NORTH DAKOTA TEACHERS' FUND FOR RETIREMENT

ACTUARIAL EXPERIENCE STUDY

AS OF JUNE 30, 2009

Gabriel Roeder Smith & Company

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Board of Trustees
North Dakota Teachers' Fund for Retirement
P.O. Box 7100
Bismarck, ND 58507-7100

Dear Members of the Board:

Subject: Results of 2009 Experience Study

We are pleased to present our report of the 2009 Experience Study for the North Dakota Teachers' Fund for Retirement (TFFR). It includes a discussion of experience during the last five years, it presents our recommendations for new actuarial assumptions and methods, and it provides information about the actuarial impact of these recommendations on the margin and other key actuarial measures.

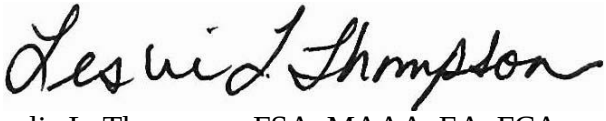
With the Board's approval of the recommendations in this report, we believe the actuarial condition of the System will be more accurately portrayed.

The study was conducted in accordance with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. The undersigned both meet the Qualification Standards of the American Academy of Actuaries

We wish to thank the RIO staff for their assistance in this project.

Sincerely,

J. Christian Conradi, ASA, MAAA, EA, FCA
Senior Consultant



Leslie L. Thompson, FSA, MAAA, EA, FCA
Senior Consultant

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SECTION I

INTRODUCTION

Introduction

In determining liabilities, contribution rates and funding periods for retirement plans, actuaries must make assumptions about the future. Among the assumptions that must be made are:

- Retirement rates
- Mortality rates
- Termination rates
- Disability rates
- Investment return rate
- Salary increase rates
- Inflation rate

For some of these assumptions, such as the mortality rates, past experience provides important evidence about the future. For other assumptions, such as the investment return rate, the link between past and future results is much weaker. In either case, though, actuaries should review their assumptions periodically and determine whether these assumptions are consistent with actual past experience and with anticipated future experience.

TFFR has an experience study done every fifth year. This study is generally based on experience during the five-year period FY 2005 – FY 2009. The last experience study was prepared in 2005 following completion of the July 1, 2004 actuarial valuation report. That report generally covered experience during FY 2000 – FY 2004.

In conducting experience studies, actuaries generally use data over a period of several years. This is necessary in order to gather enough data so that the results are statistically significant. In addition, if the study period is too short, the impact of the current economic conditions may lead to misleading results. It is known, for example, that the health of the general economy can impact salary increase rates and withdrawal rates. Using results gathered during a short-term boom or bust will not be representative of the long-term trends in these assumptions. Also, the adoption of legislation, such as plan improvements or changes in salary schedules, will sometimes cause a short-term distortion in the experience. For example, if an early retirement window was opened during the study period, we would usually see a short-term spike in the number of retirements followed by a dearth of retirements for the following two-to-four years. Using a longer period prevents giving too much weight to such short-term effects. On the other hand, using a much longer period would water down real changes that may be occurring, such as mortality improvement or a change in the ages at which members retire. In our view, using a five-year period is reasonable. However, note that in our analysis of salary increases, we used data for the last ten years, and for some of the assumptions where little data was available, we kept in mind the results for the last ten years.

In an experience study, we first determine the number of deaths, retirements, etc. that occurred during the period. Then we determine the number expected to occur, based on the current actuarial assumptions. The number "expected" is determined by multiplying the probability of the occurrence at the given age, by the "exposures" at that same age. For example, let's look at a rate

of retirement of 50% at age 55. The number of exposures can only be those members who are age 55 and eligible for retirement at that time. Thus they are considered "exposed" to that assumption. Finally we calculate the A/E ratio, where "A" is the actual number (of retirements, for example) and "E" is the expected number. If the current assumptions were "perfect", the A/E ratio would be 100%. When it varies much from this figure, it is a sign that new assumptions may be needed. Of course we not only look at the assumptions as a whole, but we also review how well they fit the actual results by sex, by age, and by service.

Finally, if the data leads the actuary to conclude that new tables are needed, the actuary "graduates" or smoothes the results since the raw results can be quite uneven from age to age or from service year to service year.

Please bear in mind that, while the recommended assumption set represents our best estimate, there are other reasonable assumptions sets that could be supported. Some reasonable assumption sets would show much higher or lower liabilities or margins. For example, while we recommend continuing with the 8.00% investment return assumption, others might argue for a lower or higher rate. Yet even a 0.25% change in this one assumption would dramatically affect the UAAL, margin, funded ratio, etc. For example, we would expect to see changes of over one percentage point in the annual required contribution due to a 0.25% change in this one assumption.

ORGANIZATION OF REPORT

Section II contains our findings and recommendations for each actuarial assumption. The impact of adopting our recommendations on liabilities and contribution rates is shown in Section III. Section IV summarizes the recommended changes. Finally, Section V presents detailed summaries of the data and comparisons of the A/E ratios.

SECTION V EXHIBITS

The exhibits in Section V should generally be self-explanatory. For example, on page 37, we show the exhibit analyzing the male termination rates. The second column shows the total number of males who terminated during the study period. This excludes members who died, became disabled or retired. Column (3), labeled "Total Count" shows the total exposures. This is the number of males who could have terminated during any of the years. On this exhibit, the exposures exclude anyone eligible for retirement. A member is counted in each year he could have terminated, so the total shown is the total exposures for the five year period. Colum (4) shows the probability of termination based on the raw data. That is, it is the result of dividing the actual number of terminations (col. 2) by the number exposed (col. 3). Column (5) shows the current average termination rate and column (6) shows the new recommended termination rate. Columns (7) and (8) show the expected numbers of terminations based on the current and proposed termination assumptions. Columns (9) and (10) show the Actual-to-Expected ratios under the current and proposed termination assumptions.

SECTION II

ANALYSIS OF EXPERIENCE AND RECOMMENDATIONS

Analysis of Experience and Recommendations

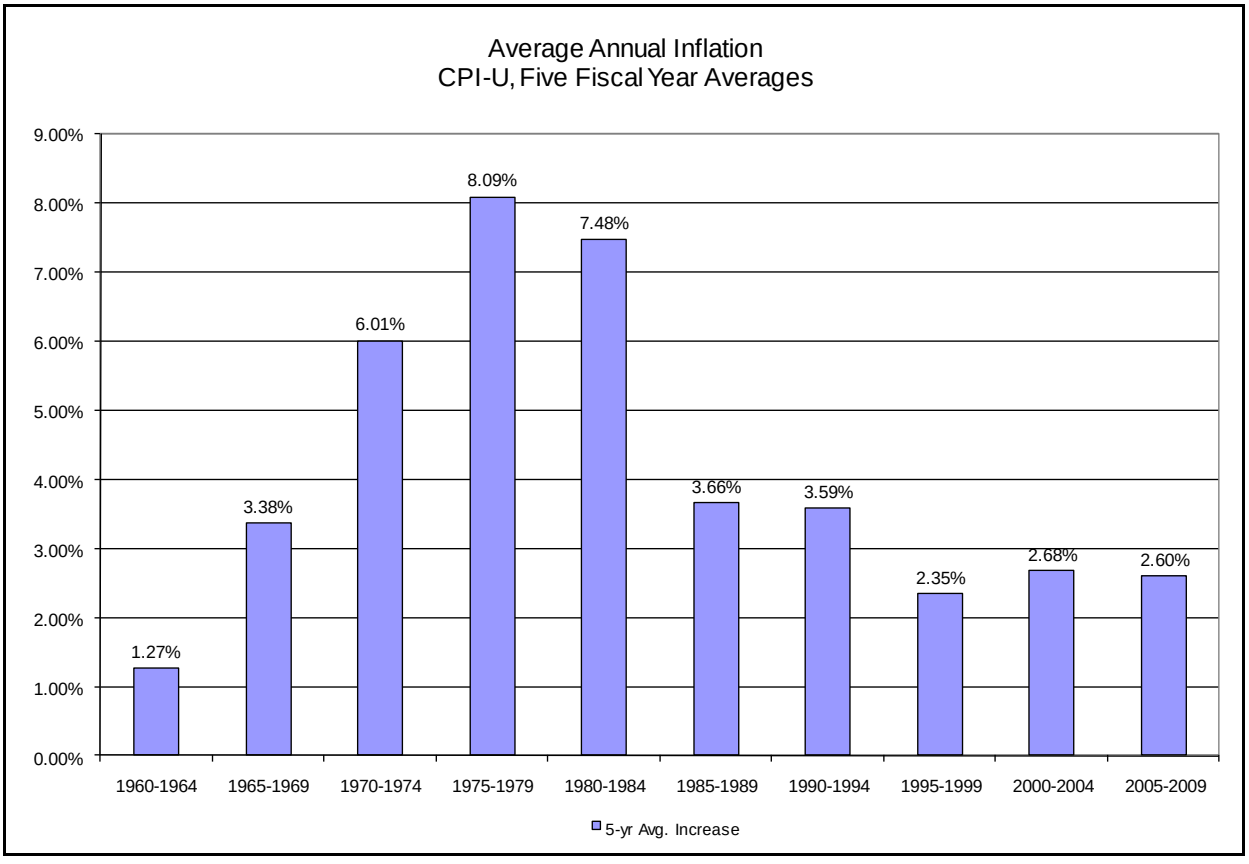
We will begin by discussing the economic assumptions: inflation, the investment return rate, and the salary increase assumption. We will then discuss the membership and payroll growth rates. Next are the demographic assumptions: mortality, disability, termination and retirement. Finally we will discuss the actuarial methods used.

INFLATION

By "inflation," we mean price inflation, as measured by annual increases in the Consumer Price Index (CPI). This inflation assumption underlies all of the other economic assumptions we employ. It impacts investment return, salary increases, and payroll growth. Our current annual inflation assumption is 3.00%.

Over the five-year period from June 2004 through June 2009, the CPI-U has increased at an average rate of 2.60%. However, the assumed inflation rate is only weakly tied to past results.

The chart below shows the average annual inflation in each of the ten consecutive five-year periods over the last fifty years:



The table below shows the average inflation over various periods, ending June 2009:

Periods Ending June 2009	Average Annual Increase in CPI-U
Last five (5) years	2.60%
Last ten (10) years	2.64%
Last fifteen (15) years	2.54%
Last twenty (20) years	2.80%
Last twenty-five (25) years	2.97%
Last fifty (50) years	4.09%
Since 1913 (first available year)	3.27%

Source: Bureau of Labor Statistics, CPI-U, all items, not seasonally adjusted

As you can see, while inflation has been lower than 3.00% over the last twenty-five years, if we look back over a period of 25 or more years, inflation has averaged around or above 3.00% per year. Most observers expect inflation to be low or non-existent for the next 1-3 years, as the US economy works out of the current recession. After that, many expect inflation to increase as a consequence of the large amount of government borrowing.

The investment consulting firms set an inflation assumption, as part of setting their capital market assumptions. We examined the 2009 capital market assumption sets for five investment consulting firms, including Callan, TFFR's consultant. These ranged from 2.30% to 3.00%, with an average of 2.71%. Callan's assumption was 2.75%. However, the investment consulting firms typically set their assumptions based on a five or ten year outlook, while actuaries must make much longer projections.

Another source of information about future inflation is the market for US Treasury bonds and TIPs (Treasury Inflation Protection bonds). For example, the June 30, 2009 yield for a 20-year inflation indexed Treasury bond was 2.12% plus actual inflation. The yield for a 20-year non-indexed US Treasury bond was 4.30%. Simplistically, this means that on that day the bond market was predicting that inflation over the next twenty years would average 2.18% (4.30% – 2.12%) per year. One year before, as of June 30, 2008, the imputed inflation rate was 2.75%.

However, this analysis is known to be imperfect. It ignores the inflation risk premium that buyers of US Treasury bonds should ask for, and it ignores the differences in liquidity between US Treasury bonds and TIPs. For a number of years, the Cleveland Fed published on its website an adjusted inflation expectation, using formulas to adjust the raw results for these two factors. However, because of the unprecedented rush to safety and liquidity following the market meltdown, demand for US Treasury bonds soared, and the spreads between treasuries and TIPs shrank. As a result, the Cleveland Fed discontinued publication of its adjustments, believing their formulas would not work in the current economic climate.

Another source of information about this assumption is the Public Funds Survey that is prepared on behalf of the National Association of State Retirement Administrators (NASRA) and the National

Council on Teacher Retirement (NCTR). This report surveys about 125 plans, including all of the largest public funds covering state employees or teachers. The current survey shows that the median inflation rate assumed for large public retirement systems in the U.S. is 3.50%. Our current 3.00% assumption is used by about 25% of the surveyed systems, with almost all of the rest using higher assumptions.

We believe that inflation may continue to be less than 3.00% annually over the next few years, but we believe a 3.00% rate of inflation is likely over the long term. This is in line with the average for the last 25 years, and a little below the long-term historical average. Therefore, we are recommending retaining the 3.00% inflation assumption.

INVESTMENT AND ADMINISTRATIVE EXPENSES

Since the trust fund pays expenses in addition to member benefits and refunds, we must make some assumption about these. Almost all actuaries treat investment expenses as an offset to the investment return assumption. That is, the investment return assumption represents expected return after payment of investment expenses.

On the other hand, there is a divergence of practice on the handling of administrative expenses. Some actuaries make an assumption that administrative expenses will be some fixed or increasing dollar amount, others assume that the administrative expenses will be some percentage of the plan's actuarial liabilities or normal cost, and others treat administrative expenses like investment expenses, as an offset to the investment return assumption.

Our practice is to set the investment return assumption as the net return after payment of both investment and administrative expenses. In the last experience study, based on data through June 30, 2004, we assumed these expenses would average 0.45% per year.

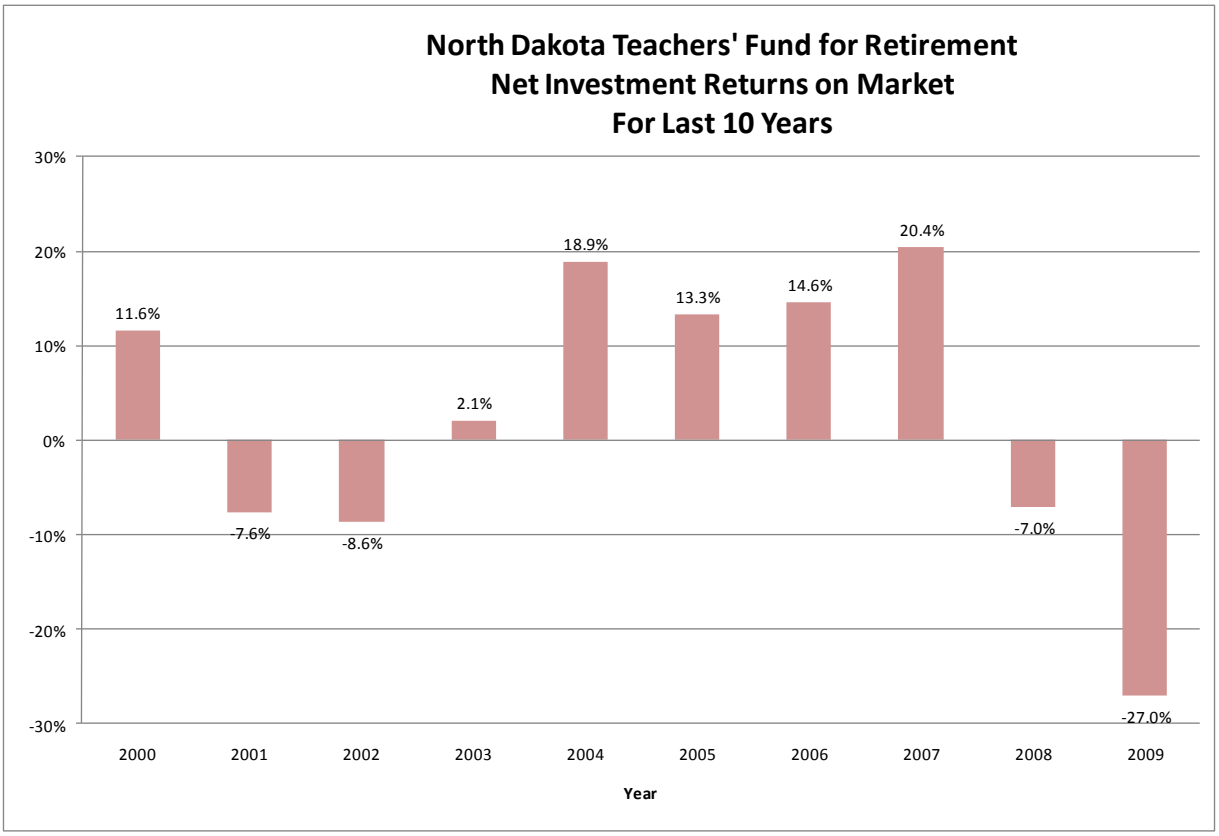
This chart shows the administrative and investment expenses for the last five years expressed as a percentage of the assets each year:

Annual Expenses Expressed as a Percentage Assets			
Fiscal Year	Administrative	Investment	Total
2009	0.11%	0.42%	0.53%
2008	0.08%	0.59%	0.67%
2007	0.08%	0.56%	0.64%
2006	0.09%	0.67%	0.76%
2005	0.14%	0.42%	0.56%
Average	0.10%	0.53%	0.63%

Based on this information, we have assumed that investment and administrative expenses will consume 0.65% (65 basis points) of each year's investment return in the future. This assumption is then used in setting the investment return assumption.

INVESTMENT RETURN

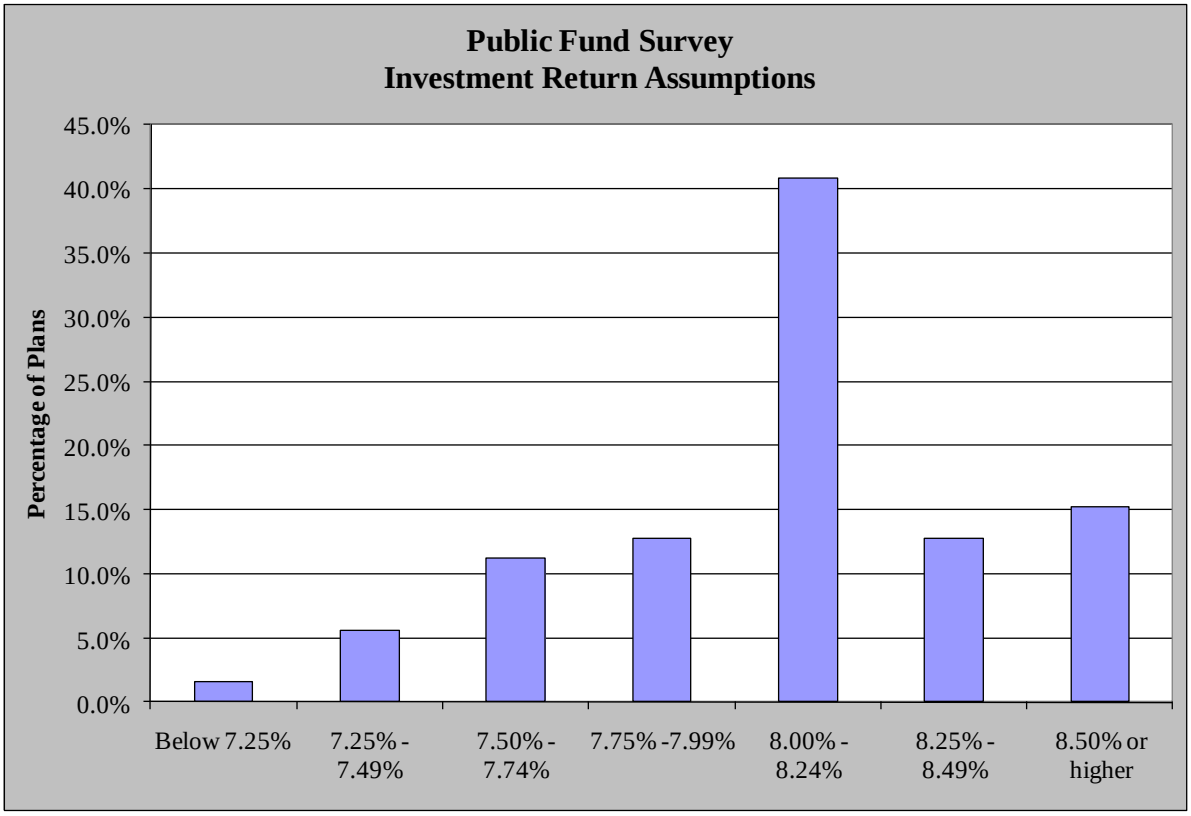
Currently, TFFR assumes an investment return rate of 8.00%, net of investment and administrative expenses. This is the rate used in discounting future payments in calculating the actuarial present value of those payments. The current assumption assumes inflation of 3.00% per annum and an annual real rate of return of 5.00%, net of expenses. The following chart shows the year-by-year returns, net of investment and administrative expenses, for the last ten fiscal years.



For the last ten years, the average market return net of investment and administrative expenses has been about 2.0%, and for the last twenty years the average net return has been about 6.6%. However, for this assumption, past performance, even averaged over a twenty-year period, is not a reliable indicator of future performance.

The actual asset allocation of the trust fund will significantly impact the overall performance, so returns achieved under a different allocation are not meaningful. More importantly, the real rates of return for many asset classes, especially equities, vary so dramatically from year to year that even a twenty-year period is not long enough to provide reasonable guidance.

You should note that 8.00% is still the median investment return assumption used by large public pension plans, per the Public Funds survey. The chart below shows the distribution of assumed returns from the survey.



We believe a better approach to selecting an investment return assumption is to determine the median expected portfolio return given the fund's target allocation and given a set of capital market assumptions. Since we are not investment professionals, we looked at the results under the capital market assumptions used by five different investment consulting firms, including Callan.

Per TFFR's CAFR, the current target asset allocation is:

Equities – Large Cap US	28%
Equities – Small Cap US	10%
Equities – International (EAFE)	18%
Equities – Emerging Markets	5%
Private Equity	5%
Domestic Fixed Income	12%
High-yield Bonds	7%
International Fixed Income	5%
Cash Equivalents	1%
Real Estate	9%
Total	100%

The modeling results are shown in the table below:

Investment Consultant	Expected Gross Return	Consultant's Assumed Inflation	Expected Real Return [(2)-(3)]	Assumed Offset for Expenses	Expected Net Real Return [(4)-(5)]
(1)	(2)	(3)	(4)	(5)	(6)
Consultant 1	8.79%	2.75%	6.04%	0.65%	5.39%
Consultant 2	9.47%	3.00%	6.47%	0.65%	5.82%
Consultant 3	7.50%	2.50%	5.00%	0.65%	4.35%
Consultant 4	9.09%	2.30%	6.79%	0.65%	6.14%
Consultant 5	9.37%	3.00%	6.37%	0.65%	5.72%
Average	8.84%	2.71%	6.13%	0.65%	5.48%

Therefore, four of the five sets support a 5.00% net real return, and one does not. The average of the five also is above 5.00%. Coupled with our 3.00% inflation assumption, that means we recommend continuing to assume 8.00% net investment returns in the future. This means the trust will need to achieve an average gross return of 8.65%.

Arguably, the results of the analysis would even support an increase in the assumed return, but given the poor returns over the last two decades, we would prefer to have some margin for conservatism here. Therefore, we recommend retaining the current 8.00% net investment return assumption.

We believe it is also important for the Retirement Board to bear in mind the risk involved. You can see from the chart of annual returns shown earlier how wildly the year-by-year returns can swing. Only in one of the ten years was the return within 5.00 percentage points (500 basis points) of the 8.00% assumption. The standard deviation of the investment returns is around 13%, depending on the particular set of capital market assumptions used. This means that even over a ten or twenty year period, there is a significant possibility that the average return will be less than 6.5% or greater than 9.5%.

SALARY INCREASE RATES

In order to project future benefits, the actuary must project future salary increases. Salaries may increase for a variety of reasons:

- Across-the-board increases provided by the state for all teachers
- Across-the-board increases for all teachers in a district
- Increases to a statewide minimum teacher salary schedule
- Additional pay for additional duties, such as teaching in a summer program
- Step or service-related increases
- Increases for acquisition of advanced degrees or specialized training
- Promotions
- Merit increases, if available
- Bonuses, if available

Our salary increase assumption is meant to reflect all of these types of increases, since all of these affect the salaries used in benefit calculations and upon which contributions are made.

The actuary should not look at the overall increases in payroll in setting this assumption, because payroll can grow at a rate different from the average pay increase for individual members. There are two reasons for this. First, when older, longer-service members terminate, retire or die, they are generally replaced with new teachers who have a lower salary. Because of this, in most populations that are not growing in size, the growth in total payroll will be smaller than the average pay increase for members. Second, payroll can change due to an increase or decrease in the size of the group. Therefore, to analyze salary increases, we examine the actual increases for individuals.

We analyzed the salary increases based on the change in the member's reported pay from one year to the next. That is, we looked at each member who appeared as an active member in two consecutive valuations—these are called continuing members—and measured his/her salary increase.

Salary increases for teachers can vary significantly from year to year. When the employer's tax revenues stall or increase slowly, salary increases can be small or nonexistent. During good times, salary increases can be larger. Our experience across many teacher systems also shows many occasions in which salary increases will be low for a period of several years followed by a significant increase in one year. Therefore, for this assumption in particular, we prefer to use data over a longer period in establishing our assumptions. We used a ten-year period to analyze this assumption.

Over the last ten years, the average pay increases for continuing members were as follows:

Period	Increase
FY 1999 to FY 2000	5.99%
FY 2000 to FY 2001	5.34%
FY 2001 to FY 2002	6.56%
FY 2002 to FY 2003	7.42%
FY 2003 to FY 2004	5.01%
FY 2004 to FY 2005	4.93%
FY 2005 to FY 2006	5.12%
FY 2006 to FY 2007	4.66%
FY 2007 to FY 2008	6.44%
FY 2008 to FY 2009	5.92%
Average	5.74%

Increases for FY 2002 and FY 2003 were the largest in the last ten years, probably a reflection of the additional $3,000 per teacher provided by the legislature for pay increases during that two-year period ($1,000 in FY 2002 and an additional $2,000 in FY 2003). On the other hand, increases in this study averaged 5.74% over the last ten years, while increases averaged 5.44% in the prior study, covering FY 1994 through FY 2004.

The salary assumption can be thought of as consisting of wage inflation (that part of the pay increase which is given to all employees) and an additional component to reflect step increases and other increases correlated with service. Most actuaries recommend salary increase assumptions that include an element that depends on the member's age or service, especially for large, public retirement systems. It is typical to assume larger pay increases for younger or shorter-service employees. Experience shows salaries are more closely correlated to service than age, since most teacher salary schedules are based on service.

Our current assumptions follow this pattern. Therefore, we divide the task of setting the salary increase into two pieces:

1. Determining the assumption for long-service employees (wage inflation)
2. Determining the additional increases to be applied to shorter-service employees

The current salary increase rates vary by service. They range from 14.00% for new teachers to 4.50% for the teachers with 15 or more years of service. That is, the wage inflation assumption is 4.50%. The average increase, taking into account TFFR's age/service distribution, is 5.76%.

One might assume that since the actual increases averaged 5.74%, while the expected average on the current assumptions is 5.76%, the current assumption does not need to be changed. However,

this ignores the fact that over the study period inflation averaged 2.64%, while we assume it will average 3.00% in the future. If inflation had been higher over the last ten years, we believe actual salary increases also would have been higher by a similar amount. Our analysis must adjust for this difference. Further, we must examine the results for each of the service groups, not just in total.

Results of this analysis are shown in Section V on page 43.

One thing we noted was that, while we had previously used a single assumed increase rate for all members with 15 or more years of service, the data did not support this practice. The average increase for members with 15-24 years of service over the period was 5.70%, while the average for members with 25 or more years of service was 4.24%. Therefore, we decided to extend the select period from 15 years to 25 years.

Next, we backed out actual inflation during the period (2.64%), arriving at the real rates of increase. We smoothed these rates, and then added back our assumed 3.00% inflation rate to arrive at the new recommended rates. We believe that in periods of higher inflation, salary increases will be higher by a similar amount.

As you can see from the exhibit on page 43, the rates of increase for years 1-8 are unchanged. (These correspond to a teacher's second through ninth annual increases.) The first increase was changed from 14.00% to 14.75%, about 0.25% was added to the rate for service 9-14, and rates at service 15-24 were increased between 0.25% and 1.00%. We left the ultimate increase for long service employees unchanged at 4.50%. The recommended assumption produces an average increase of 6.02%.

MEMBERSHIP GROWTH RATE

Currently, when doing a projection, we assume the number of active members will decrease over time. This assumption was set several years ago based on projections made by the US Census Bureau. These projections showed that the population of school age children in North Dakota would decrease significantly. This projection was in turn the result of a large amount of emigration from North Dakota of people in their late teens or early 20s who left the state in the late 1980s and early 1990s, after graduation from high school or college. These are people who would have had children in North Dakota if they had remained in the state. We assumed tacitly that a decrease in the number of students would produce a decrease in the number of teachers needed.

In fact, the population of school age children has declined significantly. The Department of Public Instruction (DPI) has reported that public school enrollment fell about 25,000 since 1994 (118,512 in 1994 to 93,406 in 2009), a 21% decrease. However, during the same 15-year period, active membership in TFFR went from 9,653 to 9,561, or only a 1% decrease.

Our current assumption is that active membership will decrease 0.5% per year. This assumption does not affect the results of the actuarial valuation; it is only used in the projections.

In 2005, the US Census Bureau released projections to 2030 by age for each state. These projections are based on the 2000 census. These projections show that the North Dakota

population of school-age children (age 5-17) is expected to decrease 0.31% per year between 2010 (103,095) and 2030 (96,861), a 6% decrease.

This projection might argue for continuing to assume some membership decrease will occur, but the DPI report argues against this, since a much larger decrease in the student population resulted in almost no change to the number of members. DPI does not expect to see any significant decrease in the number of members over the next ten years. Also, the North Dakota State Data Center reported that net migration between July 1, 2007 and July 1, 2008 was positive (albeit a very small positive).

On the strength of this information, we now recommend assuming no change in the active membership in the future (i.e. assuming that the active membership remains constant).

One caveat to bear in mind, though, is that this assumes there will not be a significant increase in students educated outside the public schools by non-TFFR members, such as might occur if:

- There were extreme budget constraints or school closings
- A voucher program was instituted, resulting in a shift to private or parochial schools
- The number of students being home schooled or attending charter schools increased

NEW HIRE SALARY INCREASES

Another assumption used only in the projections is the rate of increase in the average starting pay for each year's group of new members. In past projections, we have assumed that new entrant pay increased by 4.00% over the pays for the prior year's cohort of new hires. This assumption is supported by recent experience, when adjusted for differences between actual and assumed inflation.

In FY 2004, the average salary for the cohort of new hires was $23,987, while in FY 2009 it was $28,600, implying an average increase of 3.58%. Over this period, inflation averaged 2.60%, so the average new hire received an inflationary increase +0.98%. Since we assume inflation of 3.00% in the future, this suggests that salaries for each cohort of new hires will increase at 3.98% per year, which we round to 4.00%. This is consistent with the results over the last fifteen years.

Therefore, we recommend retaining the assumption that salaries for each cohort of new members will increase 4.00% per year.

PAYROLL GROWTH RATE

The salary increase rates discussed above are assumptions applied to individuals. They are used in projecting future benefits. We also use a separate payroll growth assumption, currently 2.00%, in determining the charge needed to amortize the unfunded actuarial accrued liability. The amortization payments are calculated to be a level percentage of payroll, so as payroll increases over time, these charges do too. The amortization percentage is dependent on the rate at which payroll is assumed to increase.

Over the last five years, payroll growth has averaged 3.16%, and it has averaged 3.41% over the last ten years.

Note that this is less than the lowest recommended salary increase rate (4.50%). This is because of the effect of older teachers retiring or terminating and being replaced by new starting teachers.

Theoretically, over the long term the total payroll for a population of constant size should grow at about the rate that starting pays increase. However, because of the baby boomer retirements expected over the next 10-15 years, we expect actual payroll growth to be lower than 4.00%. When we looked at projection results, with no decrease in active membership and the 4.00% salary increase rate for new entrant cohorts, we found that over the next twenty years, total payroll was expected to increase as shown:

Projected Payroll	
2009	$ 466.9 million
2019	$ 628.5 million
2029	$ 902.0 million
2039	$1,332.8 million

From this we can compute the average expected rate of increase over the future, as seen here:

Projected Payroll Growth	
Next 10 years	3.02%
Next 20 years	3.35%
Next 30 years	3.56%

Our recommendation is to use a 3.25% expected payroll growth rate.

Although not relevant in TFFR's case, we should note that GASB 25 prohibits systems from using anticipated membership growth in setting the payroll growth assumption.

POST-RETIREMENT MORTALITY RATES

TFFR's liability depends in part on how long retirees live. If members live longer, benefits will be paid for a longer period of time, and the liability will increase.

The mortality table currently being used for non-disabled retirees and for beneficiaries receiving benefits is the 1994 Uninsured Pensioner Mortality Table. The table has separate rates for males and females. The rates are then adjusted by using a three-year setback for males and a two-year setback for females. (Set-backs and set-forwards are traditional actuarial techniques used to adjust a table to match the actual observed data. When a table is set back three years, the actuary uses the table's rate for an age three years younger than the person's actual age. For example, the mortality rate used for a 60-year old male retiree is the rate in the 1994 Group Annuity Mortality Table for males at age 57.)

To analyze the data, we begin by determining the expected number of deaths in each year at each age for males and females. Then we compare the actual number to the expected number. The ratio of the actual deaths to the expected deaths—the A/E ratio—then tells us whether the assumptions are reasonable. The results of this analysis are shown in Section V on pages 29 (males) and 30 (females).

There were 239 deaths among the male retirees and 558 deaths among female retirees during the last five years. (These figures exclude deaths among beneficiaries and disabled retirees.) Based on the current tables, we expected 243 and 558 deaths respectively. This produced A/E ratios of 98% for males and 100% for females. This is a good match in total, but on this assumption, we aim for a higher A/E ratio because we expect to see continuing mortality improvement (longer life expectancies) in the future.

Further, we have noticed that the standard published mortality tables, even when adjusted to match the overall number of deaths, fit your experience poorly in the age range from 65 to 80. Note for example that there were 105 expected female deaths between ages 65 and 80, but there will only 72 actual females deaths in this age range. This poor fit leads to understatement of the liabilities. We have seen this same poor fit in this age range in other teacher systems, especially ones that do not include support personnel.

Therefore, we are recommending the adoption of new tables. A few years ago, we constructed new tables based on experience for another state's teachers. This state, like North Dakota, is among the states with the longest life expectancies. Then we adjusted these mortality tables by multiplying the male rates by 80% and the female rates by 75%.

As you can see on the exhibits on pages 29 and 30, this does two things:

- It produces A/E ratios that are more conservative: 118% for males and 115% for females. This provides a margin for future mortality improvement.

- It significantly improves the fit of the assumptions to the actual experience

This is the change with the largest impact on liabilities and costs, as will be discussed later.

DISABLED MORTALITY RATES

This is a minor assumption, and it has little impact on the liabilities. See the analysis exhibits on pages 31 and 32. There were only 21 deaths among the disabled retirees during the five-year study period (8 males and 13 females). However, we expected 17 deaths (7 males and 10 females). This produced A/E ratios of 70% and 77% respectively. Because of the very small number of deaths, the results carry little credibility. However, the A/E ratios for the five years before the study period were also low, with 8 deaths vs. 13 expected deaths. Also, the current tables are based on Social Security Administration experience from the 1970s, and are dated. Therefore, we recommend adopting the RP-2000 disabled-life tables for males and females, and then multiplying the male rates by 80% and the female rates by 95%, to better fit the experience and give a margin for future improvement. This produces A/E ratios of 116% and 121% for males and females respectively.

ACTIVE MORTALITY RATES

This is another minor assumption with little impact on the contribution rates.

Mortality across employee groups is generally lower than the mortality rates in the post-retirement mortality tables. We currently assume the active mortality rates will be 65% of the post-retirement mortality rates.

The results of the analysis are shown in Section 7 on pages 33 and34. As you can see, there were 30 actual deaths (14 males and 16 females), while there were 52 expected deaths (20 males and 32 females). This produced A/E ratios of 70% and 49% respectively. Note that in the study five years ago, there were 45 active member deaths. Although the number of deaths isn't large enough for the results to have much credibility, we concluded that a change was warranted.

We recommend assuming that male active mortality rates are 60% of the post-retirement rates, and female active mortality is 40% of the post-retirement mortality rates. This change produces A/E ratios of 88% and 70% respectively. We did not want to lower the rates further, since there is little data, and since it is difficult to believe that much more real improvement occurred over a five year period. The new assumption is in line with experience over the last ten years, about 7-8 deaths per year.

DISABILITY RATES

Disability is also a minor assumption.

The results of the analysis are shown in Section V, on pages 35 and36. There were 40 new disabled retirees during the period, while we expected 64. The A/E ratios were 58% and 64% for males and females respectively. Five years ago, the overall A/E ratio was 74%, but we chose not to change the assumption, in part because of the higher number during the 1994-1999 period. But now, with ten years of data indicating the current rates are too high, we are recommending a change. The rates were reduced by roughly one-third. This produces A/E ratios of 84% and 93% respectively. We wanted to end up with A/E ratios below 100% to be conservative and to account for members who may have become disabled late in the period but who were not approved for disability at the end of the period.

TERMINATION RATES

Termination rates reflect members who leave for any reason other than death, disability, or service retirement. They apply whether the termination is voluntary or involuntary, and whether the member takes a refund or keeps his/her account balance on deposit. The current termination rates reflect the member's age, service, and sex.

Analysis results are shown in Section V on pages 37 and 38. In the aggregate, the current assumptions produce an A/E ratio for males of 104% and an A/E ratio for females of 112%. For this assumption, A/E ratios over 100% are conservative. This is a reasonably good match, but we are recommending new rates here as well, for two reasons.

First, when we took a look at members with service over ten years, we found material differences between the experience for members with 10-14 years of service and members with 20 or more years of experience. We were concerned that, despite the reasonable match between our assumptions and experience in total, we were understating liabilities by grouping members with 10-14 years of service (members who have relatively modest benefits) with those who are nearly eligible for retirement. Second, some other actuaries have criticized the use of age-service termination rates as overly complex. Therefore, we are proposing changing to new rates which vary by service and sex only, with separate rates set for service from 0-28 years.

The proposed new assumptions produce A/E ratios of 102% and 103% for males and females respectively, and produce better matches to experience by service, as shown in summary here:

Service	Males		Females	
	Current	Proposed	Current	Proposed
Service 0-4	122.1%	102.0%	121.8%	101.1%
Service 5-9	76.4%	101.8%	92.8%	104.8%
Service 10-14	143.1%	102.1%	161.8%	105.6%
Service 15-19	60.5%	86.0%	114.6%	106.3%
Service 20-24	84.2%	106.2%	86.7%	104.2%
Service 25+	76.6%	132.4%	39.0%	124.1%
Total	104.3%	102.2%	112.2%	102.9%

RETIREMENT RATES

We currently use rates of retirement that vary by age, sex and type of retirement (reduced or unreduced). In addition, we apply higher rates to members in the year they are first eligible for Rule of 85 retirement, if this age is less than 65.

Our analysis showed 1,614 active members retired during the study period: 1440 eligible for unreduced retirement (i.e., they met the Rule of 85 or were at least age 65), and 174 eligible for reduced retirement. This compares with about 1,250 retirees during the preceding five-year period. Note that these numbers exclude previously terminated members who retired during the period.

The analysis shows that our current retirement rates are too high. This was not unexpected, since we had noted that the number of expected retirees in each year's valuation was much larger than the actual number of new retirees. As shown in Section V on pages 39 and 40, for unreduced retirement, we expected 2,303 retirements over the five-year period (662 males and 1,641 females), compared to the 1,440 actual retirements (521 males and 919 females). This produced overall A/E ratios of 79% (males) and 56% (females).

Further, if we look at the group who retired upon first eligibility—age plus service equals 85 or 86—before 65, the numbers are worse:

Item	Males	Females
Retirements	125	308
Number eligible	436	1,177
Expected retirements	218	765
A/E ratio	57%	40%

Therefore, we concluded that a change in the assumption was necessary. We created new rate tables by age for both males and females, as shown on pages 39 and 40. Rather than having a separate rate apply to all who reach initial eligibility for unreduced retirement, we decided to add 10% to the new age-based probability just at the age the member reaches eligibility.

On this basis, the overall A/Es become 92% (males) and 93% (females). The fact that these are still below 100% is intentional, since it is a bit conservative.

We also looked at the results for reduced retirement, which is a much less significant assumption. Results are shown in Section V on pages 41 and 42. We would like to have an A/E ratio over 100% for this assumption, since that is a bit conservative. As you can see from the exhibits, for males the A/E ratio was 74% and for females the ratio was 125%. We decided to tweak the early retirement rates, producing A/E ratios of 113% and 116% under the new assumptions.

OTHER ASSUMPTIONS AND REFUNDS

There are other assumptions made in the course of a valuation, such as the percentage of members who are married, the age difference between husbands and wives, the likelihood that a terminating employee will take a refund, etc. We reviewed these, and believe these are generally realistic or conservative, so we decided to recommend no changes to these other assumptions.

ACTUARIAL COST METHOD

Although the actual contribution to TFFR is fixed by statute, we use the Entry Age actuarial cost method to determine the GASB Annual Required Contribution (ARC) and the margin. The Entry Age method usually does the best job of keeping costs level as a percentage of payroll. It is far and away the most common actuarial cost method among statewide pension funds, and we recommend continuing to use this method.

NEW ENTRANT PROFILE

The version of the Entry Age cost method that is being used for TFFR uses a hypothetical group of new members to determine the normal cost, a weighted distribution of new hires by age, sex and salary. The current "profile" was based on new members who joined TFFR in the five years ending FY 2004. We examined the new entrant data for the five years ending FY 2009, and we constructed a new profile.

The average entry age went down a bit, from 31.6 years to 30.4 year. Females, who had made up 73% of new entrants between FY 2000 and FY 2004, were 75% of the group hired in FY 2005 - FY 2009.

ACTUARIAL ASSET VALUATION METHOD

Actuaries generally recommend using a smoothed actuarial value of assets (AVA), rather than market value (MVA), in order to dampen the fluctuations in measurements such as the margin and the funded status.

The current method smoothes all differences between the expected returns (based on the 8.00% investment return assumption) and actual returns, net of expenses, over a five-year period. For example, if the actual return is 13% in one year, then 8% is reflected immediately in the AVA, and the other 5% is recognized in 20% increments over five years.

We continue to believe this method is appropriate. It does not distinguish between types of return (interest, dividends, realized gains/losses, and unrealized gains/losses), like some other methods. It treats different asset classes and different investment styles the same. We do not believe the method has a bias relative to market. In other words, we expect the ratio of the AVA to MVA to average about 100% over the very long term. We believe this method does a good job of smoothing asset gains and losses, and reduces fluctuations in the funding period. Therefore, we are not recommending a change to this method.

SECTION III

ACTUARIAL IMPACT OF RECOMMENDATIONS

Actuarial Impact of Recommendations

Shown below is a table that compares key results from the July 1, 2009 actuarial valuation with these same results redetermined using the recommended actuarial assumptions and methods. As you can see, the assumption changes produce an increase of 14 basis points in the Annual Required Contribution (ARC) and a $65.0 million increase in the unfunded actuarial accrued liability (UAAL).

Item	Current Assumptions and Methods	Recommended Assumptions and Methods	Increase/ Decrease
Normal cost	10.26%	10.57%	0.32%
Unfunded actuarial accrued liability	$545.6 million	$610.6 million	$65.0 million
Funded ratio	77.7%	75.7%	-2.0%
Funding period	Infinite	Infinite	NA
GASB 25 Annual Required Contribution			
a. Dollar amount	$50.2 million	$51.0 million	$0.8 million
b. Percent of payroll	10.78%	10.92%	0.14%
Margin (compared to 8.25% statutory rate)	-2.53%	-2.67%	-0.14%

The normal cost is the average expected cost for a typical new member. The normal cost includes both the 7.75% contribution paid by members and the balance to be paid by the employers. The unfunded actuarial accrued liability is the portion of the total present value of future benefits that is assigned to past years and is in excess of the actuarial value of assets. The funding period is the number of years that will be required to amortize the UAAL, assuming that the employer contribution rate remains at 8.25% (or 8.75%), and assuming there are no gains, losses, benefit changes, assumption changes, etc. The GASB annual required contribution (ARC) is the sum of the employer's share of the normal cost and an amount needed to amortize the UAAL over 30 years with payments increasing at the assumed payroll growth rate (2.00% for the current valuation, 3.25% under the proposed assumptions). The margin is the excess (shortfall) between the current statutory employer contribution rate of 8.25% and the ARC.

The table on the next page shows the changes in (i) the UAAL, and (ii) the ARC expressed as a percent of payroll, due to each of the recommended assumption changes.

Item	UAAL (millions)	ARC (% of Payroll)
July 1, 2009 Actuarial Valuation	$545.6	10.78%
Increase/(decrease) due to:		
Mortality rates	83.5	1.66%
Disability rates	0.8	-0.01%
Retirement rates	(44.3)	-0.94%
Termination rates	3.8	0.05%
Salary increase rates	16.5	0.56%
New Entrant profile	4.7	-0.04%
Payroll growth rate	0.0	-1.14%
All changes reflected	$65.0	10.92%

As can be seen, the mortality change was the most significant item, with the changes in the salary increase rates also adding materially to the liability. The affect of these changes were partially offset by the change in retirement rates and the change in the payroll growth rate. The other items did not have a material impact.

The figures above were calculated as of July 1, 2009, using the same benefit provisions and the same member and financial data that were used to prepare the regular July 1, 2009 actuarial valuation report.

SECTION IV

SUMMARY OF RECOMMENDATIONS

Summary of Recommendations

Our recommendations may be summarized as follows:

1. Change the post retirement mortality for male non-disabled retirees and beneficiaries to the rates GRS Table 378, multiplied by 80%. Change the rates for females to those in GRS Table 379, multiplied by 75%. Sample rates are shown on pages 29 and 30.

2. Change the disabled post-retirement mortality assumption to the RP-2000 disabled life mortality rates for males and females, with the male rates multiplied by 80% and the female rates multiplied by 95%. Sample rates are shown on pages 31 and 32.

3. Change the pre-retirement mortality rates for males to 60% of the post-retirement rates (i.e., 48% of GRS Table 378). Change the pre-retirement mortality rates for females to 40% of the post-retirement rates (i.e., 30% of GRS Table 379). Sample rates are shown on pages 33 and 34.

4. Decrease the disability rates from 160% of the rates in GRS Table 513 to 110% of the rates in the same table. Sample rates are shown on pages 35 and 36.

5. Change the termination rates from age-service matrices to the service-based rates shown on pages 37 and 38.

6. Change the unreduced retirement rates to new tables as shown on pages 39 and 40. Eliminate the special rates for retirement at the first age eligible for unreduced retirement (below age 65). Instead add 10% to the new probabilities when the member is first eligible for unreduced retirement (if before 65).

7. Change the reduced retirement rates to those shown on pages 41and 42.

8. Extend the service-based salary schedule to a 25-year schedule as shown on page 43.

9. Revise the age/sex/pay profile for new entrants, which is used to determine the normal cost, to one based on new members joining TFFR in fiscal years 2005 through 2009.

SECTION V

SUMMARY OF DATA AND EXPERIENCE

List of Tables

NON-DISABLED RETIREES
POST-RETIREMENT MORTALITY - MALE

Age	Actual Deaths	Total Count	Actual Rate	Assumed Rate		Expected Deaths		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
50-54	0	96	0.0000	0.0025	0.0028	0	0	0%	0%
55-59	5	1,293	0.0039	0.0043	0.0040	6	5	85%	100%
60-64	12	2,125	0.0056	0.0076	0.0041	17	9	72%	136%
65-69	24	2,156	0.0111	0.0139	0.0060	30	16	80%	154%
70-74	28	1,737	0.0161	0.0234	0.0161	40	28	69%	99%
75-79	36	1,045	0.0345	0.0366	0.0246	38	28	95%	129%
80-84	46	702	0.0655	0.0601	0.0533	43	40	108%	114%
85-89	47	433	0.1085	0.0964	0.0988	41	44	116%	107%
90-94	27	138	0.1957	0.1499	0.1647	20	23	135%	118%
95-99	13	37	0.3514	0.2319	0.2395	8	9	159%	148%
100-104	1	2	0.5000	0.3240	0.3014	1	1	169%	175%
Other	0	0	N\A	0.4189	0.3802	0	0	0%	0%
Totals	239	9,764				243	202	98%	118%

NON-DISABLED RETIREES
POST-RETIREMENT MORTALITY - FEMALE

				Assumed Rate		Expected Deaths		Actual/Expected	
Age	Actual Deaths	Total Count	Actual Rate	Current	Proposed	Current (3) * (5)	Proposed (3) * (6)	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
50-54	1	156	0.0064	0.0015	0.0017	0	0	357%	286%
55-59	7	1,936	0.0036	0.0025	0.0036	5	7	138%	102%
60-64	19	2,683	0.0071	0.0048	0.0031	13	9	144%	223%
65-69	20	2,847	0.0070	0.0093	0.0041	26	12	76%	165%
70-74	14	2,172	0.0064	0.0148	0.0085	32	18	43%	77%
75-79	38	1,893	0.0201	0.0244	0.0138	47	27	82%	140%
80-84	58	1,684	0.0344	0.0424	0.0342	73	59	80%	98%
85-89	114	1,610	0.0708	0.0728	0.0730	117	117	97%	98%
90-94	154	1,027	0.1500	0.1250	0.1253	126	126	123%	122%
95-99	96	439	0.2187	0.2002	0.1857	85	79	113%	121%
100-104	33	108	0.3056	0.2972	0.2557	31	27	108%	124%
Other	4	9	N\A	0.0000	0.0000	3	3	116%	138%
Totals	558	16,564				558	484	100%	115%

POST-RETIREMENT DISABILITY MORTALITY - MALE

Age	Actual Deaths	Total Count	Actual Rate	Assumed Rate		Expected Deaths		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
40 - 44	0	0	N\A	0.0297	0.0181	0	0	0%	0%
45 - 49	0	1	0.0000	0.0340	0.0201	1.0	1.0	0%	0%
50 - 54	0	7	0.0000	0.0420	0.0253	0.3	0.2	0%	0%
55 - 59	3	44	0.0682	0.0531	0.0304	2.4	1.3	127%	222%
60 - 64	2	34	0.0588	0.0643	0.0360	2.2	1.2	93%	164%
65 - 69	0	17	0.0000	0.0697	0.0436	1.2	0.7	0%	0%
70 - 74	0	11	0.0000	0.0776	0.0555	0.8	0.6	0%	0%
75 - 79	0	3	0.0000	0.0908	0.0737	0.3	0.2	0%	0%
80 - 84	0	0	N\A	0.1322	0.0975	0	0	0%	0%
85 - 89	0	0	N\A	0.1980	0.1242	0	0	0%	0%
90 - 94	0	0	N\A	0.2972	0.1733	0	0	0%	0%
95 +	0	0	N\A	0.4458	0.2399	0	0	0%	0%
Totals	5	117				7.2	4.3	70%	116%

POST-RETIREMENT DISABILITY MORTALITY - FEMALE

Age	Actual Deaths	Total Count	Actual Rate	Assumed Rate		Expected Deaths		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
40 - 44	0	17	0.0000	0.0213	0.0071	0.4	0.1	0%	0%
45 - 49	0	43	0.0000	0.0235	0.0085	1.0	0.4	0%	0%
50 - 54	0	64	0.0000	0.0272	0.0128	1.7	0.8	0%	0%
55 - 59	3	66	0.0455	0.0307	0.0177	2.0	1.2	147%	256%
60 - 64	4	58	0.0690	0.0347	0.0229	2.0	1.3	201%	307%
65 - 69	0	34	0.0000	0.0386	0.0298	1.3	1.0	0%	0%
70 - 74	1	23	0.0435	0.0433	0.0407	(0.0)	(0.1)	102%	110%
75 - 79	0	8	0.0000	0.0578	0.0566	0.4	0.4	0%	0%
80 - 84	0	4	0.0000	0.0885	0.0782	0.4	0.3	0%	0%
85 - 89	0	1	0.0000	0.1322	0.1088	0.1	0.1	0%	0%
90 - 94	0	0	N\A	0.1980	0.1519	0	0	0%	0%
95 +	0	0	N\A	0.2972	0.2045	0	0	0%	0%
Totals	8	318				10.4	6.6	77%	121%

MALE PRE-RETIREMENT MORTALITY

Age	Actual Deaths	Total Count	Actual Rate	Assumed Rate		Expected Deaths		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 20	-	-	N\A	0.0002	0.0002	-	-	N\A	N\A
20-24	-	69	0.0000	0.0003	0.0003	0	0	0%	0%
25-29	1	1,181	0.0008	0.0004	0.0004	1	0	192%	227%
30-34	-	1,425	0.0000	0.0005	0.0004	1	1	0%	0%
35-39	-	1,664	0.0000	0.0006	0.0005	1	1	0%	0%
40-44	1	1,719	0.0006	0.0007	0.0006	1	1	83%	90%
45-49	-	1,740	0.0000	0.0010	0.0010	2	2	0%	0%
50-54	3	2,241	0.0013	0.0016	0.0017	4	4	80%	79%
55-59	6	2,027	0.0030	0.0028	0.0024	6	5	108%	126%
60-64	2	831	0.0024	0.0050	0.0025	4	2	52%	103%
65-69	-	121	0.0000	0.0090	0.0036	1	0	0%	0%
70-74	1	27	0.0370	0.0152	0.0097	0	0	256%	417%
75 and over	-	6	0.0000	0.0238	0.0147	0	0	0%	0%
Totals	14	13,051				20	16	70%	88%

FEMALE PRE-RETIREMENT MORTALITY

Age	Actual Deaths	Total Count	Actual Rate	Assumed Rate		Expected Deaths		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 20	-	-	N\A	0.0002	0.0001	-	-	N\A	N\A
20-24	1	335	0.0030	0.0002	0.0001	0	0	1429%	3333%
25-29	1	3,368	0.0003	0.0002	0.0001	1	0	145%	303%
30-34	-	3,404	0.0000	0.0002	0.0001	1	0	0%	0%
35-39	-	3,895	0.0000	0.0003	0.0002	1	1	0%	0%
40-44	1	4,267	0.0002	0.0005	0.0003	2	1	47%	88%
45-49	3	5,157	0.0006	0.0007	0.0004	4	2	84%	159%
50-54	2	6,906	0.0003	0.0010	0.0007	7	5	28%	41%
55-59	3	5,732	0.0005	0.0016	0.0015	9	8	33%	39%
60-64	2	1,944	0.0010	0.0031	0.0012	6	3	36%	79%
65-69	3	257	0.0117	0.0060	0.0016	1	0	213%	769%
70-74	-	45	0.0000	0.0096	0.0034	0	0	0%	0%
75 and over	-	9	0.0000	0.0159	0.0055	0	0	0%	0%
Totals	16	35,319				32	20	49%	79%

MALE DISABILITY EXPERIENCE

Age	Actual Disabilities	Total Count	Actual Rate	Assumed Rate		Expected Disabilities		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 20	-	-	N\A	0.0002	0.0001	-	-	N\A	N\A
20-24	-	69	0.0000	0.0002	0.0001	0	0	0%	0%
25-29	-	1,181	0.0000	0.0002	0.0001	0	0	0%	0%
30-34	-	1,425	0.0000	0.0002	0.0001	0	0	0%	0%
35-39	-	1,664	0.0000	0.0003	0.0002	1	0	0%	0%
40-44	-	1,719	0.0000	0.0006	0.0004	1	1	0%	0%
45-49	1	1,740	0.0006	0.0010	0.0007	2	1	62%	89%
50-54	2	2,241	0.0009	0.0016	0.0011	4	3	55%	80%
55-59	4	2,027	0.0020	0.0029	0.0020	6	4	68%	100%
60-64	3	831	0.0036	0.0053	0.0036	4	3	72%	105%
65-69	-	-	N\A	0.0000	0.0000	-	-	N\A	N\A
70-74	-	-	N\A	0.0000	0.0000	-	-	N\A	N\A
75 and over	-	-	N\A	0.0000	0.0000	-	-	N\A	N\A
Totals	10	12,897				17	12	58%	84%

FEMALE DISABILITY EXPERIENCE

Age	Actual Disabilities	Total Count	Actual Rate	Assumed Rate		Expected Disabilities		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 20	-	-	N\A	0.0002	0.0001	-	-	N\A	N\A
20-24	-	335	0.0000	0.0002	0.0001	0	0	0%	0%
25-29	-	3,368	0.0000	0.0002	0.0001	1	0	0%	0%
30-34	1	3,404	0.0003	0.0002	0.0001	1	0	185%	270%
35-39	1	3,895	0.0003	0.0003	0.0002	1	1	79%	115%
40-44	7	4,267	0.0016	0.0006	0.0004	2	2	283%	412%
45-49	4	5,157	0.0008	0.0010	0.0007	5	3	83%	120%
50-54	7	6,906	0.0010	0.0016	0.0011	11	8	63%	91%
55-59	6	5,732	0.0010	0.0029	0.0020	16	11	36%	53%
60-64	4	1,944	0.0021	0.0053	0.0036	10	7	41%	60%
65-69	-	-	N\A	0.0000	0.0000	-	-	N\A	N\A
70-74	-	-	N\A	0.0000	0.0000	-	-	N\A	N\A
75 and over	-	-	N\A	0.0000	0.0000	-	-	N\A	N\A
Totals	30	35,008				47	32	64%	93%

MALE TERMINATION EXPERIENCE

Service	Actual Withdrawal	Total Count	Actual Rate	Assumed Rate		Expected Withdrawal		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	34	102	0.3333	0.1132	0.3300	12	34	294%	101%
1	119	763	0.1560	0.1086	0.1500	83	114	144%	104%
2	72	612	0.1176	0.1064	0.1200	65	73	111%	98%
3	46	515	0.0893	0.1038	0.0900	53	46	86%	99%
4	39	449	0.0869	0.0913	0.0800	41	36	95%	109%
5	27	415	0.0651	0.0788	0.0700	33	29	83%	93%
6	27	410	0.0659	0.0687	0.0600	28	25	96%	110%
7	16	414	0.0386	0.0672	0.0500	28	21	58%	77%
8	23	418	0.0550	0.0654	0.0400	27	17	84%	138%
9	15	400	0.0375	0.0636	0.0375	25	15	59%	100%
10	10	388	0.0258	0.0240	0.0350	9	14	107%	74%
11	12	344	0.0349	0.0226	0.0325	8	11	154%	107%
12	10	299	0.0334	0.0212	0.0300	6	9	158%	111%
13	9	285	0.0316	0.0201	0.0275	6	8	157%	115%
14	9	296	0.0304	0.0195	0.0250	6	7	156%	122%
15	4	284	0.0141	0.0191	0.0125	5	4	74%	113%
16	5	300	0.0167	0.0183	0.0125	5	4	91%	133%
17	1	290	0.0034	0.0176	0.0125	5	4	20%	28%
18	2	273	0.0073	0.0170	0.0125	5	3	43%	59%
19	3	248	0.0121	0.0167	0.0125	4	3	73%	97%
20	3	225	0.0133	0.0163	0.0125	4	3	82%	107%
21	4	218	0.0183	0.0159	0.0125	3	3	115%	147%
22	5	212	0.0236	0.0157	0.0125	3	3	150%	189%
23	2	199	0.0101	0.0154	0.0125	3	2	65%	80%
24	-	201	0.0000	0.0154	0.0125	3	3	0%	0%
25	6	210	0.0286	0.0154	0.0125	3	3	185%	229%
26	3	226	0.0133	0.0156	0.0125	4	3	85%	106%
27	-	210	0.0000	0.0160	0.0125	3	3	0%	0%
28	1	200	0.0050	0.0167	0.0125	3	3	30%	40%
29 and over	4	276	0.0145	0.0174	0.0000	5	-	83%	N\A
Totals	511	9,682				490	500	104%	102%

FEMALE TERMINATION EXPERIENCE

				Assumed Rate		Expected Withdrawal		Actual/Expected	
Service	Actual Withdrawal	Total Count	Actual Rate	Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	164	525	0.3124	0.1138	0.3000	60	158	275%	104%
1	323	2,174	0.1486	0.1101	0.1500	239	326	135%	99%
2	161	1,632	0.0987	0.1041	0.1000	170	163	95%	99%
3	134	1,420	0.0944	0.0988	0.0850	140	121	96%	111%
4	88	1,323	0.0665	0.0793	0.0700	105	93	84%	95%
5	80	1,270	0.0630	0.0656	0.0600	83	76	96%	105%
6	70	1,230	0.0569	0.0561	0.0500	69	62	101%	114%
7	49	1,134	0.0432	0.0509	0.0450	58	51	85%	96%
8	50	1,082	0.0462	0.0490	0.0425	53	46	94%	109%
9	41	1,048	0.0391	0.0473	0.0400	50	42	83%	98%
10	44	959	0.0459	0.0203	0.0350	19	34	226%	131%
11	23	850	0.0271	0.0200	0.0325	17	28	136%	83%
12	26	817	0.0318	0.0197	0.0300	16	25	161%	106%
13	19	833	0.0228	0.0194	0.0275	16	23	117%	83%
14	23	770	0.0299	0.0192	0.0250	15	19	156%	119%
15	15	743	0.0202	0.0189	0.0200	14	15	107%	101%
16	19	767	0.0248	0.0187	0.0200	14	15	133%	124%
17	17	742	0.0229	0.0185	0.0200	14	15	124%	115%
18	15	673	0.0223	0.0184	0.0200	12	13	121%	111%
19	10	650	0.0154	0.0183	0.0200	12	13	84%	77%
20	13	621	0.0209	0.0181	0.0150	11	9	115%	140%
21	10	588	0.0170	0.0180	0.0150	11	9	94%	113%
22	7	570	0.0123	0.0180	0.0150	10	9	68%	82%
23	5	583	0.0086	0.0180	0.0150	10	9	48%	57%
24	11	580	0.0190	0.0180	0.0150	10	9	105%	126%
25	7	565	0.0124	0.0181	0.0075	10	4	68%	165%
26	6	541	0.0111	0.0183	0.0075	10	4	61%	148%
27	3	543	0.0055	0.0185	0.0075	10	4	30%	74%
28	1	499	0.0020	0.0187	0.0075	9	4	11%	27%
29 and over	3	623	0.0048	0.0190	0.0000	12	-	25%	N\A
Totals	1,437	26,355				1,281	1,396	112%	103%

UNREDUCED RETIREMENT EXPERIENCE
MALE

Age	Actual Retirements	Total Count	Actual Rate	Assumed Rate		Expected Retirements		Actual/Expected	
				Current	Proposed	Current*	Proposed**	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 50	0	0	N/A	N/A	N/A	0	0	N/A	N/A
50	0	0	N/A	0.2000	0.2500	0	0	N/A	N/A
51	0	1	0.0000	0.2000	0.2500	0	0	N/A	N/A
52	5	7	0.7143	0.2000	0.2500	3	2	167%	250%
53	16	16	1.0000	0.2000	0.2500	6	5	267%	320%
54	45	164	0.2744	0.2000	0.2500	78	56	58%	80%
55	67	233	0.2876	0.2000	0.2000	74	56	91%	120%
56	50	242	0.2066	0.2000	0.2000	64	54	78%	93%
57	40	241	0.1660	0.2000	0.2000	57	51	70%	78%
58	37	236	0.1568	0.2000	0.2000	56	50	66%	74%
59	32	198	0.1616	0.2000	0.2000	42	41	76%	78%
60	35	190	0.1842	0.2500	0.2000	51	40	69%	88%
61	26	158	0.1646	0.3000	0.2000	49	33	53%	79%
62	63	154	0.4091	0.3000	0.4500	49	71	129%	89%
63	32	82	0.3902	0.2500	0.3500	22	29	145%	110%
64	20	54	0.3704	0.2000	0.3500	12	19	167%	105%
65	20	51	0.3922	0.6500	0.4000	33	20	61%	100%
66	10	36	0.2778	0.3500	0.3000	13	11	77%	91%
67	9	25	0.3600	0.3500	0.3000	9	8	100%	113%
68	4	15	0.2667	0.3500	0.3000	5	5	80%	80%
69	1	9	0.1111	0.3500	0.3000	3	3	33%	33%
70	0	7	0.0000	1.0000	0.2500	7	2	0%	0%
71	3	10	0.3000	1.0000	0.2500	10	3	30%	100%
72	2	6	0.3333	1.0000	0.2500	6	2	33%	100%
73	1	4	0.2500	1.0000	0.2500	4	1	25%	100%
74	1	2	0.5000	1.0000	0.2500	2	1	50%	100%
75 and over	2	7	0.2857	1.0000	1.0000	7	2	29%	114%
Subtotal	521	2,148				662	565	79%	92%

* 50% at first eligibility
**Add 10% at first eligibility

UNREDUCED RETIREMENT EXPERIENCE
FEMALE

				Assumed Rate		Expected Retirements		Actual/Expected	
Age	Actual Retirements	Total Count	Actual Rate	Current	Proposed	Current*	Proposed**	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Under 50	1	0	N/A	N/A	N/A	0	0	N/A	N/A
50	0	0	N/A	0.2500	0.1500	0	0	N/A	N/A
51	2	3	0.6667	0.2500	0.1550	2	1	100%	200%
52	13	13	1.0000	0.2500	0.1600	8	3	163%	433%
53	19	42	0.4524	0.2500	0.1650	26	11	73%	173%
54	70	349	0.2006	0.2500	0.1700	213	91	33%	77%
55	91	484	0.1880	0.2500	0.1750	196	104	46%	88%
56	90	462	0.1948	0.2500	0.1800	165	96	55%	94%
57	86	445	0.1933	0.2500	0.1850	147	91	59%	95%
58	65	414	0.1570	0.2500	0.1900	139	88	47%	74%
59	78	383	0.2037	0.2000	0.1950	120	84	65%	93%
60	62	332	0.1867	0.2500	0.2000	109	73	57%	85%
61	66	290	0.2276	0.3000	0.2000	107	64	62%	103%
62	85	237	0.3586	0.5000	0.3500	124	87	69%	98%
63	58	164	0.3537	0.2500	0.3000	51	52	114%	112%
64	30	108	0.2778	0.5000	0.3000	56	34	54%	88%
65	38	132	0.2879	0.5000	0.3000	65	40	58%	95%
66	29	84	0.3452	0.3000	0.3000	25	25	116%	116%
67	8	48	0.1667	0.3000	0.3000	14	14	57%	57%
68	11	30	0.3667	0.3000	0.3000	9	9	122%	122%
69	5	21	0.2381	0.3000	0.3000	6	6	83%	83%
70	1	15	0.0667	1.0000	0.2500	15	4	7%	25%
71	7	16	0.4375	1.0000	0.2500	16	4	44%	175%
72	0	7	0.0000	1.0000	0.2500	7	2	0%	0%
73	3	6	0.5000	1.0000	0.2500	6	2	50%	150%
74	0	3	0.0000	1.0000	0.2500	3	1	0%	0%
75 and over	1	12	0.0833	1.0000	1.0000	12	3	8%	33%
Subtotal	919	4,100				1,641	989	56%	93%

* 65% at first eligibility
**Add 10% at first eligibility

REDUCED RETIREMENT EXPERIENCE
MALE

Age	Actual Retirements	Total Count	Actual Rate	Assumed Rate		Expected Retirements		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
55	6	270	0.0222	0.0200	0.0150	5	4	120%	150%
56	5	209	0.0239	0.0200	0.0150	4	3	125%	167%
57	3	165	0.0182	0.0200	0.0150	3	2	100%	150%
58	1	135	0.0074	0.0200	0.0150	3	2	33%	50%
59	1	130	0.0077	0.0200	0.0150	3	2	33%	50%
60	3	101	0.0297	0.0500	0.0400	5	4	60%	75%
61	5	86	0.0581	0.0500	0.0400	4	3	125%	167%
62	5	57	0.0877	0.2000	0.0900	11	5	45%	100%
63	3	41	0.0732	0.0500	0.0700	2	3	150%	100%
64	3	27	0.1111	0.2500	0.1000	7	3	43%	100%
Subtotal	35	1,221				47	31	74%	113%

REDUCED RETIREMENT EXPERIENCE
FEMALE

Age	Actual Retirements	Total Count	Actual Rate	Assumed Rate		Expected Retirements		Actual/Expected	
				Current	Proposed	Current	Proposed	Current (2) / (7)	Proposed (2) / (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
55	7	968	0.0072	0.0150	0.0150	15	15	47%	47%
56	16	879	0.0182	0.0150	0.0150	13	13	123%	123%
57	15	776	0.0193	0.0150	0.0150	12	12	125%	125%
58	17	660	0.0258	0.0150	0.0150	10	10	170%	170%
59	16	509	0.0314	0.0150	0.0150	8	8	200%	200%
60	16	398	0.0402	0.0200	0.0300	8	12	200%	133%
61	8	284	0.0282	0.0200	0.0300	6	9	133%	89%
62	16	195	0.0821	0.1000	0.0800	20	16	80%	100%
63	19	126	0.1508	0.0500	0.1200	6	15	317%	127%
64	9	66	0.1364	0.2000	0.1500	13	10	69%	90%
Subtotal	139	4,861				111	120	125%	116%

Salary Increase Analysis

	Current Salary Scales		Actual Experience (10 Years)			Proposed Salary Scales		
Index	Total	Step Rate/ Promotional	Total	Above Inflation (2.64%)	Step Rate/ Promotional	Total	Step Rate/ Promotional	Increase/ (Decrease) in Rates
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0	14.00%	9.50%	14.55%	11.91%	10.31%	14.75%	10.25%	0.75%
1	8.00%	3.50%	7.74%	5.10%	3.50%	8.00%	3.50%	0.00%
2	7.75%	3.25%	7.70%	5.05%	3.46%	7.75%	3.25%	0.00%
3	7.50%	3.00%	7.31%	4.67%	3.07%	7.50%	3.00%	0.00%
4	7.25%	2.75%	6.77%	4.13%	2.53%	7.25%	2.75%	0.00%
5	7.00%	2.50%	6.90%	4.26%	2.66%	7.00%	2.50%	0.00%
6	6.75%	2.25%	6.35%	3.71%	2.11%	6.75%	2.25%	0.00%
7	6.50%	2.00%	6.00%	3.36%	1.76%	6.50%	2.00%	0.00%
8	6.25%	1.75%	6.52%	3.88%	2.28%	6.25%	1.75%	0.00%
9	6.00%	1.50%	5.79%	3.15%	1.55%	6.25%	1.75%	0.25%
10	5.75%	1.25%	5.89%	3.25%	1.65%	6.00%	1.50%	0.25%
11	5.50%	1.00%	5.62%	2.98%	1.38%	6.00%	1.50%	0.50%
12	5.50%	1.00%	5.74%	3.10%	1.50%	5.75%	1.25%	0.25%
13	5.50%	1.00%	5.51%	2.87%	1.27%	5.75%	1.25%	0.25%
14	5.25%	0.75%	4.94%	2.30%	0.70%	5.50%	1.00%	0.25%
15	4.50%	0.00%	5.17%	2.52%	0.93%	5.50%	1.00%	1.00%
16	4.50%	0.00%	4.77%	2.13%	0.54%	5.25%	0.75%	0.75%
17	4.50%	0.00%	4.89%	2.24%	0.65%	5.25%	0.75%	0.75%
18	4.50%	0.00%	4.85%	2.21%	0.61%	5.25%	0.75%	0.75%
19	4.50%	0.00%	4.62%	1.98%	0.38%	5.00%	0.50%	0.50%
20	4.50%	0.00%	4.77%	2.13%	0.53%	5.00%	0.50%	0.50%
21	4.50%	0.00%	4.69%	2.05%	0.45%	5.00%	0.50%	0.50%
22	4.50%	0.00%	4.59%	1.95%	0.35%	5.00%	0.50%	0.50%
23	4.50%	0.00%	4.62%	1.98%	0.39%	4.75%	0.25%	0.25%
24	4.50%	0.00%	4.38%	1.74%	0.15%	4.75%	0.25%	0.25%
25+	4.50%	0.00%	4.24%	1.60%	0.00%	4.50%	0.00%	0.00%