorporates improvements in mortality each year into the future, A/E ratios are targeted near 100%. If the group's A/E ratio was significantly below these thresholds, we would recommend a change to bring that A/E ratio close to the thresholds.

The following chart shows the exposures, actual deaths, expected deaths and actual to expected ratios for males and females for each of the four years in the experience study.

Postretirement Mortality for Healthy Lives	Exposures	Actual Deaths	Current (June 30, 2008) Assumption	
			Expected Deaths	**A/E Ratio**
Males				
July 1, 2004 to June 30, 2005	16,755	400	301	133%
July 1, 2005 to June 30, 2006	17,222	386	321	120%
July 1, 2006 to June 30, 2007	17,791	370	342	108%
July 1, 2007 to June 30, 2008	18,169	348	361	96%
July 1, 2004 to June 30, 2008	**69,937**	**1,504**	**1,325**	**114%**
Females				
July 1, 2004 to June 30, 2005	20,047	546	415	132%
July 1, 2005 to June 30, 2006	20,749	463	423	110%
July 1, 2006 to June 30, 2007	22,089	504	444	113%
July 1, 2007 to June 30, 2008	22,869	491	453	108%
July 1, 2004 to June 30, 2008	**85,754**	**2,004**	**1,735**	**116%**

The actual experience shows that the current assumption for male and female retirees is predicting too few retiree deaths. Given that the current table is based on experience that is over a quarter century old, we are recommending a change to the RP2000 generational white collar mortality tables for annuitants with a two year setback for males and a three year setback for females. The setback results in lower mortality rates than the standard table rates.

Demographic Assumptions

The following chart shows the exposures, actual deaths, expected deaths under the proposed assumption and actual to expected ratios for males and females for each of the four years in the experience study.

Postretirement Mortality for Healthy Lives	Exposures	Actual Deaths	Proposed Assumption	
			Expected Deaths	A/E Ratio
Males				
July 1, 2004 to June 30, 2005	16,755	400	333	120%
July 1, 2005 to June 30, 2006	17,222	386	352	110%
July 1, 2006 to June 30, 2007	17,791	370	372	99%
July 1, 2007 to June 30, 2008	18,169	348	389	89%
July 1, 2004 to June 30, 2008	**69,937**	**1,504**	**1,446**	**104%**
Females				
July 1, 2004 to June 30, 2005	20,047	546	450	121%
July 1, 2005 to June 30, 2006	20,749	463	456	102%
July 1, 2006 to June 30, 2007	22,089	504	477	106%
July 1, 2007 to June 30, 2008	22,869	491	484	101%
July 1, 2004 to June 30, 2008	**85,754**	**2,004**	**1,867**	**107%**

A summary of the current and recommended healthy retired mortality assumptions is shown below:

Postretirement Mortality for Healthy Lives	Current (June 30, 2008) Assumption	Recommended Assumption
Basic Tables	1983 Group Annuity Mortality	RP2000 annuitant generational mortality, white collar adjustment
Males	Male rates set back 6 years	Male rates set back 2 years
Females	Female rates set back 3 years	Female rate set back 3 years

Post-retirement Mortality for Disabled Lives (through age 65)

Disabled members are expected to have a shorter life expectancy than healthy retired members. In addition, future life expectancies for disabled members are not expected to increase as significantly as the future life expectancies for healthy retirees. As a result, A/E ratios for disabled retirees have been targeted near 100 percent. Note that TRA converts disability retirees to regular retirees at normal retirement age, so this assumption only applies prior to age 65.

Demographic Assumptions

The following chart shows the exposures, actual deaths, expected deaths and actual to expected ratios for males and females for each of the years in the experience study.

Post-retirement Mortality for Disabled Lives	Exposures	Actual Deaths	Current (June 30, 2008) Assumption	
			Expected Deaths	**A/E Ratio**
Males				
July 1, 2004 to June 30, 2005	200	7	7	100%
July 1, 2005 to June 30, 2006	194	3	6	50%
July 1, 2006 to June 30, 2007	193	4	6	67%
July 1, 2007 to June 30, 2008	180	3	5	60%
July 1, 2004 to June 30, 2008	**767**	**17**	**24**	**71%**
Females				
July 1, 2004 to June 30, 2005	376	8	13	62%
July 1, 2005 to June 30, 2006	370	9	13	69%
July 1, 2006 to June 30, 2007	389	14	14	100%
July 1, 2007 to June 30, 2008	395	10	13	77%
July 1, 2004 to June 30, 2008	**1,530**	**41**	**53**	**77%**

Discussion

The actual experience shows that the current assumption for disabled retirees is predicting too many deaths.

However, the small sampling does not represent enough data to make a reasonable analysis of projected mortality rates. Our recommendation is that TRA adopt a current standard published table rather than attempt to fit a table to TRA's specific experience.

We are recommending a change to the RP2000 disabled mortality table.

Demographic Assumptions

The following chart shows the exposures, actual deaths, expected deaths under the proposed assumption and actual to expected ratios for males and females for each of the four years in the experience study.

Post-retirement Mortality for Disabled Lives	Exposures	Actual Deaths	Proposed Assumption	
			Expected Deaths	A/E Ratio
Males				
July 1, 2004 to June 30, 2005	200	7	8	88%
July 1, 2005 to June 30, 2006	194	3	8	38%
July 1, 2006 to June 30, 2007	193	4	8	50%
July 1, 2007 to June 30, 2008	180	3	8	38%
July 1, 2004 to June 30, 2008	**767**	**17**	**32**	**53%**
Females				
July 1, 2004 to June 30, 2005	376	8	7	114%
July 1, 2005 to June 30, 2006	370	9	7	129%
July 1, 2006 to June 30, 2007	389	14	7	200%
July 1, 2007 to June 30, 2008	395	10	8	125%
July 1, 2004 to June 30, 2008	**1,530**	**41**	**29**	**141%**

A summary of current and recommended disabled retiree mortality assumptions is shown below:

Disabled Retired Mortality	Current Assumption	Recommended Assumption
Basic Tables	1965 RRB rates through age 54. For ages 55 to 64, graded rates between 1965 RRB rates and the healthy postretirement mortality table. For ages 65 and later, the healthy postretirement mortality table.	RP2000 disabled retiree mortality table, without adjustment.

Demographic Assumptions

Pre-retirement Mortality for Healthy Lives

The pre-retirement mortality assumption applies to healthy active members and inactive members (those members who have terminated employment but are vested and entitled to a future benefit). The current pre-retirement mortality assumption is based on 1983 Group Annuity Mortality. A/E ratios for non-retired members have been targeted around 100 percent.

The following chart shows the exposures, actual deaths, expected deaths and actual to expected ratios for males and females for the last two years in the experience study. Preretirement mortality data was not available for the first two years of the experience period.

Pre-retirement Mortality for Healthy Lives			Current (June 30, 2008) Assumption	
	Exposures	**Actual Deaths**	**Expected Deaths**	**A/E Ratio**
Males				
July 1, 2006 to June 30, 2007	22,612	26	27	96%
July 1, 2007 to June 30, 2008	22,316	19	27	70%
July 1, 2006 to June 30, 2008	**44,928**	**45**	**54**	**83%**
Females				
July 1, 2006 to June 30, 2007	59,556	35	38	92%
July 1, 2007 to June 30, 2008	59,693	46	39	118%
July 1, 2006 to June 30, 2008	**119,249**	**81**	**77**	**105%**

Demographic Assumptions

Discussion

With the very limited number of deaths in the experience period, the A/E ratio tends to fluctuate year to year. Similar to our recommended change to healthy post-retirement mortality, we are recommending a change to the RP2000 generational white collar mortality tables for non-annuitants, but with a set back 5 years for males and set back 7 years for females. The setback results in lower mortality rates for males and females than the standard table rates.

The following chart shows the exposures, actual deaths, expected deaths under the proposed assumption and actual to expected ratios for males and females for the last two years in the experience study.

Pre-retirement Mortality for Healthy Lives	Exposures	Actual Deaths	Proposed Assumption	
			Expected Deaths	A/E Ratio
Males				
July 1, 2006 to June 30, 2007	22,612	26	23	113%
July 1, 2007 to June 30, 2008	22,316	19	22	86%
July 1, 2006 to June 30, 2008	**44,928**	**45**	**45**	**100%**
Females				
July 1, 2006 to June 30, 2007	59,556	35	41	85%
July 1, 2007 to June 30, 2008	59,693	46	41	112%
July 1, 2006 to June 30, 2008	**119,249**	**81**	**82**	**99%**

A summary of the current and recommended pre-retirement mortality assumptions is shown below:

Pre-retirement Mortality for Healthy Lives	Current (June 30, 2008) Assumption	Recommended Assumption
Basic Tables	1983 Group Annuity Mortality	RP2000 non-annuitant generational mortality, white collar adjustment
Males	Male rates set back 12 years	Males rates set back 5 years
Females	Female rates set back 10 years	Female rates set back 7 years

Demographic Assumptions

Retirement Assumptions

The retirement assumptions used in the actuarial valuation include the following assumptions:
- Rule of 90 retirement from active status
- Regular retirement from active status
- Retirement from inactive status

Retirement from Active Status
Members are eligible to retire as early as age 55 or earlier if the member has met the Rule of 90 provision and was hired prior to July 1, 1989.

A summary of the early, normal, and unreduced retirement dates under the plan are as follows:

Hire Date	Normal Retirement Age	Early Retirement Age	Unreduced Retirement
Before July 1, 1989	Age 65 and 3 years	Age 55 and 3 years of service, or 30 years of service	Rule of 90 or Age 62 with 30 years of service
July 1, 1989 or later	Social Security Normal Retirement Age, but not later than 66 with 1 year of service	Age 55 and 3 years of service	N/A

In prior experience studies, it was observed that members exhibited different retirement patterns based on eligibility for Rule of 90 unreduced benefits. As a result, we completed separate analyses for these two groups. The following chart shows the exposures, actual retirements, expected retirements and actual to expected ratios for each of the years in the experience study for Rule of 90 retirements.

Rule of 90 Retirements	Exposures	Actual Retirements	Current (June 30, 2008) Assumption	
			Expected Retirements	A/E Ratio
Total				
July 1, 2004 to June 30, 2005	2,235	785	1,198	66%
July 1, 2005 to June 30, 2006	2,758	1,119	1,461	77%
July 1, 2006 to June 30, 2007	2,852	1,141	1,500	76%
July 1, 2007 to June 30, 2008	2,915	1,069	1,528	70%
July 1, 2004 to June 30, 2008	**10,760**	**4,114**	**5,687**	**72%**

Demographic Assumptions

The following chart shows the exposures, actual retirements, expected retirements and actual to expected ratios for each of the years in the experience study for Non-Rule of 90 retirements.

Non-Rule of 90 Retirements	Exposures	Actual Retirements	Current (June 30, 2008) Assumption	
			Expected Retirements	A/E Ratio
Total				
July 1, 2004 to June 30, 2005	9,407	779	994	78%
July 1, 2005 to June 30, 2006	10,045	1,069	1,092	98%
July 1, 2006 to June 30, 2007	10,524	1,137	1,173	97%
July 1, 2007 to June 30, 2008	10,751	1,018	1,235	82%
July 1, 2004 to June 30, 2008	**40,727**	**4,003**	**4,494**	**89%**

Discussion

For both groups, the actual number of retirements was significantly less than predicted. As a result, we are recommending changes to both tables to more closely match the actual experience.

Note that the prior experience study showed more Rule of 90 retirements than expected, and rates were increased. We are now recommending reductions in the Rule of 90 rates to reflect more recent experience, which shows a change in behavior since the last experience study. Our recommended rates also reflect anticipated future changes in retirement patterns.

Recent legislation raised the salary amount that retired members can earn without affecting the receipt of their retirement benefit. This legislation could affect retirement patterns; we recommend that retirement experience be monitored, and that this legislation be considered in future analysis of retirement rates.

Demographic Assumptions

The following charts show the exposures, actual retirements, expected retirements under the proposed assumption and actual to expected ratios for each of the years in the experience study for Rule of 90 and non Rule of 90 retirements.

| | | | Proposed Assumption | |
| | | **Actual** | **Expected** | |
Rule of 90 Retirements	**Exposures**	**Retirements**	**Retirements**	**A/E Ratio**
Total				
July 1, 2004 to June 30, 2005	2,235	785	864	91%
July 1, 2005 to June 30, 2006	2,758	1,119	1,050	107%
July 1, 2006 to June 30, 2007	2,852	1,141	1,074	106%
July 1, 2007 to June 30, 2008	2,915	1,069	1,093	98%
July 1, 2004 to June 30, 2008	**10,760**	**4,114**	**4,081**	**101%**

| | | | Proposed Assumption | |
| | | **Actual** | **Expected** | |
Non-Rule of 90 Retirements	**Exposures**	**Retirements**	**Retirements**	**A/E Ratio**
Total				
July 1, 2004 to June 30, 2005	9,407	779	918	85%
July 1, 2005 to June 30, 2006	10,045	1,069	1,009	106%
July 1, 2006 to June 30, 2007	10,524	1,137	1,081	105%
July 1, 2007 to June 30, 2008	10,751	1,018	1,137	90%
July 1, 2004 to June 30, 2008	**40,727**	**4,003**	**4,145**	**97%**

Demographic Assumptions

Summary of Recommended Retirement Rates

Age	Rule of 90		Non-Rule of 90	
	Current	Recommended	Current	Recommended
55	50%	45%	7%	6%
56	60%	45%	7%	7%
57	55%	40%	7%	7%
58	50%	35%	8%	8%
59	50%	35%	10%	10%
60	50%	35%	12%	12%
61	50%	35%	18%	15%
62	50%	35%	20%	20%
63	50%	35%	20%	15%
64	50%	35%	20%	20%
65	50%	35%	45%	35%
66	35%	30%	35%	30%
67	35%	30%	35%	30%
68	35%	30%	35%	30%
69	35%	30%	35%	30%
70	35%	30%	35%	30%
71	100%	100%	100%	100%

Retirement from Inactive Status

Members who terminate after completing three years of service are vested and entitled to either a refund of their employee contributions with interest, or a deferred retirement benefit. The valuation currently assumes that members will elect a refund if it is more valuable than the deferred annuity. For those inactive members for whom the deferred retirement benefit is more valuable than a refund, the valuation assumes the benefit will commence at normal retirement age. If actual commencement is earlier, benefits are actuarially reduced. We recommend no changes to these assumptions.

Demographic Assumptions

Retirement Statistics

The retirement statistics used in the actuarial valuation include the following assumptions:

- Marital status (% married)
- Age of beneficiary
- Annuity form elected at retirement

Marital Status

The current (June 30, 2008) valuation assumption is 85% of male members and 65% of female members are married.

The data reported to us does not contain a marital status; beneficiary date of birth is only reported for those retirees that elect a joint and survivor form of payment. Since we do not have sufficient information to analyze the marital status of plan members, we recommend no change to the 85% married for males and 65% married for females.

We also recommend that marital status data be provided by TRA and analyzed in the next experience study.

Age of Beneficiary

Joint & Survivor annuity benefit amounts are determined based on the member's and beneficiary's age. The current (June 30, 2008) valuation assumption is that males are three years older than females. The following chart shows the current assumed age difference and the observed experience for members that elected a joint and survivor annuity. For purposes of this analysis, we excluded age differences of 20 years or more on the assumption that the vast majority of those included child, not spouse, beneficiaries.

	Total New Retirees	Average Age Difference	Current (June 30, 2008) Assumption	
			Expected Age Difference	A - E
Males				
July 1, 2004 to June 30, 2005	739	2.28	3.00	(0.72)
July 1, 2005 to June 30, 2006	816	2.06	3.00	(0.94)
July 1, 2006 to June 30, 2007	787	1.94	3.00	(1.06)
July 1, 2007 to June 30, 2008	745	2.31	3.00	(0.69)
July 1, 2004 to June 30, 2008	**3,087**	**2.14**	**3.00**	**(0.86)**
Females				
July 1, 2004 to June 30, 2005	1,053	(1.43)	(3.00)	1.57
July 1, 2005 to June 30, 2006	1,422	(1.20)	(3.00)	1.80
July 1, 2006 to June 30, 2007	1,458	(1.38)	(3.00)	1.62
July 1, 2007 to June 30, 2008	1,501	(1.46)	(3.00)	1.54
July 1, 2004 to June 30, 2008	**5,434**	**(1.36)**	**(3.00)**	**1.64**

We recommend changing the age difference assumption from 3 years to 2 years for both males and females.

Demographic Assumptions

Annuity Form

Upon retirement, a member can elect any of the following forms of payment:

- Straight life annuity – the benefit is paid for the lifetime of the member. No benefit is payable to a beneficiary upon member's death.

- 15-Year Certain and Life – a reduced benefit is paid for the lifetime of the member. If the member dies before 180 payments have been made, the benefit continues to be paid to a beneficiary until 180 payments have been made.

- 50% Joint & Survivor – a reduced benefit is paid for the lifetime of the member. Upon death of the member, 50% of the benefit is paid to a beneficiary. If the beneficiary predeceases the member, the benefit reverts back to the straight life annuity amount.

- 75% Joint & Survivor – a reduced benefit is paid for the lifetime of the member. Upon death of the member, 75% of the benefit is paid to a beneficiary. If the beneficiary predeceases the member, the benefit reverts back to the straight life annuity amount.

- 100% Joint & Survivor – a reduced benefit is paid for the lifetime of the member. Upon death of the member, 100% of the benefit is paid to a beneficiary. If the beneficiary predeceases the member, the benefit reverts back to the straight life annuity amount.

Demographic Assumptions

Annuity Form

The following chart shows the current assumed annuity selection and the observed experience:

New Retirees from July 1, 2004 to June 30, 2008	Total New Retirees	Assumed Percent Married	Assumed Married New Retirees	Actual Electing Annuity Form	Current (June 30, 2008) Assumption	
					Actual Percent Electing Annuity Form	Expected Percent Electing Annuity Form
Males						
15-Year Certain and Life	3,087	85%	2,624	45	1.7%	0%
50% Joint & Survivor	3,087	85%	2,624	305	10.7%	15%
75% Joint & Survivor	3,087	85%	2,624	355	13.4%	25%
100% Joint & Survivor	3,087	85%	2,624	1,835	69.7%	55%
Females						
15-Year Certain and Life	5,434	65%	3,532	168	4.7%	0%
50% Joint & Survivor	5,434	65%	3,532	704	17.5%	20%
75% Joint & Survivor	5,434	65%	3,532	436	12.0%	10%
100% Joint & Survivor	5,434	65%	3,532	1,866	52.7%	30%

The assumed Straight Life annuity selection is the sum of 100% of the non-married retirees plus those married retirees that are not assumed to elect a joint and survivor form of payment.

We recommend the following changes to the annuity selection assumption:

	Percent of Married Members Electing			
	Current (June 30, 2008)		Recommended	
Annuity Form	Males	Females	Males	Females
Straight Life	5%	40%	5%	20%
15-Year Certain and Life	0%	0%	0%	0%
50% Joint & Survivor	15%	20%	10%	20%
75% Joint & Survivor	25%	10%	15%	10%
100% Joint & Survivor	55%	30%	70%	50%

Note that the increased utilization of the subsidized Joint and Survivor options would be expected to increase costs modestly.

Demographic Assumptions

Disability Assumptions
The Plan provides disability benefits to members. Members are eligible for disability benefits if they become totally and permanently disabled after three years of service but prior to normal retirement eligibility.

Disability Retirement

We analyzed disability incidence rates as a single group covering all members, with rates developed for each age.

The following chart shows the exposures, actual retirements, expected retirements under the current assumption and actual to expected ratios for males and females for each of the years in the experience study for disability retirements.

| | | | Current (June 30, 2008) Assumption | |
Disability Retirement	Exposures	Actual Retirements	Expected Retirements	A/E Ratio
Males				
July 1, 2004 to June 30, 2005	19,755	17	20	85%
July 1, 2005 to June 30, 2006	20,038	16	20	80%
July 1, 2006 to June 30, 2007	19,768	9	19	47%
July 1, 2007 to June 30, 2008	19,308	15	19	79%
July 1, 2004 to June 30, 2008	**78,869**	**57**	**78**	**73%**
Females				
July 1, 2004 to June 30, 2005	48,965	26	37	70%
July 1, 2005 to June 30, 2006	51,178	58	39	149%
July 1, 2006 to June 30, 2007	51,774	39	39	100%
July 1, 2007 to June 30, 2008	51,181	36	39	92%
July 1, 2004 to June 30, 2008	**203,098**	**159**	**154**	**103%**

Demographic Assumptions

Discussion

The actual experience shows that the current assumption for males is predicting too many disabilities. The results demonstrate that the rates of disability are not statistically different between males and females. Because the current female table has been historically accurate, we are recommending a change in this assumption to use the current female table for both males and females.

The following chart shows the exposures, actual retirements, expected retirements under the proposed assumption and actual to expected ratios for males and females for each of the years in the experience study for disability retirements.

| | | | Proposed Assumption | |
Disability Retirement	Exposures	Actual Retirements	Expected Retirements	A/E Ratio
Males				
July 1, 2004 to June 30, 2005	19,755	17	16	106%
July 1, 2005 to June 30, 2006	20,038	16	16	100%
July 1, 2006 to June 30, 2007	19,768	9	15	60%
July 1, 2007 to June 30, 2008	19,308	15	15	100%
July 1, 2004 to June 30, 2008	**78,869**	**57**	**62**	**92%**
Females				
July 1, 2004 to June 30, 2005	48,965	26	37	70%
July 1, 2005 to June 30, 2006	51,178	58	39	149%
July 1, 2006 to June 30, 2007	51,774	39	39	100%
July 1, 2007 to June 30, 2008	51,181	36	39	92%
July 1, 2004 to June 30, 2008	**203,098**	**159**	**154**	**103%**

Demographic Assumptions

Termination Assumptions

The termination assumptions used in the actuarial valuation include an assumption for termination from active status prior to retirement eligibility because not all active members are expected to continue working until retirement. Termination rates represent the probabilities that a member at any given age will leave employment at that age. Current termination rates for members are developed by gender on an ultimate basis with a 3-year select period.

The following chart shows the exposures, actual terminations, expected terminations under the current assumption and actual to expected ratios for males and females for each of the years in the experience study during the three-year select period.

Terminations in 3-year Select Period	Exposures	Actual Terminations	Current (June 30, 2008) Assumption	
			Expected Terminations	A/E Ratio
Males				
July 1, 2004 to June 30, 2005	3,654	851	755	113%
July 1, 2005 to June 30, 2006	3,581	732	714	103%
July 1, 2006 to June 30, 2007	3,473	860	624	138%
July 1, 2007 to June 30, 2008	3,392	705	657	107%
July 1, 2004 to June 30, 2008	**14,100**	**3,148**	**2,750**	**114%**
Females				
July 1, 2004 to June 30, 2005	11,043	2,273	2,071	110%
July 1, 2005 to June 30, 2006	11,414	2,303	2,044	113%
July 1, 2006 to June 30, 2007	11,593	2,654	1,926	138%
July 1, 2007 to June 30, 2008	11,145	2,204	1,918	115%
July 1, 2004 to June 30, 2008	**45,195**	**9,434**	**7,959**	**119%**

Demographic Assumptions

The following chart shows the exposures, actual terminations, expected terminations and actual to expected ratios for males and females for each of the years in the experience study for withdrawals beyond the 3-year select period.

Terminations beyond 3-year Select Period			Current (June 30, 2008) Assumption	
	Exposures	**Actual Terminations**	**Expected Terminations**	**A/E Ratio**
Males				
July 1, 2004 to June 30, 2005	12,967	214	292	73%
July 1, 2005 to June 30, 2006	13,167	392	297	132%
July 1, 2006 to June 30, 2007	12,946	416	293	142%
July 1, 2007 to June 30, 2008	12,663	320	288	111%
July 1, 2004 to June 30, 2008	**51,743**	**1,342**	**1,170**	**115%**
Females				
July 1, 2004 to June 30, 2005	31,965	688	906	76%
July 1, 2005 to June 30, 2006	32,851	1,169	943	124%
July 1, 2006 to June 30, 2007	32,667	1,482	945	157%
July 1, 2007 to June 30, 2008	32,197	1,088	937	116%
July 1, 2004 to June 30, 2008	**129,680**	**4,427**	**3,732**	**119%**

Demographic Assumptions

Discussion

Our analysis of terminations indicates that the current assumption is predicting too few terminations and that service has a strong influence on terminations, not only during the first three years of employment, but also well beyond the three year select period. As a result, we are recommending revising the basis for the termination assumption to a service based assumption.

The following chart shows the exposures, actual terminations, expected terminations under the proposed assumption and actual to expected ratios for males and females for each of the years in the experience study for withdrawals.

| | | | Proposed Assumption | |
| | | Actual | Expected | |
Terminations	Exposures	Terminations	Terminations	A/E Ratio
Males				
July 1, 2004 to June 30, 2005	16,621	1,065	1,182	90%
July 1, 2005 to June 30, 2006	16,748	1,124	1,154	97%
July 1, 2006 to June 30, 2007	16,419	1,276	1,078	118%
July 1, 2007 to June 30, 2008	16,055	1,025	1,074	95%
July 1, 2004 to June 30, 2008	**65,843**	**4,490**	**4,488**	**100%**
Females				
July 1, 2004 to June 30, 2005	43,008	2,961	3,470	85%
July 1, 2005 to June 30, 2006	44,265	3,472	3,523	99%
July 1, 2006 to June 30, 2007	44,260	4,136	3,449	120%
July 1, 2007 to June 30, 2008	43,342	3,292	3,382	97%
July 1, 2004 to June 30, 2008	**174,875**	**13,861**	**13,824**	**100%**

Summary of Recommended Termination Rates

Females

Age	Current Rates*	Years of Service	Proposed Rates
20	4.50%	0	36.00%
21	4.50%	1	17.00%
22	4.50%	2	12.00%
23	4.50%	3	9.50%
24	4.50%	4	8.00%
25	4.50%	5	6.00%
26	4.50%	6	5.00%
27	4.50%	7	4.00%
28	4.50%	8	3.50%
29	4.50%	9	3.00%
30	4.50%	10	2.50%
31	4.50%	11	2.00%
32	4.50%	12	2.00%
33	4.30%	13	1.50%
34	4.10%	14	1.25%
35	3.90%	15	1.00%
36	3.70%	16	1.00%
37	3.50%	17	1.00%
38	3.25%	18	1.00%
39	3.00%	19	1.00%
40	2.75%	20	1.00%
41	2.50%	21	0.75%
42	2.25%	22	0.75%
43	2.00%	23	0.75%
44	2.15%	24	0.75%
45	2.10%	25	0.50%
46	2.05%	26	0.50%
47	2.00%	27	0.50%
48	1.95%	28	0.50%
49	1.90%	29	0.50%
50	1.85%	>30	0.50%
51	1.80%		
52	1.75%		
53	1.70%		
54	1.65%		

*   Current termination rates for members with less than 3 years of service are 40% in the first year, 10% in the second year and 8% in the third year of employment.

Males

Age	Current Rates**	Years of Service	Proposed Rates
20	3.70%	0	38.00%
21	3.60%	1	20.00%
22	3.50%	2	11.00%
23	3.40%	3	9.00%
24	3.30%	4	8.00%
25	3.20%	5	5.00%
26	3.10%	6	4.00%
27	3.00%	7	3.00%
28	2.90%	8	2.00%
29	2.80%	9	1.80%
30	2.70%	10	1.60%
31	2.60%	11	1.40%
32	2.50%	12	1.20%
33	2.50%	13	1.10%
34	2.50%	14	1.00%
35	2.50%	15	1.00%
36	2.50%	16	1.00%
37	2.50%	17	1.00%
38	2.45%	18	1.00%
39	2.40%	19	0.90%
40	2.35%	20	0.80%
41	2.30%	21	0.70%
42	2.25%	22	0.60%
43	2.20%	23	0.50%
44	2.15%	24	0.50%
45	2.10%	25	0.50%
46	2.05%	26	0.50%
47	2.00%	27	0.50%
48	1.95%	28	0.50%
49	1.90%	29	0.50%
50	1.85%	>30	0.50%
51	1.80%		
52	1.75%		
53	1.70%		
54	1.65%		

** Current termination rates for members with less than 3 years of service are 45% in the first year, 12% in the second year and 6% in the third year of employment.

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Appendix

Data

The experience analysis uses member data from July 1, 2004, through June 30, 2008, which was supplied by Minnesota Teachers Retirement Association and the Segal Company. We have not verified the data, but have reviewed the information for internal consistency and have no reason to doubt its substantial accuracy.

Due to data quality issues, experience for former members of the Minneapolis Teachers Retirement Fund Association was excluded from this study.

The member data was summarized according to the actual and potential member decrements for each year in the study. Actual and potential decrements were grouped according to age or service depending on the demographic assumption.

Appendix

Assumption Tables

| | Pre-retirement Mortality for Healthy Lives | | | | Post-retirement Mortality for Healthy Lives | | | | Post-retirement Mortality for Disabled Lives | | | |
| | Current Assumption | | Proposed Assumption* | | Current Assumption | | Proposed Assumption* | | Current Assumption | | Proposed Assumption | |
Age	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
20	0.0294%	0.0096%	0.0183%	0.0161%	0.0317%	0.0159%	0.0215%	0.0177%	4.4060%	4.4060%	0.7450%	0.7450%
21	0.0292%	0.0104%	0.0194%	0.0161%	0.0325%	0.0168%	0.0266%	0.0181%	4.4060%	4.4060%	0.7450%	0.7450%
22	0.0293%	0.0113%	0.0205%	0.0161%	0.0333%	0.0179%	0.0235%	0.0181%	4.4060%	4.4060%	0.7450%	0.7450%
23	0.0298%	0.0121%	0.0215%	0.0169%	0.0343%	0.0189%	0.0245%	0.0180%	4.4060%	4.4060%	0.7450%	0.7450%
24	0.0304%	0.0131%	0.0226%	0.0177%	0.0353%	0.0201%	0.0254%	0.0180%	4.4060%	4.4060%	0.7450%	0.7450%
25	0.0310%	0.0140%	0.0235%	0.0181%	0.0365%	0.0212%	0.0263%	0.0182%	4.4060%	4.4060%	0.7450%	0.7450%
26	0.0317%	0.0149%	0.0245%	0.0181%	0.0377%	0.0225%	0.0269%	0.0186%	4.4060%	4.4060%	0.7450%	0.7450%
27	0.0325%	0.0159%	0.0254%	0.0180%	0.0392%	0.0238%	0.0276%	0.0191%	4.4060%	4.4060%	0.7450%	0.7450%
28	0.0333%	0.0168%	0.0263%	0.0180%	0.0408%	0.0253%	0.0286%	0.0199%	4.4060%	4.4060%	0.7450%	0.7450%
29	0.0343%	0.0179%	0.0269%	0.0182%	0.0424%	0.0268%	0.0292%	0.0209%	4.4060%	4.4060%	0.7450%	0.7450%
30	0.0353%	0.0189%	0.0276%	0.0186%	0.0444%	0.0283%	0.0300%	0.0218%	4.4060%	4.4060%	0.7450%	0.7450%
31	0.0365%	0.0201%	0.0286%	0.0191%	0.0464%	0.0301%	0.0315%	0.0229%	4.4060%	4.4060%	0.7450%	0.7450%
32	0.0377%	0.0212%	0.0292%	0.0199%	0.0488%	0.0320%	0.0339%	0.0242%	4.4060%	4.4060%	0.7450%	0.7450%
33	0.0392%	0.0225%	0.0300%	0.0209%	0.0513%	0.0342%	0.0373%	0.0262%	4.4060%	4.4060%	0.7450%	0.7450%
34	0.0408%	0.0238%	0.0315%	0.0218%	0.0542%	0.0364%	0.0414%	0.0305%	4.4060%	4.4060%	0.7450%	0.7450%
35	0.0424%	0.0253%	0.0339%	0.0229%	0.0572%	0.0388%	0.0462%	0.0341%	4.4060%	4.4060%	0.7450%	0.7450%
36	0.0444%	0.0268%	0.0373%	0.0242%	0.0607%	0.0414%	0.0513%	0.0373%	4.4070%	4.4070%	0.7450%	0.7450%
37	0.0464%	0.0283%	0.0414%	0.0262%	0.0645%	0.0443%	0.0567%	0.0401%	4.4080%	4.4080%	0.7450%	0.7450%
38	0.0488%	0.0301%	0.0462%	0.0305%	0.0687%	0.0476%	0.0624%	0.0427%	4.4090%	4.4090%	0.7450%	0.7450%
39	0.0513%	0.0320%	0.0513%	0.0341%	0.0734%	0.0502%	0.0679%	0.0451%	4.4100%	4.4100%	0.7450%	0.8184%
40	0.0542%	0.0342%	0.0567%	0.0373%	0.0785%	0.0535%	0.0730%	0.0475%	4.4120%	4.4120%	0.7450%	0.8959%
41	0.0572%	0.0364%	0.0624%	0.0401%	0.0860%	0.0573%	0.0782%	0.0502%	4.4140%	4.4140%	0.7450%	0.9775%
42	0.0607%	0.0388%	0.0679%	0.0427%	0.0907%	0.0617%	0.0835%	0.0531%	4.4160%	4.4160%	0.7450%	1.0634%
43	0.0645%	0.0414%	0.0730%	0.0451%	0.0966%	0.0665%	0.0891%	0.0571%	4.4280%	4.4280%	0.7450%	1.1535%
44	0.0687%	0.0443%	0.0782%	0.0475%	0.1039%	0.0716%	0.0955%	0.0619%	4.4490%	4.4490%	0.8184%	1.2477%
45	0.0734%	0.0476%	0.0835%	0.0502%	0.1128%	0.0775%	0.1028%	0.0676%	4.4810%	4.4810%	0.8959%	1.3456%
46	0.0785%	0.0502%	0.0891%	0.0531%	0.1238%	0.0841%	0.1112%	0.0741%	4.5260%	4.5260%	0.9775%	1.4465%
47	0.0860%	0.0535%	0.0955%	0.0571%	0.1370%	0.0919%	0.1209%	0.0817%	4.5820%	4.5820%	1.0634%	1.5497%
48	0.0907%	0.0573%	0.1028%	0.0619%	0.1527%	0.1010%	0.1302%	0.0893%	4.6560%	4.6560%	1.1535%	1.6544%
49	0.0966%	0.0617%	0.1112%	0.0676%	0.1715%	0.1117%	0.1403%	0.0976%	4.7480%	4.7480%	1.2477%	1.7598%
50	0.1039%	0.0665%	0.1209%	0.0741%	0.1932%	0.1237%	0.1504%	0.1063%	4.8640%	4.8640%	1.3456%	1.8654%

Rates shown are recommended RP2000 rates projected to 2008.

	Pre-retirement Mortality for Healthy Lives				Post-retirement Mortality for Healthy Lives				Post-retirement Mortality for Disabled Lives			
	Current Assumption		Proposed Assumption*		Current Assumption		Proposed Assumption*		Current Assumption		Proposed Assumption	
Age	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
51	0.1128%	0.0716%	0.1302%	0.0817%	0.2183%	0.1366%	0.1607%	0.1162%	5.0080%	5.0080%	1.4465%	1.9710%
52	0.1238%	0.0775%	0.1403%	0.0893%	0.2471%	0.1505%	0.5174%	0.1265%	5.1780%	5.1780%	1.5497%	2.0768%
53	0.1370%	0.0841%	0.1504%	0.0976%	0.2790%	0.1647%	0.5111%	0.2133%	5.3840%	5.3840%	1.6544%	2.1839%
54	0.1527%	0.0919%	0.1607%	0.1063%	0.3138%	0.1793%	0.4989%	0.2224%	5.6140%	5.6140%	1.7598%	2.2936%
55	0.1715%	0.1010%	0.1710%	0.1162%	0.3513%	0.1948%	0.4863%	0.2395%	5.1799%	5.1510%	1.8654%	2.4080%
56	0.1932%	0.1117%	0.1811%	0.1265%	0.3909%	0.2119%	0.4730%	0.2631%	4.7457%	4.6880%	1.9710%	2.5293%
57	0.2183%	0.1237%	0.1914%	0.1385%	0.4324%	0.2315%	0.4660%	0.2923%	4.3116%	4.2250%	2.0768%	2.6600%
58	0.2471%	0.1366%	0.2040%	0.1511%	0.4755%	0.2541%	0.4676%	0.3272%	3.8774%	3.7620%	2.1839%	2.8026%
59	0.2790%	0.1505%	0.2179%	0.1664%	0.5200%	0.2803%	0.4775%	0.3669%	3.4433%	3.2990%	2.2936%	2.9594%
60	0.3138%	0.1647%	0.2356%	0.1830%	0.5660%	0.3103%	0.5000%	0.4086%	3.0091%	2.8360%	2.4080%	3.1325%
61	0.3513%	0.1793%	0.2576%	0.2017%	0.6131%	0.3442%	0.5322%	0.4501%	2.5750%	2.3730%	2.5293%	3.3234%
62	0.3909%	0.1948%	0.2831%	0.2227%	0.6618%	0.3821%	0.5806%	0.4936%	2.1408%	1.9100%	2.6600%	3.5335%
63	0.4324%	0.2119%	0.3116%	0.2469%	0.7139%	0.4241%	0.6484%	0.5396%	1.7067%	1.4470%	2.8026%	3.7635%
64	0.4755%	0.2315%	0.3414%	0.2721%	0.7719%	0.4702%	0.7266%	0.5903%	1.2725%	0.9840%	2.9594%	4.0140%
65	0.5200%	0.2541%	0.3747%	0.2985%	0.8384%	0.5210%	0.8247%	0.6471%	0.8384%	0.5210%	3.1325%	4.2851%
66	0.5660%	0.2803%	0.4149%	0.3281%	0.9158%	0.5769%	0.9277%	0.7128%	0.9158%	0.5769%	3.3234%	4.5769%
67	0.6131%	0.3103%	0.4557%	0.3607%	1.0064%	0.6385%	1.0393%	0.7888%	1.0064%	0.6385%	3.5335%	4.8895%
68	0.6618%	0.3442%	0.5036%	0.3968%	1.1133%	0.7064%	1.1676%	0.8752%	1.1133%	0.7064%	3.7635%	5.2230%
69	0.7139%	0.3821%	0.5506%	0.4361%	1.2391%	0.7817%	1.2927%	0.9714%	1.2391%	0.7817%	4.0140%	5.5777%
70	0.7719%	0.4241%	0.6008%	0.4783%	1.3868%	0.8681%	1.4145%	1.0770%	1.3868%	0.8681%	4.2851%	5.9545%
71	0.8384%	0.4702%	0.6579%	0.5231%	1.5592%	0.9702%	1.5572%	1.1907%	1.5592%	0.9702%	4.5769%	6.3545%
72	0.9158%	0.5210%	0.7116%	0.5710%	1.7579%	1.0921%	1.7080%	1.3174%	1.7579%	1.0921%	4.8895%	6.7793%
73	1.0064%	0.5769%	0.7616%	0.6213%	1.9804%	1.2385%	1.8963%	1.4588%	1.9804%	1.2385%	5.2230%	7.2312%
74	1.1133%	0.6385%	0.8190%	0.6742%	2.2229%	1.4128%	2.1152%	1.6077%	2.2229%	1.4128%	5.5777%	7.7135%
75	1.2391%	0.7064%	0.8704%	0.7293%	2.4817%	1.6159%	2.3668%	1.7902%	2.4817%	1.6159%	5.9545%	8.2298%
76	1.3868%	0.7817%	1.8963%	0.7864%	2.7530%	1.8481%	2.6555%	1.9760%	2.7530%	1.8481%	6.3545%	8.7838%
77	1.5592%	0.8681%	2.1152%	0.8455%	3.0354%	2.1091%	3.0047%	2.1949%	3.0354%	2.1091%	6.7793%	9.3794%
78	1.7579%	0.9702%	2.3668%	1.6077%	3.3370%	2.3992%	3.3753%	2.4116%	3.3370%	2.3992%	7.2312%	10.0203%
79	1.9804%	1.0921%	2.6555%	1.7902%	3.6680%	2.7184%	3.8146%	2.6716%	3.6680%	2.7184%	7.7135%	10.7099%
80	2.2229%	1.2385%	3.0047%	1.9760%	4.0388%	3.0672%	4.3113%	2.9823%	4.0388%	3.0672%	8.2298%	11.4512%
81	2.4817%	1.4128%	3.3753%	2.1949%	4.4597%	3.4459%	4.8674%	3.3053%	4.4597%	3.4459%	8.7838%	12.2464%
82	2.7530%	1.6159%	3.8146%	2.4116%	4.9388%	3.8549%	5.4822%	3.6648%	4.9388%	3.8549%	9.3794%	13.0972%
83	3.0354%	1.8481%	4.3113%	2.6716%	5.4758%	4.2945%	6.2122%	4.0726%	5.4758%	4.2945%	10.0203%	14.0049%
84	3.3370%	2.1091%	4.8674%	2.9823%	6.0678%	4.7655%	7.0269%	4.5317%	6.0678%	4.7655%	10.7099%	14.9698%

Rates shown are recommended RP2000 rates projected to 2008.

	Pre-retirement Mortality for Healthy Lives				Post-retirement Mortality for Healthy Lives				Post-retirement Mortality for Disabled Lives			
	Current Assumption		Proposed Assumption*		Current Assumption		Proposed Assumption*		Current Assumption		Proposed Assumption	
Age	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
85	3.6680%	2.3992%	5.4822%	3.3053%	6.7125%	5.2691%	7.8750%	5.0450%	6.7125%	5.2691%	11.4512%	15.9924%
86	4.0388%	2.7184%	6.2122%	3.6648%	7.4070%	5.8071%	8.8667%	5.6254%	7.4070%	5.8071%	12.2464%	17.0433%
87	4.4597%	3.0672%	7.0269%	4.0726%	8.1484%	6.3807%	9.8946%	6.2761%	8.1484%	6.3807%	13.0972%	18.2799%
88	4.9388%	3.4459%	7.8750%	4.5317%	8.9320%	6.9918%	11.0398%	7.0706%	8.9320%	6.9918%	14.0049%	19.4509%
89	5.4758%	3.8549%	8.8667%	5.0450%	9.7525%	7.6570%	12.4074%	7.9579%	9.7525%	7.6570%	14.9698%	20.5379%
90	6.0678%	4.2945%	9.8946%	5.6254%	10.6047%	8.3870%	13.9173%	8.9565%	10.6047%	8.3870%	15.9924%	21.5240%
91	6.7125%	4.7655%	11.0398%	6.2761%	11.4836%	9.1935%	15.4762%	9.9760%	11.4836%	9.1935%	17.0433%	22.3947%
92	7.4070%	5.2691%	12.4074%	7.0706%	12.4170%	10.1354%	17.2647%	11.1555%	12.4170%	10.1354%	18.2799%	23.1387%
93	8.1484%	5.8071%	13.9173%	7.9579%	13.3870%	11.1750%	18.8822%	12.3155%	13.3870%	11.1750%	19.4509%	23.7467%
94	8.9320%	6.3807%	15.4762%	8.9565%	14.4073%	12.3076%	20.7020%	13.5241%	14.4073%	12.3076%	20.5379%	24.4834%
95	9.7525%	6.9918%	17.2647%	9.9760%	15.4859%	13.5630%	22.4007%	14.7412%	15.4859%	13.5630%	21.5240%	25.4498%
96	10.6047%	7.6570%	18.8822%	11.1555%	16.6307%	14.9577%	24.0579%	16.0848%	16.6307%	14.9577%	22.3947%	26.6044%
97	11.4836%	8.3870%	20.7020%	12.3155%	17.8214%	16.5103%	25.9029%	17.2699%	17.8214%	16.5103%	23.1387%	27.9055%
98	12.4170%	9.1935%	22.4007%	13.5241%	19.0460%	18.2419%	27.9394%	18.3953%	19.0460%	18.2419%	23.7467%	29.3116%
99	13.3870%	10.1354%	24.0579%	14.7412%	20.3007%	20.1757%	29.5088%	20.2116%	20.3007%	20.1757%	24.4834%	30.7811%
100	14.4073%	11.1750%	25.9029%	16.0848%	21.7904%	22.2043%	31.2782%	21.3524%	21.7904%	22.2043%	25.4498%	32.2725%

Rates shown are recommended RP2000 rates projected to 2008.

Termination Rates

Age	Current Assumption – Males	Years of Service	Proposed Assumption – Males	Age	Current Assumption – Females	Years of Service	Proposed Assumption – Females
20	3.70%	0	38.00%	20	4.50%	0	36.00%
21	3.60%	1	20.00%	21	4.50%	1	17.00%
22	3.50%	2	11.00%	22	4.50%	2	12.00%
23	3.40%	3	9.00%	23	4.50%	3	9.50%
24	3.30%	4	8.00%	24	4.50%	4	8.00%
25	3.20%	5	5.00%	25	4.50%	5	6.00%
26	3.10%	6	4.00%	26	4.50%	6	5.00%
27	3.00%	7	3.00%	27	4.50%	7	4.00%
28	2.90%	8	2.00%	28	4.50%	8	3.50%
29	2.80%	9	1.80%	29	4.50%	9	3.00%
30	2.70%	10	1.60%	30	4.50%	10	2.50%
31	2.60%	11	1.40%	31	4.50%	11	2.00%
32	2.50%	12	1.20%	32	4.50%	12	2.00%
33	2.50%	13	1.10%	33	4.30%	13	1.50%
34	2.50%	14	1.00%	34	4.10%	14	1.25%
35	2.50%	15	1.00%	35	3.90%	15	1.00%
36	2.50%	16	1.00%	36	3.70%	16	1.00%
37	2.50%	17	1.00%	37	3.50%	17	1.00%
38	2.45%	18	1.00%	38	3.25%	18	1.00%
39	2.40%	19	0.90%	39	3.00%	19	0.75%
40	2.35%	20	0.80%	40	2.75%	20	0.75%
41	2.30%	21	0.70%	41	2.50%	21	0.50%
42	2.25%	22	0.60%	42	2.25%	22	0.50%
43	2.20%	23	0.50%	43	2.29%	23	0.50%
44	2.15%	24	0.50%	44	2.15%	24	0.50%
45	2.10%	25	0.50%	45	2.10%	25	0.50%
46	2.05%	26	0.50%	46	2.05%	26	0.50%
47	2.00%	27	0.50%	47	2.00%	27	0.50%
48	1.95%	28	0.50%	48	1.95%	28	0.50%
49	1.90%	29	0.50%	49	1.90%	29	0.50%
50	1.85%	>30	0.50%	50	1.85%	>30	0.50%
51	1.80%			51	1.80%		
52	1.75%			52	1.75%		
53	1.70%			53	1.70%		
54	1.65%			54	1.65%		
55+	0.00%			55+	0.00%		

Appendix

Retirement Rates

Age	Current Assumption		Proposed Assumption	
	Rule of 90	**Non-Rule of 90**	**Rule of 90**	**Non-Rule of 90**
55	50.0%	7.0%	45.0%	6.0%
56	60.0%	7.0%	45.0%	7.0%
57	55.0%	7.0%	40.0%	7.0%
58	50.0%	8.0%	35.0%	8.0%
59	50.0%	10.0%	35.0%	10.0%
60	50.0%	12.0%	35.0%	12.0%
61	50.0%	18.0%	35.0%	15.0%
62	50.0%	20.0%	35.0%	20.0%
63	50.0%	20.0%	35.0%	15.0%
64	50.0%	20.0%	35.0%	20.0%
65	50.0%	45.0%	35.0%	35.0%
66	35.0%	35.0%	30.0%	30.0%
67	35.0%	35.0%	30.0%	30.0%
68	35.0%	35.0%	30.0%	30.0%
69	35.0%	35.0%	30.0%	30.0%
70	35.0%	35.0%	30.0%	30.0%
71+	100.0%	100.0%	100.0%	100.0%

Appendix

	Disability Rates			
	Current Assumption			**Proposed Assumption**
Age	**Male**	**Female**		**Unisex**
20	0.0000%	0.0000%		0.0000%
21	0.0000%	0.0000%		0.0000%
22	0.0000%	0.0000%		0.0000%
23	0.0000%	0.0000%		0.0000%
24	0.0000%	0.0000%		0.0000%
25	0.0000%	0.0000%		0.0000%
26	0.0000%	0.0000%		0.0000%
27	0.0000%	0.0000%		0.0000%
28	0.0000%	0.0000%		0.0000%
29	0.0000%	0.0000%		0.0000%
30	0.0000%	0.0000%		0.0000%
31	0.0100%	0.0100%		0.0100%
32	0.0100%	0.0100%		0.0100%
33	0.0100%	0.0100%		0.0100%
34	0.0100%	0.0100%		0.0100%
35	0.0100%	0.0100%		0.0100%
36	0.0200%	0.0200%		0.0200%
37	0.0200%	0.0200%		0.0200%
38	0.0200%	0.0200%		0.0200%
39	0.0200%	0.0200%		0.0200%
40	0.0300%	0.0300%		0.0300%
41	0.0300%	0.0300%		0.0300%
42	0.0300%	0.0300%		0.0300%
43	0.0400%	0.0400%		0.0400%
44	0.0400%	0.0400%		0.0400%
45	0.0500%	0.0500%		0.0500%
46	0.0600%	0.0600%		0.0600%
47	0.0700%	0.0700%		0.0700%
48	0.0800%	0.0800%		0.0800%
49	0.0900%	0.0900%		0.0900%
50	0.1100%	0.1000%		0.1000%
51	0.1300%	0.1100%		0.1100%
52	0.1500%	0.1200%		0.1200%
53	0.1700%	0.1300%		0.1300%
54	0.1900%	0.1400%		0.1400%
55	0.2200%	0.1600%		0.1600%
56	0.2400%	0.1800%		0.1800%
57	0.2600%	0.2000%		0.2000%
58	0.2800%	0.2200%		0.2200%
59	0.3000%	0.2400%		0.2400%
60	0.3300%	0.2500%		0.2500%
61	0.3700%	0.2600%		0.2600%
62	0.4100%	0.2700%		0.2700%
63	0.4600%	0.2800%		0.2800%
64	0.5200%	0.2900%		0.2900%
65+	0.0000%	0.0000%		0.0000%

Appendix

Salary Scale

Current Assumption		Proposed Assumption	
Age	**Ultimate***	**Service**	**Ultimate**
20	5.50%	1	12.00%
21	5.50%	2	9.00%
22	5.50%	3	8.00%
23	5.50%	4	7.50%
24	5.50%	5	7.25%
25	5.50%	6	7.00%
26	5.50%	7	6.85%
27	5.50%	8	6.70%
28	5.50%	9	6.55%
29	5.50%	10	6.40%
30	5.50%	11	6.25%
31	5.50%	12	6.00%
32	5.50%	13	5.75%
33	5.50%	14	5.50%
34	5.50%	15	5.25%
35	5.50%	16	5.00%
36	5.50%	17	4.75%
37	5.50%	18	4.50%
38	5.40%	19	4.25%
39	5.30%	20	4.00%
40	5.20%	21	3.90%
41	5.10%	22	3.80%
42	5.00%	23	3.70%
43	4.90%	24	3.60%
44	4.80%	25	3.50%
45	4.70%	26	3.50%
46	4.60%	27	3.50%
47	4.50%	28	3.50%
48	4.50%	29	3.50%
49	4.50%	30+	3.50%
50	4.50%		
51	4.50%		
52	4.50%		
53	4.50%		
54	4.50%		
55	4.50%		
56	4.50%		
57	4.50%		
58	4.60%		
59	4.70%		
60	4.80%		
61	4.90%		
62	5.00%		
63	5.10%		
64+	5.20%		

* During a 10-year select period, .60% x (10-T) where T is completed years of service, is added to the ultimate rate.

Appendix

Detailed Experience Analysis

Salary Increases

2004 – 2008 Experience

Age Group	Service < 10 Years			Service >= 10 Years			Total		
	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average
19-24	3,021	14.10%	8.11%	0			3,021	14.10%	8.11%
25-29	28,081	8.81%	7.54%	0			28,081	8.81%	7.54%
30-34	28,691	7.54%	6.79%	3,456	7.16%	5.50%	32,147	7.50%	6.65%
35-39	16,117	8.11%	6.77%	17,490	6.34%	5.44%	33,607	7.19%	6.08%
40-44	11,487	8.15%	6.49%	19,888	5.15%	4.99%	31,375	6.25%	5.54%
45-49	10,787	7.75%	6.06%	22,768	4.43%	4.56%	33,555	5.50%	5.04%
50-54	8,799	6.54%	5.97%	32,569	3.83%	4.50%	41,368	4.41%	4.81%
55-59	5,655	5.44%	6.03%	28,933	3.55%	4.54%	34,588	3.86%	4.78%
60-64	2,210	5.61%	6.55%	6,733	3.58%	4.93%	8,943	4.08%	5.33%
65-69	598	6.98%	7.05%	685	3.91%	5.20%	1,283	5.34%	6.06%
70 +	213	4.32%	7.26%	109	3.92%	5.20%	322	4.18%	6.56%
Total	**115,659**	**7.95%**	**6.80%**	**132,631**	**4.48%**	**4.77%**	**248,290**	**6.20%**	**5.72%**

2004 – 2005 Experience

Age Group	Service < 10 Years			Service >= 10 Years			Total		
	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average
19-24	727	15.99%	8.12%	0			727	15.99%	8.12%
25-29	6,879	8.79%	7.52%	0			6,879	8.79%	7.52%
30-34	7,007	6.73%	6.82%	921	6.25%	5.50%	7,928	6.67%	6.67%
35-39	3,810	6.89%	6.80%	3,874	6.45%	5.44%	7,684	6.67%	6.11%
40-44	2,925	7.16%	6.54%	4,712	5.17%	5.00%	7,637	5.93%	5.59%
45-49	2,680	7.18%	6.07%	5,810	4.13%	4.55%	8,490	5.09%	5.03%
50-54	2,278	6.42%	5.98%	8,958	3.55%	4.50%	11,236	4.13%	4.80%
55-59	1,289	4.66%	6.02%	6,910	3.00%	4.53%	8,199	3.26%	4.76%
60-64	499	5.61%	6.55%	1,466	2.66%	4.93%	1,965	3.41%	5.34%
65-69	130	2.35%	7.08%	138	4.40%	5.20%	268	3.41%	6.11%
70 +	47	6.97%	7.39%	20	2.41%	5.20%	67	5.61%	6.74%
Total	**28,271**	**7.42%**	**6.81%**	**32,809**	**4.15%**	**4.75%**	**61,080**	**5.66%**	**5.70%**

Appendix

Salary Increases

2005 – 2006 Experience

Age Group	Service < 10 Years			Service >= 10 Years			Total		
	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average
19-24	765	10.80%	8.11%	0			765	10.80%	8.11%
25-29	7,018	5.77%	7.53%	0			7,018	5.77%	7.53%
30-34	7,248	4.77%	6.80%	827	3.94%	5.50%	8,075	4.68%	6.67%
35-39	4,069	4.85%	6.77%	4,302	3.58%	5.44%	8,371	4.20%	6.09%
40-44	2,951	4.60%	6.50%	4,958	2.46%	4.99%	7,909	3.26%	5.55%
45-49	2,731	3.96%	6.07%	5,666	1.81%	4.55%	8,397	2.51%	5.04%
50-54	2,306	2.37%	5.96%	8,462	1.31%	4.50%	10,768	1.54%	4.81%
55-59	1,411	2.51%	6.06%	7,229	0.76%	4.54%	8,640	1.05%	4.79%
60-64	522	2.81%	6.58%	1,536	0.48%	4.94%	2,058	1.07%	5.36%
65-69	148	1.19%	7.06%	150	-1.18%	5.20%	298	0.00%	6.12%
70 +	50	9.00%	7.29%	23	-3.42%	5.20%	73	5.09%	6.63%
Total	**29,219**	**4.74%**	**6.80%**	**33,153**	**1.75%**	**4.76%**	**62,372**	**3.15%**	**5.72%**

2006 – 2007 Experience

Age Group	Service < 10 Years			Service >= 10 Years			Total		
	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average
19-24	780	30.21%	8.11%	0			780	30.21%	8.11%
25-29	7,112	11.12%	7.55%	0			7,112	11.12%	7.55%
30-34	7,076	9.67%	6.77%	810	8.64%	5.50%	7,886	9.56%	6.64%
35-39	4,180	10.96%	6.76%	4,554	7.10%	5.44%	8,734	8.95%	6.07%
40-44	2,841	11.94%	6.48%	5,040	6.05%	4.99%	7,881	8.17%	5.53%
45-49	2,725	10.75%	6.06%	5,627	5.53%	4.56%	8,352	7.23%	5.05%
50-54	2,136	10.10%	5.97%	7,875	5.08%	4.50%	10,011	6.15%	4.81%
55-59	1,468	8.01%	6.04%	7,377	4.78%	4.54%	8,845	5.32%	4.79%
60-64	559	6.61%	6.55%	1,724	4.91%	4.93%	2,283	5.33%	5.33%
65-69	148	0.69%	7.02%	183	4.98%	5.20%	331	3.06%	6.01%
70 +	57	-1.45%	7.20%	28	6.77%	5.20%	85	1.26%	6.54%
Total	**29,082**	**10.91%**	**6.80%**	**33,218**	**5.59%**	**4.77%**	**62,300**	**8.07%**	**5.72%**

Appendix

Salary Increases

2007 – 2008 Experience

Age Group	Service < 10 Years			Service >= 10 Years			Total		
	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average	Exposures	Observed Average	Expected Average
19-24	749	12.57%	8.11%	0			749	12.57%	8.11%
25-29	7,072	9.93%	7.56%	0			7,072	9.93%	7.56%
30-34	7,360	9.11%	6.78%	898	9.72%	5.50%	8,258	9.18%	6.64%
35-39	4,058	9.93%	6.76%	4,760	8.02%	5.43%	8,818	8.90%	6.04%
40-44	2,770	10.06%	6.45%	5,178	6.83%	5.00%	7,948	7.96%	5.51%
45-49	2,651	9.72%	6.04%	5,665	6.26%	4.56%	8,316	7.36%	5.03%
50-54	2,079	8.52%	5.98%	7,274	5.81%	4.50%	9,353	6.41%	4.83%
55-59	1,487	6.41%	6.01%	7,417	5.50%	4.54%	8,904	5.65%	4.79%
60-64	630	7.20%	6.53%	2,007	5.42%	4.92%	2,637	5.85%	5.30%
65-69	172	36.30%	7.04%	214	6.56%	5.20%	386	19.81%	6.02%
70 +	59	0.34%	7.18%	38	7.91%	5.20%	97	3.31%	6.40%
Total	**29,087**	**9.58%**	**6.80%**	**33,451**	**6.38%**	**4.79%**	**62,538**	**7.87%**	**5.72%**

Appendix

Post-retirement Mortality for Healthy Lives

2004-2008 Experience

Age Group	Males Actual Deaths	Males Expected Deaths	Males Actual/ Expected	Females Actual Deaths	Females Expected Deaths	Females Actual/ Expected	Total Actual Deaths	Total Expected Deaths	Total Actual/ Expected
55-59	27	27.73	97.4%	32	21.15	151.3%	59	48.88	120.7%
60-64	88	109.97	80.0%	62	69.73	88.9%	150	179.70	83.5%
65-69	170	172.36	98.6%	104	111.56	93.2%	274	283.92	96.5%
70-74	213	240.78	88.5%	129	150.96	85.5%	342	391.74	87.3%
75-79	319	275.72	115.7%	222	231.50	95.9%	541	507.21	106.7%
80-84	323	254.31	127.0%	285	288.08	98.9%	608	542.39	112.1%
85-89	224	151.62	147.7%	425	351.08	121.1%	649	502.70	129.1%
90-94	106	69.44	152.6%	432	308.84	139.9%	538	378.28	142.2%
95-99	33	21.52	153.3%	259	166.93	155.2%	292	188.45	154.9%
100+	1	1.46	68.3%	54	35.67	151.4%	55	37.13	148.1%
Total	**1,504**	**1,324.91**	**113.5%**	**2,004**	**1,735.48**	**115.5%**	**3,508**	**3,060.40**	**114.6%**

2004-2005 Experience

Age Group	Males Actual Deaths	Males Expected Deaths	Males Actual/ Expected	Females Actual Deaths	Females Expected Deaths	Females Actual/ Expected	Total Actual Deaths	Total Expected Deaths	Total Actual/ Expected
55-59	9	8.00	112.5%	5	5.29	94.4%	14	13.29	105.3%
60-64	36	27.64	130.2%	19	15.62	121.6%	55	43.26	127.1%
65-69	53	40.63	130.5%	27	25.34	106.5%	80	65.97	121.3%
70-74	59	55.94	105.5%	36	36.14	99.6%	95	92.07	103.2%
75-79	75	63.18	118.7%	72	51.68	139.3%	147	114.86	128.0%
80-84	80	54.86	145.8%	72	69.74	103.2%	152	124.61	122.0%
85-89	58	31.70	183.0%	120	88.75	135.2%	178	120.44	147.8%
90-94	23	14.55	158.1%	116	72.37	160.3%	139	86.92	159.9%
95-99	7	4.51	155.2%	62	42.52	145.8%	69	47.03	146.7%
100+	-	-	0.0%	17	7.79	218.2%	17	7.79	218.2%
Total	**400**	**301.00**	**132.9%**	**546**	**415.25**	**131.5%**	**946**	**716.25**	**132.1%**

Appendix

Post-retirement Mortality for Healthy Lives

2005-2006 Experience

Age Group	Males Actual Deaths	Males Expected Deaths	Males Actual/ Expected	Females Actual Deaths	Females Expected Deaths	Females Actual/ Expected	Total Actual Deaths	Total Expected Deaths	Total Actual/ Expected
55-59	11	7.44	147.8%	11	5.51	199.5%	22	12.95	169.8%
60-64	20	27.39	73.0%	18	16.24	110.8%	38	43.63	87.1%
65-69	40	42.20	94.8%	29	26.76	108.4%	69	68.96	100.1%
70-74	51	59.29	86.0%	24	37.09	64.7%	75	96.38	77.8%
75-79	98	66.59	147.2%	39	55.71	70.0%	137	122.30	112.0%
80-84	88	60.94	144.4%	76	71.42	106.4%	164	132.36	123.9%
85-89	45	33.82	133.0%	96	85.10	112.8%	141	118.93	118.6%
90-94	21	16.59	126.6%	102	75.78	134.6%	123	92.37	133.2%
95-99	11	6.04	182.0%	62	41.73	148.6%	73	47.77	152.8%
100+	1	0.50	200.5%	6	7.12	84.3%	7	7.62	91.9%
Total	**386**	**320.79**	**120.3%**	**463**	**422.47**	**109.6%**	**849**	**743.26**	**114.2%**

2006-2007 Experience

Age Group	Males Actual Deaths	Males Expected Deaths	Males Actual/ Expected	Females Actual Deaths	Females Expected Deaths	Females Actual/ Expected	Total Actual Deaths	Total Expected Deaths	Total Actual/ Expected
50-54	5	6.66	75.1%	10	5.39	185.4%	15	12.05	124.5%
55-59	14	27.68	50.6%	9	18.15	49.6%	23	45.83	50.2%
60-64	45	43.53	103.4%	23	28.90	79.6%	68	72.42	93.9%
65-69	55	62.11	88.5%	38	38.26	99.3%	93	100.38	92.7%
70-74	83	71.17	116.6%	65	61.78	105.2%	148	132.95	111.3%
75-79	68	66.32	102.5%	71	71.83	98.8%	139	138.15	100.6%
80-84	59	39.42	149.7%	105	88.62	118.5%	164	128.04	128.1%
85-89	30	19.40	154.6%	106	80.02	132.5%	136	99.42	136.8%
90-94	11	5.51	199.7%	63	41.27	152.6%	74	46.78	158.2%
95-99	-	0.47	0.0%	14	10.10	138.6%	14	10.57	132.4%
Total	**370**	**342.26**	**108.1%**	**504**	**444.33**	**113.4%**	**874**	**786.59**	**111.1%**

Appendix

Post-retirement Mortality for Healthy Lives

2007-2008 Experience

Age Group	Males			Females			Total		
	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected
50-54	2	5.64	35.5%	6	4.94	121.4%	8	10.58	75.6%
55-59	18	27.27	66.0%	16	19.72	81.1%	34	46.99	72.4%
60-64	32	46.00	69.6%	25	30.56	81.8%	57	76.57	74.4%
65-69	48	63.44	75.7%	31	39.47	78.5%	79	102.91	76.8%
70-74	63	74.78	84.2%	46	62.32	73.8%	109	137.10	79.5%
75-79	87	72.19	120.5%	66	75.09	87.9%	153	147.28	103.9%
80-84	62	46.68	132.8%	104	88.60	117.4%	166	135.28	122.7%
85-89	32	18.91	169.3%	108	80.67	133.9%	140	99.57	140.6%
90-94	4	5.46	73.3%	72	41.41	173.9%	76	46.87	162.2%
95-99	-	0.50	0.0%	17	10.65	159.6%	17	11.15	152.5%
Total	**348**	**360.86**	**96.4%**	**491**	**453.43**	**108.3%**	**839**	**814.30**	**103.0%**

Appendix

Post-retirement Mortality for Disabled Lives

2004-2008 Experience

Age Group	Males Actual Deaths	Males Expected Deaths	Males Actual/ Expected	Females Actual Deaths	Females Expected Deaths	Females Actual/ Expected	Total Actual Deaths	Total Expected Deaths	Total Actual/ Expected
40-44	1	0.22	451.3%	-	2.21	0.0%	1	2.43	41.2%
45-49	-	0.42	0.0%	4	3.75	106.7%	4	4.17	95.9%
50-54	-	3.73	0.0%	12	14.58	82.3%	12	18.31	65.5%
55-59	8	11.79	67.8%	11	23.91	46.0%	19	35.70	53.2%
60-64	8	7.83	102.2%	14	9.06	154.5%	22	16.90	130.2%
Total	**17**	**23.99**	**70.9%**	**41**	**53.51**	**76.6%**	**58**	**77.51**	**74.8%**

2004-2005 Experience

Age Group	Males Actual Deaths	Males Expected Deaths	Males Actual/ Expected	Females Actual Deaths	Females Expected Deaths	Females Actual/ Expected	Total Actual Deaths	Total Expected Deaths	Total Actual/ Expected
40-44	1	0.09	1132.2%	-	0.53	0.0%	1	0.62	161.3%
45-49	-	0.09	0.0%	1	1.35	74.2%	1	1.44	69.4%
50-54	-	1.17	0.0%	2	4.20	47.7%	2	5.37	37.3%
55-59	5	3.47	143.9%	3	5.22	57.5%	8	8.69	92.1%
60-64	1	1.71	58.5%	2	2.07	96.6%	3	3.78	79.4%
Total	**7**	**6.54**	**107.0%**	**8**	**13.37**	**59.8%**	**15**	**20.12**	**74.6%**

2005-2006 Experience

Age Group	Males Actual Deaths	Males Expected Deaths	Males Actual/ Expected	Females Actual Deaths	Females Expected Deaths	Females Actual/ Expected	Total Actual Deaths	Total Expected Deaths	Total Actual/ Expected
40-44	-	0.04	0.0%	-	0.53	0.0%	-	0.58	0.0%
45-49	-	0.09	0.0%	1	0.83	119.8%	1	0.93	107.9%
50-54	-	1.07	0.0%	4	3.68	108.7%	4	4.75	84.2%
55-59	1	3.14	31.8%	1	5.85	17.1%	2	8.99	22.2%
60-64	2	1.86	107.5%	3	2.05	146.3%	5	3.91	127.9%
Total	**3**	**6.21**	**48.3%**	**9**	**12.95**	**69.5%**	**12**	**19.16**	**62.6%**

Appendix

Post-retirement Mortality for Disabled Lives

2006-2007 Experience

Age Group	Males			Females			Total		
	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected
40-44	-	0.09	0.0%	-	0.49	0.0%	-	0.58	0.0%
45-49	-	0.14	0.0%	2	0.83	241.4%	2	0.97	206.2%
50-54	-	0.74	0.0%	4	3.63	110.1%	4	4.37	91.5%
55-59	1	2.83	35.4%	3	6.62	45.3%	4	9.45	42.3%
60-64	3	2.16	139.0%	5	2.19	228.7%	8	4.35	184.1%
Total	**4**	**5.96**	**67.1%**	**14**	**13.76**	**101.7%**	**18**	**19.72**	**91.3%**

2007-2008 Experience

Age Group	Males			Females			Total		
	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected
40-44	-	-	0.0%	-	0.66	0.0%	-	0.66	0.0%
45-49	-	0.09	0.0%	-	0.74	0.0%	-	0.83	0.0%
50-54	-	0.74	0.0%	2	3.08	65.0%	2	3.82	52.4%
55-59	1	2.35	42.6%	4	6.22	64.3%	5	8.57	58.4%
60-64	2	2.11	94.9%	4	2.75	145.3%	6	4.86	123.5%
Total	**3**	**5.29**	**56.7%**	**10**	**13.45**	**74.3%**	**13**	**18.74**	**69.4%**

Appendix

Pre-retirement Mortality for Healthy Lives

2006-2008 Experience

Age Group	Males			Females			Total		
	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected
25-29	-	2	0.0%	-	2	0.0%	-	3.86	0.0%
30-34	-	2.21	0.0%	3	3.13	95.9%	3	5.34	56.2%
35-39	3	3.01	99.8%	3	4.60	65.3%	6	7.60	78.9%
40-44	1	3.43	29.2%	6	5.79	103.6%	7	9.22	75.9%
45-49	6	4.49	133.6%	10	8.46	118.3%	16	12.95	123.6%
50-54	4	8.06	49.6%	22	14.11	155.9%	26	22.17	117.2%
55-59	18	18.28	98.4%	27	25.73	105.0%	45	44.01	102.3%
60-64	13	12.62	103.0%	10	13.37	74.8%	23	26.00	88.5%
Total	**45**	**53.68**	**83.8%**	**81**	**77.46**	**104.6%**	**126**	**131.15**	**96.1%**

2006-2007 Experience

Age Group	Males			Females			Total		
	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected
25-29	-	0.80	0.0%	-	1.16	0.0%	-	1.96	0.0%
30-34	-	1.11	0.0%	2	1.53	130.8%	2	2.64	75.9%
35-39	1	1.49	67.0%	1	2.29	43.7%	2	3.78	52.9%
40-44	1	1.71	58.6%	-	2.88	0.0%	1	4.59	21.8%
45-49	6	2.25	266.6%	5	4.26	117.5%	11	6.51	169.1%
50-54	3	4.21	71.3%	11	7.28	151.1%	14	11.49	121.9%
55-59	9	9.24	97.4%	11	12.67	86.8%	20	21.91	91.3%
60-64	6	6.04	99.3%	5	6.27	79.7%	11	12.32	89.3%
Total	**26**	**26.85**	**96.8%**	**35**	**38.34**	**91.3%**	**61**	**65.19**	**93.6%**

Appendix

Pre-retirement Mortality for Healthy Lives

2007-2008 Experience

Age Group	Males			Females			Total		
	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected	Actual Deaths	Expected Deaths	Actual/ Expected
25-29	-	0.77	0.0%	-	1.12	0.0%	-	1.89	0.0%
30-34	-	1.10	0.0%	1	1.60	62.5%	1	2.70	37.0%
35-39	2	1.51	132.1%	2	2.31	86.7%	4	3.82	104.7%
40-44	-	1.72	0.0%	6	2.91	206.3%	6	4.63	129.6%
45-49	-	2.24	0.0%	5	4.20	119.1%	5	6.44	77.6%
50-54	1	3.85	26.0%	11	6.83	161.0%	12	10.69	112.3%
55-59	9	9.04	99.5%	16	13.05	122.6%	25	22.10	113.1%
60-64	7	6.58	106.4%	5	7.10	70.4%	12	13.68	87.7%
Total	**19**	**26.83**	**70.8%**	**46**	**39.12**	**117.6%**	**65**	**65.95**	**98.6%**

Appendix

Rule of 90 Retirement

2004-2008 Experience

Age	Actual Retirements	Expected Retirements	Actual/Expected
55	37	40.50	91.4%
56	962	1,197.00	80.4%
57	818	1,181.40	69.2%
58	716	969.50	73.9%
59	500	713.50	70.1%
60	334	519.00	64.4%
61	287	380.50	75.4%
62	205	283.00	72.4%
63	124	226.00	54.9%
64	131	176.50	74.2%
Total	**4,114**	**5,686.90**	**72.3%**

2004-2005 Experience

Age	Actual Retirements	Expected Retirements	Actual/Expected
55	12	11.00	109.1%
56	258	324.60	79.5%
57	180	286.00	62.9%
58	118	164.00	72.0%
59	58	104.50	55.5%
60	46	92.00	50.0%
61	48	82.50	58.2%
62	21	54.50	38.5%
63	22	47.00	46.8%
64	22	31.50	69.8%
Total	**785**	**1,197.60**	**65.5%**

2005-2006 Experience

Age	Actual Retirements	Expected Retirements	Actual/Expected
55	13	11.00	118.2%
56	267	322.80	82.7%
57	227	313.50	72.4%
58	217	271.50	79.9%
59	107	154.00	69.5%
60	74	109.00	67.9%
61	69	91.00	75.8%
62	76	82.00	92.7%
63	30	59.00	50.8%
64	39	47.50	82.1%
Total	**1,119**	**1,461.30**	**76.6%**

Appendix

Rule of 90 Retirement

2006-2007 Experience

Age	Actual Retirements	Expected Retirements	Actual/Expected
55	7	11.00	63.6%
56	230	271.20	84.8%
57	246	314.05	78.3%
58	198	269.00	73.6%
59	186	229.00	81.2%
60	93	136.50	68.1%
61	72	92.00	78.3%
62	41	71.50	57.3%
63	34	53.50	63.6%
64	34	52.00	65.4%
Total	**1,141**	**1,499.75**	**76.1%**

2007-2008 Experience

Age	Actual Retirements	Expected Retirements	Actual/Expected
55	5	7.50	66.7%
56	207	278.40	74.4%
57	165	267.85	61.6%
58	183	265.00	69.1%
59	149	226.00	65.9%
60	121	181.50	66.7%
61	98	115.00	85.2%
62	67	75.00	89.3%
63	38	66.50	57.1%
64	36	45.50	79.1%
Total	**1,069**	**1,528.25**	**69.9%**

Appendix

Non-rule of 90 Retirement

2004-2008 Experience

Age	Actual Retirements	Expected Retirements	Actual/Expected
55	579	680.47	85.1%
56	508	519.75	97.7%
57	389	409.29	95.0%
58	368	367.68	100.1%
59	324	344.60	94.0%
60	284	307.08	92.5%
61	280	340.38	82.3%
62	264	271.20	97.3%
63	168	193.20	87.0%
64	157	136.60	114.9%
65	278	359.10	77.4%
66	145	164.50	88.1%
67	88	109.20	80.6%
68	47	80.15	58.6%
69	45	66.85	67.3%
70	51	49.70	102.6%
71	28	95.00	29.5%
Total	**4,003**	**4,494.75**	**89.1%**

2004-2005 Experience

Age	Actual Retirements	Expected Retirements	Actual/Expected
55	140	176.54	79.3%
56	111	125.51	88.4%
57	86	101.78	84.5%
58	73	77.44	94.3%
59	57	65.50	87.0%
60	49	59.52	82.3%
61	57	81.36	70.1%
62	40	60.20	66.4%
63	21	42.00	50.0%
64	29	25.00	116.0%
65	40	58.95	67.9%
66	26	30.80	84.4%
67	16	26.25	61.0%
68	10	20.65	48.4%
69	4	9.80	40.8%
70	12	9.10	131.9%
71	8	24.00	33.3%
Total	**779**	**994.40**	**78.3%**

Appendix

Non-rule of 90 Retirement

2005-2006 Experience

Age	Actual Retirements	Expected Retirements	Actual/Expected
55	155	165.20	93.8%
56	137	133.56	102.6%
57	99	101.43	97.6%
58	106	97.68	108.5%
59	82	82.60	99.3%
60	69	65.52	105.3%
61	62	75.06	82.6%
62	91	74.20	122.6%
63	54	49.20	109.8%
64	50	35.20	142.0%
65	65	83.70	77.7%
66	36	35.00	102.9%
67	22	25.20	87.3%
68	14	23.45	59.7%
69	14	19.95	70.2%
70	8	9.45	84.7%
71	5	16.00	31.3%
Total	**1,069**	**1,092.40**	**97.9%**

2006-2007 Experience

Age	Actual Retirements	Expected Retirements	Actual/Expected
55	157	174.09	90.2%
56	136	126.84	107.2%
57	107	105.07	101.8%
58	108	94.16	114.7%
59	103	100.00	103.0%
60	85	83.52	101.8%
61	78	81.00	96.3%
62	74	67.80	109.1%
63	58	54.60	106.2%
64	40	37.00	108.1%
65	79	101.25	78.0%
66	41	45.50	90.1%
67	24	24.15	99.4%
68	8	18.90	42.3%
69	17	20.30	83.7%
70	14	15.75	88.9%
71	8	23.00	34.8%
Total	**1,137**	**1,172.93**	**96.9%**

Appendix

Non-rule of 90 Retirement

2007-2008 Experience

Age	Actual Retirements	Expected Retirements	Actual/Expected
55	127	164.64	77.1%
56	124	133.84	92.6%
57	97	101.01	96.0%
58	81	98.40	82.3%
59	82	96.50	85.0%
60	81	98.52	82.2%
61	83	102.96	80.6%
62	59	69.00	85.5%
63	35	47.40	73.8%
64	38	39.40	96.4%
65	94	115.20	81.6%
66	42	53.20	78.9%
67	26	33.60	77.4%
68	15	17.15	87.5%
69	10	16.80	59.5%
70	17	15.40	110.4%
71	7	32.00	21.9%
Total	**1,018**	**1,235.02**	**82.4%**

Appendix

Disability Retirements

2004-2008 Experience

Age Group	Males			Females			Total		
	Actual Disabilities	Expected Disabilities	Actual/ Expected	Actual Disabilities	Expected Disabilities	Actual/ Expected	Actual Disabilities	Expected Disabilities	Actual/ Expected
25-29	-	-	0.0%	-	-	0.0%	-	-	0.0%
30-34	-	0.87	0.0%	1	2.03	49.2%	1	2.91	34.4%
35-39	2	2.02	98.9%	7	4.70	149.0%	9	6.72	134.0%
40-44	1	3.31	30.2%	7	8.65	80.9%	8	11.97	66.9%
45-50	3	6.52	46.0%	16	19.61	81.6%	19	26.13	72.7%
50-54	17	18.04	94.2%	43	39.62	108.5%	60	57.66	104.1%
55-60	26	31.90	81.5%	63	56.66	111.2%	89	88.56	100.5%
60-64	8	15.08	53.0%	22	22.42	98.1%	30	37.51	80.0%
Total	**57**	**77.75**	**73.3%**	**159**	**153.70**	**103.5%**	**216**	**231.45**	**93.3%**

2004-2005 Experience

Age Group	Males			Females			Total		
	Actual Disabilities	Expected Disabilities	Actual/ Expected	Actual Disabilities	Expected Disabilities	Actual/ Expected	Actual Disabilities	Expected Disabilities	Actual/ Expected
25-29	-	-	0.0%	-	-	0.0%	-	-	0.0%
30-34	-	0.22	0.0%	1	0.49	204.1%	1	0.71	140.8%
35-39	-	0.46	0.0%	-	1.05	0.0%	-	1.51	0.0%
40-44	-	0.79	0.0%	1	2.11	47.3%	1	2.90	34.4%
45-50	1	1.66	60.1%	1	4.96	20.1%	2	6.63	30.2%
50-54	6	4.99	120.2%	9	10.63	84.6%	15	15.62	96.0%
55-60	9	8.11	110.9%	10	12.64	79.1%	19	20.75	91.6%
60-64	1	3.44	29.1%	4	4.67	85.6%	5	8.11	61.6%
Total	**17**	**19.68**	**86.4%**	**26**	**36.55**	**71.1%**	**43**	**56.24**	**76.5%**

Appendix

Disability Retirements

2005-2006 Experience

Age Group	Males			Females			Total		
	Actual Disabilities	Expected Disabilities	Actual/ Expected	Actual Disabilities	Expected Disabilities	Actual/ Expected	Actual Disabilities	Expected Disabilities	Actual/ Expected
25-29	-	-	0.0%	-	-	0.0%	-	-	0.0%
30-34	-	0.22	0.0%	-	0.52	0.0%	-	0.74	0.0%
35-39	-	0.50	0.0%	2	1.16	172.8%	2	1.66	120.5%
40-44	1	0.84	119.4%	1	2.19	45.7%	2	3.03	66.1%
45-50	1	1.65	60.5%	5	4.95	101.1%	6	6.60	90.9%
50-54	5	4.82	103.7%	16	10.32	155.0%	21	15.15	138.6%
55-60	5	8.25	60.6%	30	14.16	211.9%	35	22.41	156.2%
60-64	4	3.60	111.2%	4	5.35	74.8%	8	8.95	89.4%
Total	**16**	**19.88**	**80.5%**	**58**	**38.64**	**150.1%**	**74**	**58.52**	**126.4%**

2006-2007 Experience

Age Group	Males			Females			Total		
	Actual Disabilities	Expected Disabilities	Actual/ Expected	Actual Disabilities	Expected Disabilities	Actual/ Expected	Actual Disabilities	Expected Disabilities	Actual/ Expected
25-29	-	-	0.0%	-	-	0.0%	-	-	0.0%
30-34	-	0.22	0.0%	-	0.51	0.0%	-	0.73	0.0%
35-39	1	0.53	190.0%	4	1.24	323.1%	5	1.76	283.4%
40-44	-	0.84	0.0%	2	2.18	91.6%	2	3.02	66.2%
45-50	-	1.61	0.0%	4	4.92	81.3%	4	6.53	61.2%
50-54	2	4.33	46.2%	9	9.67	93.0%	11	14.01	78.5%
55-60	4	8.06	49.6%	14	14.93	93.7%	18	22.99	78.3%
60-64	2	3.85	51.9%	6	5.85	102.5%	8	9.70	82.5%
Total	**9**	**19.44**	**46.3%**	**39**	**39.31**	**99.2%**	**48**	**58.75**	**81.7%**

Appendix

Disability Retirements

2007-2008 Experience

Age Group	Males Actual Disabilities	Expected Disabilities	Actual/ Expected	Females Actual Disabilities	Expected Disabilities	Actual/ Expected	Total Actual Disabilities	Expected Disabilities	Actual/ Expected
25-29	-	-	0.0%	-	-	0.0%	-	-	0.0%
30-34	-	0.21	0.0%	-	0.52	0.0%	-	0.73	0.0%
35-39	1	0.53	189.3%	1	1.25	79.8%	2	1.78	112.3%
40-44	-	0.85	0.0%	3	2.17	138.4%	3	3.02	99.4%
45-50	1	1.59	62.8%	6	4.78	125.4%	7	6.38	109.8%
50-54	4	3.90	102.7%	9	8.99	100.1%	13	12.88	100.9%
55-60	8	7.48	107.0%	9	14.93	60.3%	17	22.41	75.9%
60-64	1	4.19	23.8%	8	6.55	122.1%	9	10.75	83.8%
Total	**15**	**18.75**	**80.0%**	**36**	**39.20**	**91.8%**	**51**	**57.94**	**88.0%**

Appendix

Terminations – Select Period

2004-2008 Experience, Service <3 Years

Age Group	Males			Females			Total		
	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected
0-1	1,531	1,793.70	85.4%	4,421	4,961.69	89.1%	5,952	6,755.39	88.1%
1-2	1,141	699.84	163.0%	3,292	1,873.60	175.7%	4,433	2,573.44	172.3%
2-3	476	256.92	185.3%	1,721	1,124.16	153.1%	2,197	1,381.08	159.1%
Total	3,148	2,750.46	114.5%	9,434	7,959.45	118.5%	12,582	10,709.91	117.5%

2004-2005 Experience, Service <3 Years

Age Group	Males			Females			Total		
	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected
0-1	471	518.40	90.9%	1,222	1,375.20	88.9%	1,693	1,893.60	89.4%
1-2	296	173.76	170.3%	721	438.30	164.5%	1,017	612.06	166.2%
2-3	84	63.24	132.8%	330	257.76	128.0%	414	321.00	129.0%
Total	851	755.40	112.7%	2,273	2,071.26	109.7%	3,124	2,826.66	110.5%

2005-2006 Experience, Service <3 Years

Age Group	Males			Females			Total		
	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected
0-1	366	475.65	76.9%	1,118	1,295.29	86.3%	1,484	1,770.94	83.8%
1-2	250	174.12	143.6%	763	473.40	161.2%	1,013	647.52	156.4%
2-3	116	64.38	180.2%	422	275.12	153.4%	538	339.50	158.5%
Total	732	714.15	102.5%	2,303	2,043.81	112.7%	3,035	2,757.96	110.0%

2006-2007 Experience, Service <3 Years

Age Group	Males			Females			Total		
	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected
0-1	321	373.95	85.8%	1,012	1,122.40	90.2%	1,333	1,496.35	89.1%
1-2	357	183.36	194.7%	1,088	505.50	215.2%	1,445	688.86	209.8%
2-3	182	66.84	272.3%	554	298.56	185.6%	736	365.40	201.4%
Total	860	624.15	137.8%	2,654	1,926.46	137.8%	3,514	2,550.61	137.8%

Appendix

Terminations – Select Period

2007-2008 Experience, Service <3 Years

Age Group	Males			Females			Total		
	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected
0-1	373	425.70	87.6%	1,069	1,168.80	91.5%	1,442	1,594.50	90.4%
1-2	238	168.60	141.2%	720	456.40	157.8%	958	625.00	153.3%
2-3	94	62.46	150.5%	415	292.72	141.8%	509	355.18	143.3%
Total	**705**	**656.76**	**107.3%**	**2,204**	**1,917.92**	**114.9%**	**2,909**	**2,574.68**	**113.0%**

Appendix

Terminations – Ultimate

2004-2008 Experience

Age Group	Males Actual Terminations	Males Expected Terminations	Males Actual/ Expected	Females Actual Terminations	Females Expected Terminations	Females Actual/ Expected	Total Actual Terminations	Total Expected Terminations	Total Actual/ Expected
25-29	222	135.62	163.7%	755	594.13	127.1%	977	729.75	133.9%
30-34	321	229.27	140.0%	1,123	909.57	123.5%	1,444	1,138.84	126.8%
35-39	261	250.28	104.3%	807	761.85	105.9%	1,068	1,012.13	105.5%
40-44	163	198.07	82.3%	557	481.95	115.6%	720	680.02	105.9%
45-49	173	167.60	103.2%	534	468.83	113.9%	707	636.43	111.1%
50-54	202	188.52	107.2%	651	515.64	126.3%	853	704.15	121.1%
Total	**1,342**	**1,169.36**	**114.8%**	**4,427**	**3,731.98**	**118.6%**	**5,769**	**4,901.34**	**117.7%**

2004-2005 Experience

Age Group	Males Actual Terminations	Males Expected Terminations	Males Actual/ Expected	Females Actual Terminations	Females Expected Terminations	Females Actual/ Expected	Total Actual Terminations	Total Expected Terminations	Total Actual/ Expected
25-29	46	35.68	128.9%	116	147.19	78.8%	162	182.88	88.6%
30-34	42	57.94	72.5%	150	216.14	69.4%	192	274.09	70.1%
35-39	40	57.47	69.6%	109	170.46	63.9%	149	227.93	65.4%
40-44	23	46.83	49.1%	87	115.52	75.3%	110	162.34	67.8%
45-49	26	41.97	61.9%	94	117.99	79.7%	120	159.96	75.0%
50-54	37	51.70	71.6%	132	138.74	95.1%	169	190.43	88.7%
Total	**214**	**291.59**	**73.4%**	**688**	**906.04**	**75.9%**	**902**	**1,197.63**	**75.3%**

2005-2006 Experience

Age Group	Males Actual Terminations	Males Expected Terminations	Males Actual/ Expected	Females Actual Terminations	Females Expected Terminations	Females Actual/ Expected	Total Actual Terminations	Total Expected Terminations	Total Actual/ Expected
25-29	63	34.64	181.8%	188	150.57	124.9%	251	185.21	135.5%
30-34	90	58.47	153.9%	299	229.79	130.1%	389	288.26	134.9%
35-39	51	62.42	81.7%	225	190.94	117.8%	276	253.36	108.9%
40-44	57	49.40	115.4%	146	121.65	120.0%	203	171.04	118.7%
45-49	65	42.01	154.7%	125	117.04	106.8%	190	159.05	119.5%
50-54	66	49.91	132.2%	186	133.62	139.2%	252	183.53	137.3%
Total	**392**	**296.85**	**132.1%**	**1,169**	**943.60**	**123.9%**	**1,561**	**1,240.45**	**125.8%**

Appendix

Terminations – Ultimate

2006-2007 Experience

Age Group	Males			Females			Total		
	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected
25-29	66	33.74	195.6%	255	148.68	171.5%	321	182.42	176.0%
30-34	103	56.95	180.9%	403	229.35	175.7%	506	286.30	176.7%
35-39	107	65.40	163.6%	285	201.69	141.3%	392	267.08	146.8%
40-44	37	49.99	74.0%	182	122.11	149.0%	219	172.10	127.3%
45-49	49	41.64	117.7%	171	117.30	145.8%	220	158.94	138.4%
50-54	54	45.54	118.6%	186	125.80	147.8%	240	171.35	140.1%
Total	**416**	**293.27**	**141.9%**	**1,482**	**944.93**	**156.8%**	**1,898**	**1,238.19**	**153.3%**

2007-2008 Experience

Age Group	Males			Females			Total		
	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected	Actual Terminations	Expected Terminations	Actual/ Expected
25-29	47	31.55	149.0%	196	147.69	132.7%	243	179.24	135.6%
30-34	86	55.91	153.8%	271	234.29	115.7%	357	290.20	123.0%
35-39	63	64.99	96.9%	188	198.77	94.6%	251	263.76	95.2%
40-44	46	51.86	88.7%	142	122.69	115.7%	188	174.54	107.7%
45-49	33	41.97	78.6%	144	116.50	123.6%	177	158.47	111.7%
50-54	45	41.37	108.8%	147	117.48	125.1%	192	158.85	120.9%
Total	**320**	**287.65**	**111.2%**	**1,088**	**937.41**	**116.1%**	**1,408**	**1,225.06**	**114.9%**

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