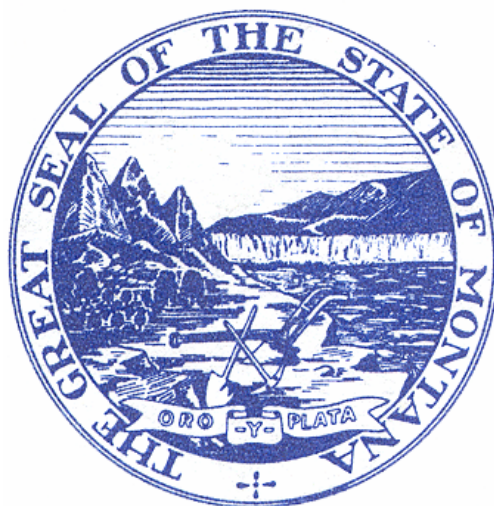


**TEACHERS' RETIREMENT SYSTEM
STATE OF MONTANA**

July 1, 2001 – July 1, 2007

INVESTIGATION OF ACTIVE MEMBER DEMOGRAPHIC EXPERIENCE



by

Mark C. Olleman, FSA, EA, MAAA
Fellow, Society of Actuaries
Member, American Academy of Actuaries

and

Craig J. Glyde, EA, MAAA
Enrolled Actuary
Member, American Academy of Actuaries



1301 Fifth Avenue
Suite 3800
Seattle, WA 98101-2605
USA

Tel +1 206 624 7940
Fax +1 206 623 3485

milliman.com

April 29, 2008

Teachers' Retirement Board
State of Montana
1500 Sixth Avenue
Helena, Montana 59620-0139

Dear Members of the Board:

It is a pleasure to submit this report of our investigation of the experience of the Teachers' Retirement System of the State of Montana. The results of this investigation are the basis for recommended changes in actuarial assumptions for the actuarial valuation to be performed as of July 1, 2008.

The purpose of this report is to communicate the results of our review of the active member demographic assumptions to be used in the completion of the upcoming valuation. Several of our recommendations represent changes from the prior methods or assumptions and are designed to better anticipate the emerging experience of the System. In addition, we have a recommended minor change to the asset valuation method. Other assumptions and actuarial methods have been reviewed within the last four years and we believe they are still reasonable to use until the next review two years from now.

In preparing this report, we relied without audit on information (some oral and some in writing) supplied by the System's staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. In our examination, after discussion with TRS, we have found the data to be reasonably consistent and comparable with data used for other purposes. Since the experience study results are dependent on the integrity of the data supplied, the results can be expected to differ if the underlying data is incomplete or missing. It should be noted that if any data or other information is inaccurate or incomplete, our determinations might need to be revised.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the Actuarial Standards of Practice promulgated by the Actuarial Standards Board and the applicable Guides to Professional Conduct, amplifying Opinions, and supporting Recommendations of the American Academy of Actuaries.

We further certify that the assumptions developed in this report satisfy ASB Standards of Practice, in particular, No. 35 (Selection of Demographic and Other Non-economic Assumptions for Measuring Pension Obligations). We have provided financial information showing in the estimated impact of the recommended assumptions on the July 1, 2007 actuarial valuation. We believe the recommended assumptions provide our best estimate of anticipated experience affecting the System. Nevertheless, the emerging costs will vary from those presented in this

report to the extent that actual experience differs from that projected by the actuarial assumptions.

Milliman has been engaged as an independent actuary. Any distribution of this report must be in its entirety, including this cover letter, unless prior written consent is obtained from Milliman. Milliman's work product was prepared exclusively for the Teachers' Retirement System of the State of Montana for a specific and limited purpose. It is a complex, technical analysis that assumes a high level of knowledge concerning the System's operations, and uses the System's data, which Milliman has not audited. It is not for the use or benefit of any third party for any purpose. Any third party recipient of Milliman's work product who desires professional guidance should not rely upon Milliman's work product, but should engage qualified professionals for advice appropriate to its own specific needs.

We would like to express our appreciation to Mr. David L. Senn, Executive Director of the System, and to members of his staff, who gave substantial assistance in supplying the data on which this report is based.

I, Mark Olleman, am a member of the American Academy of Actuaries and a Fellow of the Society of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

I, Craig Glyde, am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

We respectfully submit the following report, and we look forward to discussing it with you,

A handwritten signature in black ink that reads "Mark C. Olleman".

Mark C. Olleman, FSA, EA, MAAA
Consulting Actuary
Joint Board Enrollment # 08-05636

A handwritten signature in black ink that reads "Craig Glyde".

Craig J. Glyde, EA, MAAA
Associate Actuary
Joint Board Enrollment # 08-07186

MCO/CJG/nlo

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
2001 - 2007 INVESTIGATION OF EXPERIENCE**

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TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Section 1

Executive Summary and Recommendations

This is a study of the active member demographic experience of the Teachers' Retirement System of the State of Montana over the six-year period from July 1, 2001 to July 1, 2007. In addition, we have a recommended minor change to the asset valuation method.

Section 2 – Introduction

Just as certain investment choices have an associated "investment risk," choices in actuarial assumptions have an associated "actuarial risk." Determining the adequacy of the current contribution rates is dependent on the assumptions we use to project the future benefit payments and then to discount the value of future benefits to determine the present values. Thus, it is important that the Board understand the sensitivity of the actuarial calculations to the underlying assumptions.

Section 2 provides an introduction to the process of setting both demographic and economic actuarial assumptions. It discusses the following:

- The "actuarial risk" associated with setting actuarial assumptions.
- An overview of the presentation of results you will see in this report.
- Our philosophy in setting actuarial assumptions.
- Actuarial Standards of Practice No. 27 and No. 35.

We also discuss in Section 2 that in two years the System is changing from a six year experience study cycle to a four year cycle. We are recommending that in connection with this change the System starts studying all assumptions at the same time once every four years starting two years from now in 2010. The next experience study after that would be in 2014.

Section 3 – Retirement

The results of our retirement study showed experience which was fairly consistent with the current retirement rates. Nevertheless, we are recommending some minor revisions which will reduce the probabilities of retirement for both general and university members. Specifically, the recommended assumptions:

- make small refinements to the patterns of the unreduced retirement assumptions which generally lowers the probabilities,
- lower the probabilities of reduced retirement for general members at all ages, and
- leave the probabilities of reduced retirement for university members unchanged.

Section 4 – Disability Retirement

We are recommending lower rates for general members. There are no longer enough university members to make credible adjustments to the disability assumption. Two university members became disabled in the study period. The recommended assumption for general members is close to the current assumption for university members. Therefore we are recommending that the two groups be combined for the purpose of setting and applying this assumption.

Section 5 – Other Terminations of Employment

We are recommending lower rates for both general and university members with longer years of service. There are very few university members left with less than 25 years of experience. The experience of the two groups was very similar, so again we are recommending the two groups be combined for the purpose of setting and applying this assumption.

Section 6 – Probability of Retaining Membership in the System Upon Vested Termination

We recommend a single assumption continue to be used for general and university members. Experience was not significantly different from the assumptions. Therefore we are recommending no changes to this assumption.

Section 7 – Study Methodology

Section 7 provides some additional technical comments with regard to the investigation of experience.

Section 8 – Summary of Recommended Valuation Assumptions

The recommended assumptions are expressed in numerical format in Section 8.

The remainder of the executive summary provides recommendations and information that are not included in the other sections of the report.

Merit Salary Increases

Estimates of future salaries are based on assumptions for two types of increases:

- (1) Increases in each individual's salary due to merit increases, which occur even in the absence of inflation; and
- (2) Increases in the general wage level of the membership, which are directly related to inflation and increases in productivity.

In conjunction with this study we reviewed the data for merit salary increases over the last six years. The data indicates the experience for the past six years has changed from the preceding six years. However, the System has not been experiencing consistent salary gains or losses. Since the total salary increases depend on both the merit and general wage increase assumption, it makes sense to study and adjust these assumptions together. Therefore, we are recommending that this assumption be studied again in two years when the general wage increase assumption is studied. This will also allow another two years of data to be collected to see if the current trend continues.

Death from Active Status

We are recommending no change to the mortality assumptions.

The current assumptions are the same for active and retired members. Active member mortality experience is often incomplete due to members who terminate employment before they die, and the possibility of deaths of members with low service being classified as terminations.

The Study of Public Employee Retirement Systems released by the Society of Actuaries in 2002 states:

“Of all noneconomic assumptions reviewed in PERS experience studies, active mortality displayed the greatest overall variance from expectations. For all studies reporting numbers of actual and expected deaths, there were about 32,000 actual deaths compared with 45,000 expected occurrences, yielding an overall active mortality ratio of about 71%. Active mortality does not have a major impact on the calculation of plan liabilities and costs.”

The retired mortality assumptions are scheduled to be reviewed in two years. We recommend that the active mortality assumptions are also evaluated at that time.

Actuarial Value of Assets

The current actuarial asset valuation method spreads asset gains and losses over four years. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years. The gains and losses are measured starting with the year ended June 30, 2007. This method was adopted effective July 1, 2007.

Actuarial Standard of Practice No. 44 (Selection and Use of Asset Valuation Methods for Pension Valuations) was issued in September, 2007. Section 3.3 states:

“The asset values should 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 standard goes on to say that if no such corridor is used the asset method may still satisfy the standard if in the actuary’s professional judgment, the asset method recognizes differences from market value in a sufficiently short period. In fact, we do believe that the four year period is sufficiently short to satisfy the standard. An 80% to 120% corridor around market value is commonly used to assure any deviation from market value is reasonable. It is unlikely the four year smoothing method adopted by the Board will deviate outside a corridor of 80% to 120% of the market value of assets.

Nevertheless, to avoid any doubts or confusion concerning the asset valuation method’s compliance with Actuarial Standard of Practice No. 44, we recommend a corridor of 80% to 120% of the market value be added to the current method. This change would not have had an impact on the results of the 2007 actuarial valuation and seems unlikely to have an impact on any future valuation.

Montana University System (MUS)

The actuarial valuation of TRS uses separate assumptions for university and general members where appropriate. This is the result of legislation which created the Optional Retirement Program (ORP) for employees of the Montana University System (MUS), which was established January 1, 1988. Subsequent to the establishment of ORP, MUS employees could elect to join ORP or TRS. To prevent an adverse impact on TRS, a contribution rate of 4.503% of earned compensation of MUS employees who participated in ORP was contributed to TRS. Legislation in 1993 removed the MUS election and requires all new MUS employees hired after July 1, 1993 to join ORP. The MUS contribution rate has changed multiple times since then and is currently 4.72%. The assumptions adopted for MUS members as a result of this study will be used to measure the appropriate level of the future MUS contribution rate.

Section 19-20-621 of MCA states:

“The board shall periodically review the supplemental employer contribution rate and recommend adjustments to the legislature as needed to maintain the amortization of the university system's past service liability by July 1, 2033.”

Financial Impact

Generally, we are recommending lower assumed probabilities for retirement, disability, and other terminations of employment. Lower probabilities of retirement imply members are retiring later. This tends to decrease the unfunded actuarial accrued liability and normal costs because there is more time for contributions to accumulate with investment income and a shorter period over which benefits are paid. Lower probabilities of disability tend to have a similar effect. However, lower probabilities of terminating employment mean more members will ultimately retire from the System therefore increasing costs. The most pronounced impact of lowering the probabilities of terminating employment is on the normal cost rate which is spread over a member's entire career. Therefore, although there was a small reduction in the unfunded actuarial accrued liability due to the changes in the retirement and disability assumptions, there was a significant increase in the normal cost rate from the changes in the termination assumption and the net impact was an increase in the amortization period of the unfunded actuarial accrued liability as detailed below.

The July 1, 2007 actuarial valuation had an amortization period of the unfunded actuarial accrued liability of 28.6 years, a normal cost rate of 10.40% of pay and an unfunded actuarial accrued liability funded by TRS contributions of \$768.9 million. The net impact of the assumptions recommended in this report on the measurements from the July 1, 2007 actuarial valuation would be to: increase the amortization period from 28.6 years to 31.3 years, increase the normal cost rate from 10.40% to 10.87% of pay, and decrease the unfunded actuarial accrued liability funded by TRS contributions from \$768.9 million to \$756.1 million.

TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Section 2

Introduction

Actuarial assumptions can be broken into three broad groups:

- Active Demographic Assumptions
- Retired Mortality
- Economic Assumptions

Recently TRS has been on a cycle of examining one of these three groups of assumptions every two years before the upcoming actuarial valuation. Accordingly, the following studies have been performed in the last 6 years:

<u>Actuarial Valuation</u>	<u>Assumption Study (and Study Period for Demographic Assumptions)</u>
July 1, 2002	Active Demographic Assumptions: July 1, 1995 – July 1, 2001
July 1, 2004	Economic Assumptions Study
July 1, 2006	Retired Mortality: July 1, 1999 – July 1, 2005

However, this is being changed to a four year cycle. Both the economic assumptions and the retired mortality assumptions are scheduled to be studied two years from now. We are recommending that the System also study the active demographic assumptions at that time so that all assumptions can be put on the same four year cycle and studied simultaneously. The first study including all actuarial assumptions would therefore be in 2010. The next experience study would be in 2014. The discussion in this section encompasses all three groups of assumptions and provides an overview of the process and importance of setting actuarial assumptions.

A. Funding and Valuation Principles

Just as certain investment choices have an associated "investment risk," choices in actuarial assumptions have an associated "actuarial risk." Our responsibility is to always consider the impact our work will have on future taxpayers and on the beneficiaries of TRS.

Determining the adequacy of the current contribution rates is dependent on the actuarial assumptions. Thus, it is important that the Board understand the sensitivity of the actuarial calculations to the underlying assumptions.

- If actual experience shows that the assumptions underestimated the true cost of the plan, decisions for change may be made based on the lower current cost levels. This may result in an unexpected need to increase costs in the future and may lead to budgeting difficulties.

- If actual experience shows that the assumptions overestimated the true cost of the plan, decisions for change may be inappropriately made based on the current higher costs levels.

As an example consider the assumption for investment return. Since the actuarial assumptions are set for the long term, it is expected that in the short term there will be years in which the actual investment return will exceed the actuarial assumed rate, and there will be years when the actual experience will not meet the assumed rate. It is the expected long-term rate that is used to project and finance the retirement benefits.

It should be recognized that a higher investment return assumption will tend to lower required contributions in the short term, while a lower investment return assumption will tend to require higher contributions in the short term. However, the actuarial assumptions will not change the System's actual experience. If actual experience is less favorable than assumed, actuarial losses will develop requiring higher contributions in the long term. In addition, any move back from a more optimistic assumption to a less optimistic assumption will also tend to result in higher contribution rates and, thus, higher taxes. These concepts apply to the selection of all actuarial assumptions.

The question that needs to be asked in the public sector is: How great an actuarial risk is the Board, and thus the State of Montana, willing to accept in the actuarial assumptions? If actuarial experience gains materialize for TRS, its funded status will be better than expected. If actuarial experience losses materialize, what will be the consequences?

As stated above the actuarial assumptions can be divided into three groups: economic, active demographic, and retired mortality. The economic assumptions must not only reflect TRS' actual experience but also give even greater consideration to the long-term expectation of future economic growth for the nation, as well as the global economy. By long term, we are looking at time periods of from 20 to 40, possibly to 60, years – a much longer time frame than any period investment managers or economists will generally be discussing with you.

The non-economic, or demographic assumptions including retired mortality, are based on TRS' actual experience, adjusted to reflect trends and historical experience. Thus, the economic assumptions are much more subjective than the demographic assumptions, and the demographic assumptions are much more dependent on the results of the experience studies.

B. Overview

This report presents the results of an investigation of the recent actuarial experience of TRS. We will refer to this investigation as an experience study.

Throughout this report, we refer to "expected" and "proposed" actuarial assumptions. The "expected" assumptions are those used for our actuarial valuation of TRS as of July 1, 2007. They may also be referred to as the "current" assumptions. The "proposed" or "recommended" assumptions are those we recommend for use in the valuation as of July 1, 2008 and for subsequent valuations until further changes are made. Note that the Retirement Board has the authority and responsibility to make the final decision regarding the appropriateness of the assumptions.

Economic assumptions are generally chosen on the basis of the actuary's expectations as to the effect of future economic conditions on the operation of TRS. However, the setting of these assumptions is much more subjective than in setting and recommending the demographic assumptions. This report does not consider the economic assumptions.

Sections 3 through 10 of this report show the results of our study of active member demographic assumptions. The exhibits are detailed comparisons between actual and expected experience on both the current and proposed bases.

For each type of assumption, graphs show the actual, the expected (or old) and proposed rates. The exhibits also show the total numbers of actual and expected terminations, retirements and disabilities. Ratios larger than 100% on the current basis indicate that the rates may need to be raised; ratios smaller than 100% indicate that rates may need to be lowered.

For each exhibit, the actual decrement rates are shown as bar graphs on either a quinquennial-age basis, a years-of-service basis, or, in the case of retirement rates, on an age-by-age basis. The current rates – the "expected" rates – used in the July 1, 2007 actuarial valuation, are shown as well as the new proposed assumptions as line graphs. Therefore, the assumption changes we are proposing are illustrated by the difference between the two lines in each exhibit.

C. Our Philosophy

Similar to an actuarial valuation, the calculation of actual and expected experience is a fairly mechanical process. From one actuary to another, you would expect to see very little difference. However, the setting of assumptions is a different story, as it is more art than science. In this report, we recommend new assumptions. To help you understand our thought process, here is a brief summary of our philosophy:

- **Don't overreact:** When we see significant changes in experience, we generally do not adjust our rates to reflect the entire difference. We will generally recommend rates somewhere between the old rates and the new experience. If the experience during the next study shows the same result, we will probably recognize this trend at that point. On the other hand, if the experience returns closer to its prior level, we will not have overreacted, possibly causing unnecessary volatility in contribution rates.
- **Anticipate Trends:** If there is an identified trend that is expected to continue, we believe that this should be recognized. An example of this is the retiree mortality assumption. It is an established trend that people are continuing to live longer; therefore, we build in a margin to reflect future decreases in mortality rates.
- **Simplify:** Where there is no material difference in results, we attempt to simplify our assumptions and methods. There is no point in complexity that does not improve accuracy.

D. Actuarial Standard of Practice No. 27 – Selection of Economic Assumptions

This report does not address the current economic assumptions. Our study of the TRS economic assumptions issued May 4, 2004 confirmed that the System's current economic assumptions have been developed in accordance with ASOP No. 27. Accordingly, the economic assumptions adopted in 2004 will be used in the upcoming actuarial valuation.

The Actuarial Standards Board has adopted Actuarial Standard of Practice (ASOP) No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*. This standard provides guidance to actuaries giving advice on selecting economic assumptions for measuring obligations under defined benefit plans, such as TRS.

Because no one knows what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes. These estimates are based on a mixture of past experience, future expectations, and professional judgment. The actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. However, the standard explicitly advises the actuary not to give undue weight to recent experience.

Recognizing that there is not one “right answer”, the standard calls for the actuary to develop a best estimate range for each economic assumption, and then recommend a specific point within that range. Each economic assumption should individually satisfy this standard.

After completing the selection process, the actuary should review the set of economic assumptions for consistency. As an example, an inflation component used in both the investment return and wage growth assumptions should be consistent. If a change occurs in one assumption, the actuary needs to consider if the change should modify other economic assumptions as well.

An actuary’s best-estimate range with respect to a particular measurement of pension obligations may change from time to time due to changing conditions or emerging plan experiences. The actuary may change assumptions frequently in certain situations, even if the best-estimate range has not changed materially, and less frequently in other situations. Even if assumptions are not changed, the actuary needs to be satisfied that each of the economic assumptions selected for a particular measurement complies with Actuarial Standard of Practice No. 27 (ASOP No. 27).

E. Actuarial Standard of Practice No. 35: Selection of Demographic Assumptions

Actuarial Standard of Practice No. 35 (ASOP No. 35) governs the selection of demographic and other noneconomic assumptions for measuring pension obligations. ASOP No. 35 states that the actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment. The actuary should select reasonable demographic assumptions in light of the particular characteristics of the defined benefit plan that is the subject of the measurement. A reasonable assumption is one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains or losses over the measurement period.

ASOP No. 35 Steps

The actuary should follow the following steps in selecting the demographic assumptions:

1. Identify the types of assumptions. Types of demographic assumptions include but are not limited to retirement, mortality, termination of employment, disability, election of optional forms of payment, administrative expenses, family composition, and treatment of missing or incomplete data. The actuary should consider the purpose and nature of the measurement, the materiality of each assumption, and the characteristics of the covered group in determining which types of assumptions should be incorporated into the actuarial model.
2. Consider the relevant assumption universe. The relevant assumption universe includes experience studies or published tables based on the experience of other representative populations, the experience of the plan sponsor, the effects of plan design, and general trends.
3. Consider the assumption format. The assumption format includes whether assumptions are based on parameters such as gender, age, service or calendar year. The actuary should consider the impact the format may have on the results, the availability of relevant information, the potential to model anticipated plan experience, and the size of the covered population.
4. Select the Specific Assumptions. In selecting an assumption the actuary should consider the potential impact of future plan design as well as the factors listed above.
5. Evaluate the Reasonableness of the Selected Assumption. The assumption should be expected to appropriately model the contingency being measured. The assumption should not be anticipated to produce significant actuarial gains or losses.

ASOP No. 35 General Considerations and Application

Each individual demographic assumption should satisfy the criteria of ASOP No. 35. In selecting demographic assumptions the actuary should also consider: the internal consistency between the assumptions, materiality, cost effectiveness, and the combined effect of all assumptions. At each measurement date the actuary should consider whether the selected assumptions continue to be reasonable, but the actuary is not required to do a complete assumption study at each measurement date. In our opinion, the demographic assumptions recommended in this report have been developed in accordance with ASOP No. 35.

TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Section 3

Retirement

Exhibits in this section present comparisons of actual retirements during the current and prior study periods with those expected according to the actuarial assumptions used in our 2007 valuation. We found the rates used in our 2007 valuation to be fairly consistent with the actual experience during the study period. Nevertheless, we are recommending some minor revisions which will reduce the probabilities of retirement for both general and university members.

Assumption Format

Retirement rates are currently based on three factors:

- Age
- Eligibility for an Unreduced Retirement, and
- Membership in the Montana University System (MUS).

Our study found each factor to be significant.

The requirements for early retirement with a reduced benefit are 5 years of service and age 50. The requirements for retirement with an unreduced benefit are either 25 years of service, regardless of age, or age 60 and 5 years of service.

Results and Recommendations

Ages 70 and Over

All exhibits exclude retirees after age 70. We continue to recommend an assumption of immediate retirement for members aged 70 and older.

Exhibit 1: Retirement with Reduced Benefits - General Members

The increase in reduced retirements with age matches experience. The actual rates are less than assumed. We are recommending the current assumption be lowered at all ages.

Exhibit 2: Retirement with Reduced Benefits - University Members

The general shape of the assumption curve matches experience. The small size of the group is expected to cause irregularities in experience. We are recommending no changes to the current assumption.

Exhibit 3: Retirement with Full Benefits (First Year Eligible to Retire) - General Members

We are recommending refinements to the shape of the assumption curve to reflect that there have been more retirements than expected in the late 50s and fewer retirements than expected at 60. The total number of assumed retirements is less under the recommendation.

Exhibit 4: Retirement with Full Benefits (First Year Eligible to Retire) - University Members

Experience does not suggest higher probabilities at older ages. The recommended rates raise the assumption slightly at lower ages and lower it at age 60. The total number of assumed retirements is less under the recommendation.

Exhibit 5: Retirement with Full Benefits (Excludes First Year Eligible to Retire) - General Members

Experience follows the shape of the current assumptions, but there have been fewer retirements than expected. Our recommendation maintains the shape of the curve and lowers the total number of expected retirements.

Exhibit 6: Retirement with Full Benefits (Excludes First Year Eligible to Retire) - University Members

Our recommendation makes small adjustments to the shape of the curve and lowers the total number of expected retirements.

Summary

The results of our retirement study showed experience which was fairly consistent with the current retirement rates. Nevertheless, we are recommending some minor revisions which will reduce the probabilities of retirement for both general and university members. Specifically, the recommended assumptions:

- make small refinements to the patterns of the unreduced retirement assumptions which generally decrease the probabilities,
- decrease the probabilities of reduced retirement for general members at all ages, and
- leave the probabilities of reduced retirement for university members unchanged.

General Member Retirement Summary					
Type of Retirement	Actual	Expected	Actual/ Expected	Proposed	Actual/ Proposed
Reduced	521	870	60%	641	81%
1 st Year Unreduced	424	509	83%	475	89%
After 1 st Year Unreduced	1,829	2,318	79%	2,073	88%
Total	2,774	3,697	75%	3,189	87%

University Member Retirement Summary					
Type of Retirement	Actual	Expected	Actual/ Expected	Proposed	Actual/ Proposed
Reduced	39	48	81%	48	81%
1 st Year Unreduced	32	40	80%	34	94%
After 1 st Year Unreduced	257	347	74%	319	81%
Total	328	435	75%	401	82%

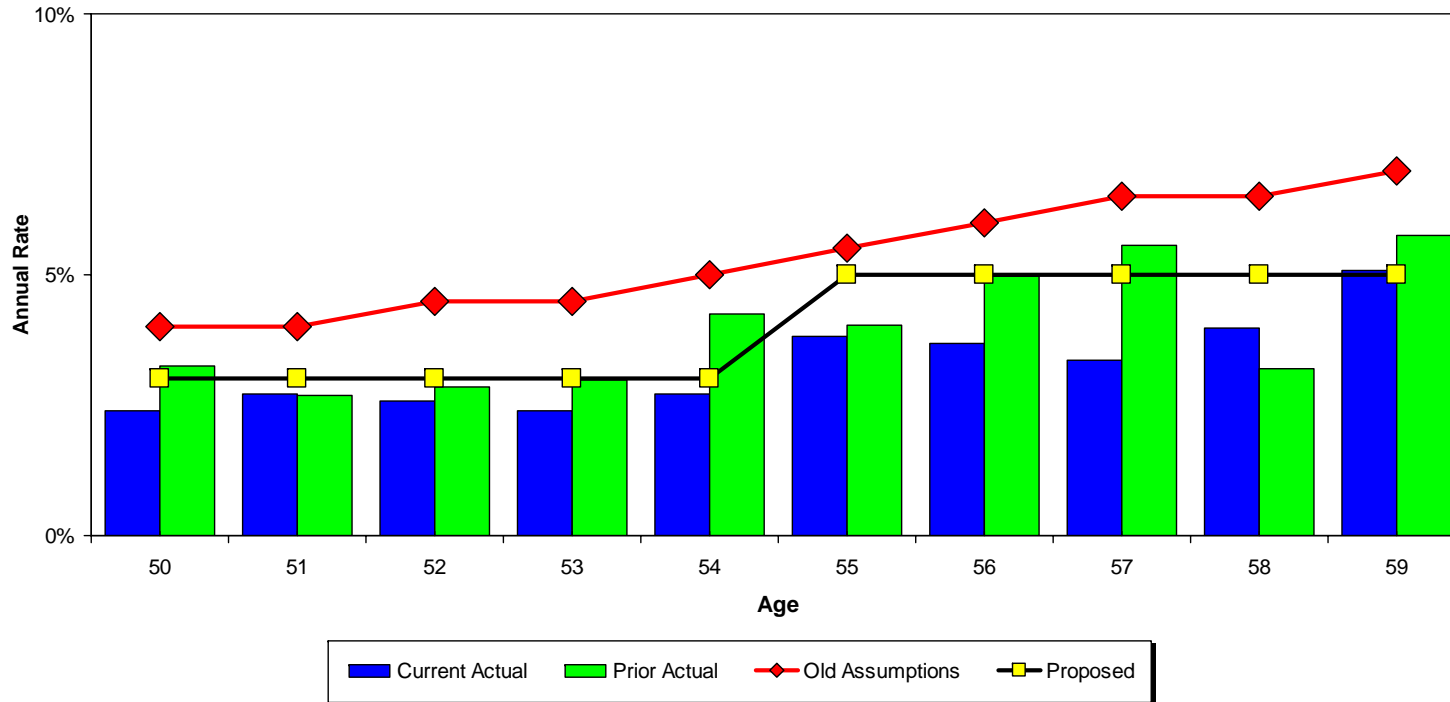
Reader's Note

The recommended assumptions are expressed in numerical format in Section 8.

TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 1

Retirement with Reduced Benefits General Members

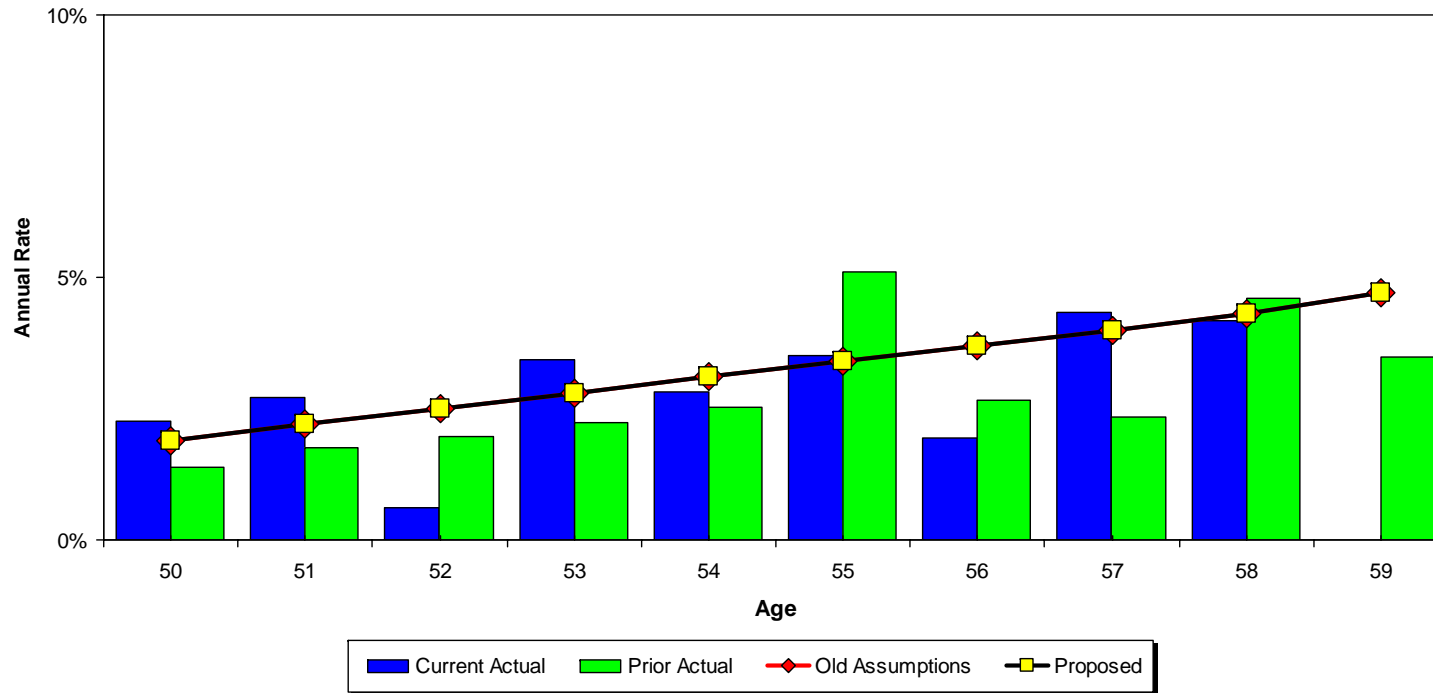


All Ages	Old Assumptions	Actual	Proposed
Total Count	870	521	641
Actual/Expected	60%		81%

TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 2

Retirement with Reduced Benefits University Members

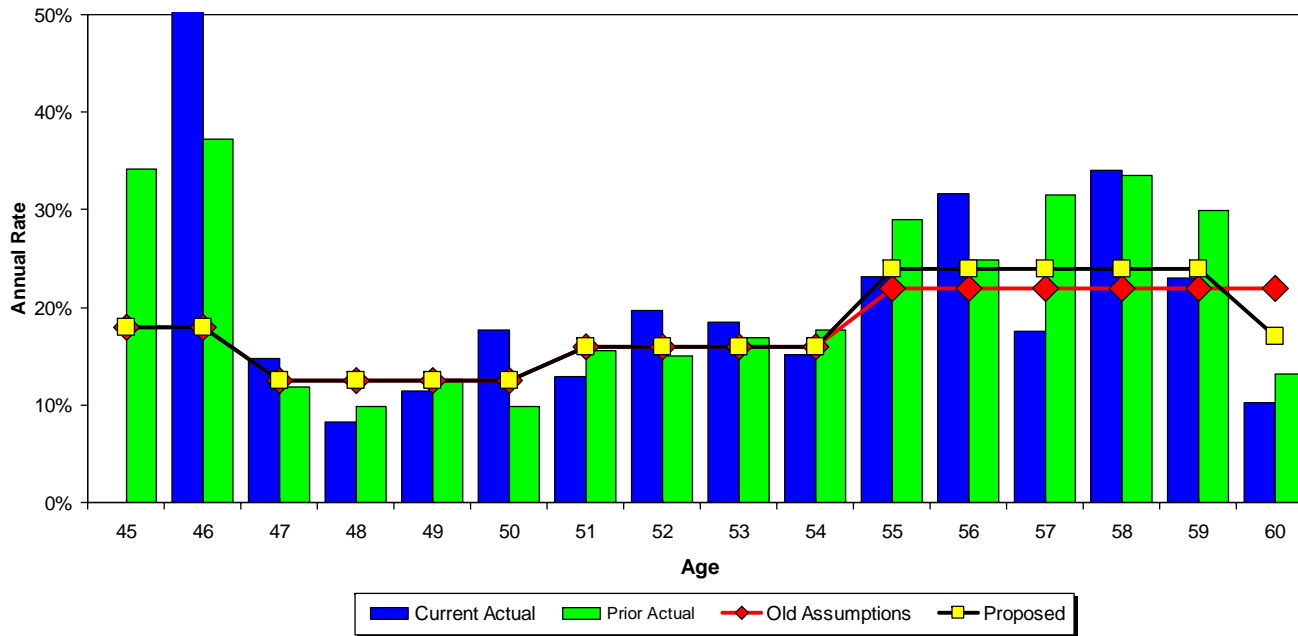


All Ages	Old Assumptions	Actual	Proposed
Total Count	48	39	48
Actual/Expected	81%		81%

TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 3

Retirement with Full Benefits (First Year Eligible to Retire) General Members



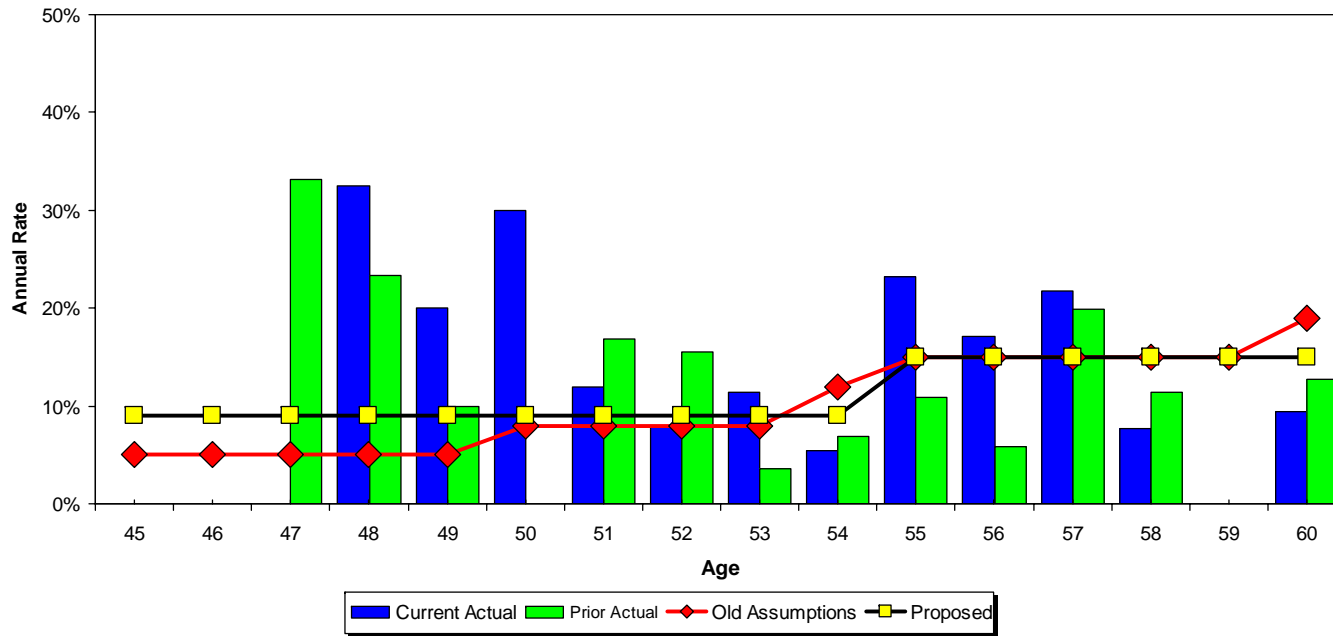
Graphed Ages	Old Assumptions	Actual	Proposed
Total Count	469	408	438
Actual/Expected	87%		93%

All Ages	Old Assumptions	Actual	Proposed
Total Count	509	424	475
Actual/Expected	83%		89%

TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 4

Retirement with Full Benefits (First Year Eligible to Retire) University Members



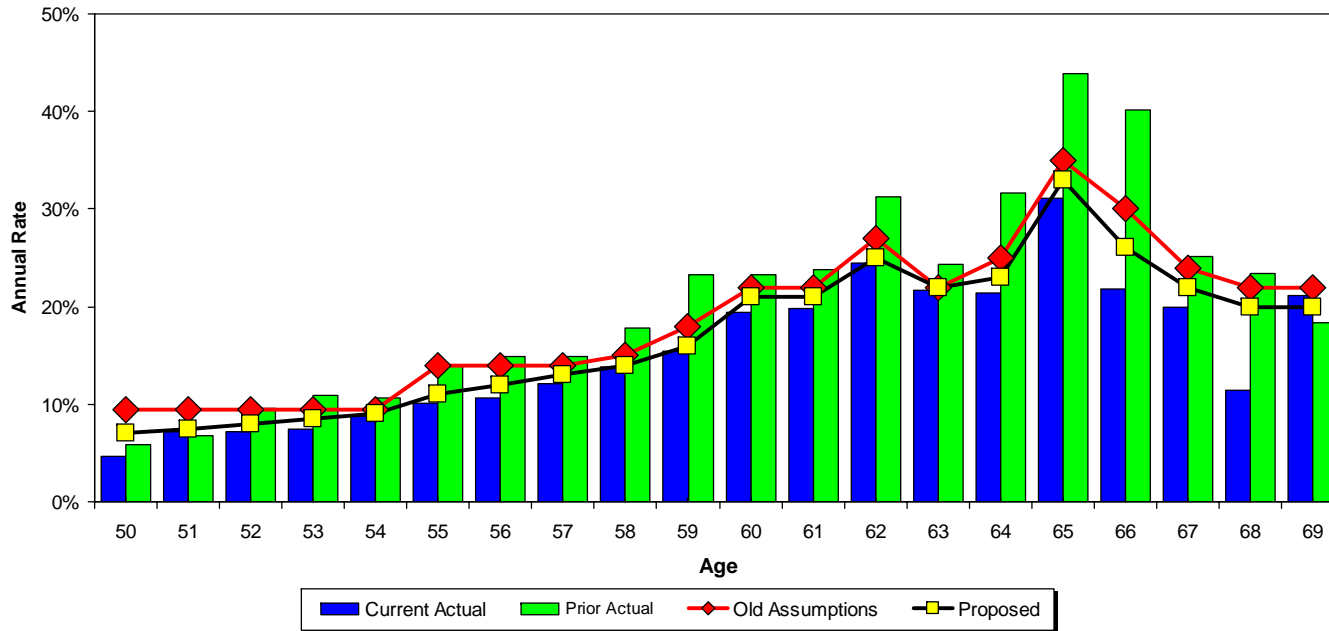
Graphed Ages	Old Assumptions	Actual	Proposed
Total Count	38	31	34
Actual/Expected	82%		91%

All Ages	Old Assumptions	Actual	Proposed
Total Count	40	32	34
Actual/Expected	80%		94%

TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 5

Retirement with Full Benefits (Excludes First Year Eligible to Retire) General Members



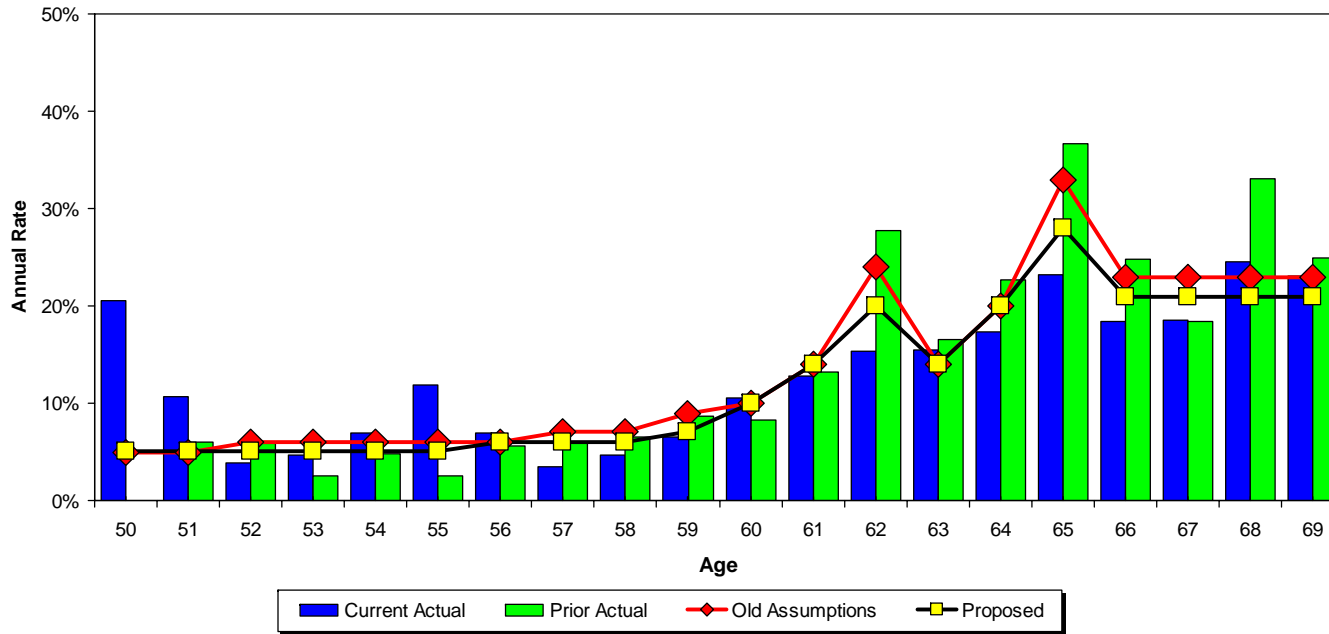
Graphed Ages	Old Assumptions	Actual	Proposed
Total Count	2,137	1,764	1,907
Actual/Expected	83%		93%

All Ages	Old Assumptions	Actual	Proposed
Total Count	2,318	1,829	2,073
Actual/Expected	79%		88%

TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 6

Retirement with Full Benefits (Excludes First Year Eligible to Retire) University Members



Graphed Ages	Old Assumptions	Actual	Proposed
Total Count	286	241	257
Actual/Expected	84%		94%

All Ages	Old Assumptions	Actual	Proposed
Total Count	347	257	319
Actual/Expected	74%		81%

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
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Section 4

Disability Retirement

Exhibits in this section present comparisons of actual disabled retirements during the current and prior study periods with those expected according to the actuarial assumptions used in our 2007 valuation. We found the rates used in our 2007 valuation to be fairly consistent with the actual experience during the study period.

Assumption Format

Disability rates are currently based on two factors:

- Age, and
- Membership in the Montana University System (MUS).

Although our study did not have a creditable number of disabilities to validate the shape of the age curve, the shape is generally consistent with experience and the increased incidence of disability at older ages is an almost universal phenomenon. We are no longer recommending a separate assumption for MUS members.

We are recommending lower rates for general members. There are no longer enough university members to make credible adjustments to the disability assumption. Only two university members became disabled in the study period. The recommended assumption for general members is close to the current assumption for university members. Therefore we are recommending that the two groups be combined for the purpose of setting and applying this assumption.

Results and Recommendations

Exhibit 7: Disability Retirement - General Members

The actual rates are less than assumed. We are recommending the current assumption be lowered at all ages.

Exhibit 8: Disability Retirement - University Members

There are only two actual disabilities. We are recommending the university assumption be set equal to the general member assumption.

Disability Retirement Summary					
Member Type	Actual	Expected	Actual/ Expected	Proposed	Actual/ Proposed
General Members	36	81	44%	45	80%
University Members	2	4	50%	5	40%
Total	38	85	45%	50	76%

Reader's Note

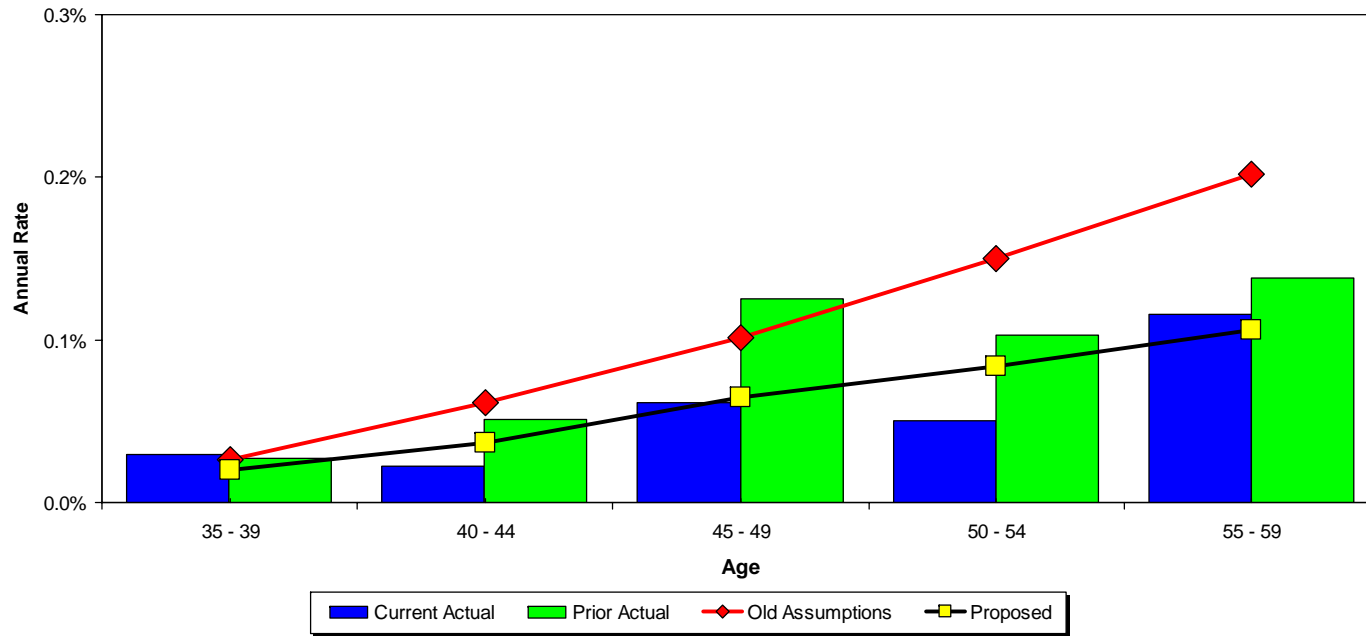
The recommended assumptions are expressed in numerical format in Section 8.



TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 7

Disability Retirement General Members

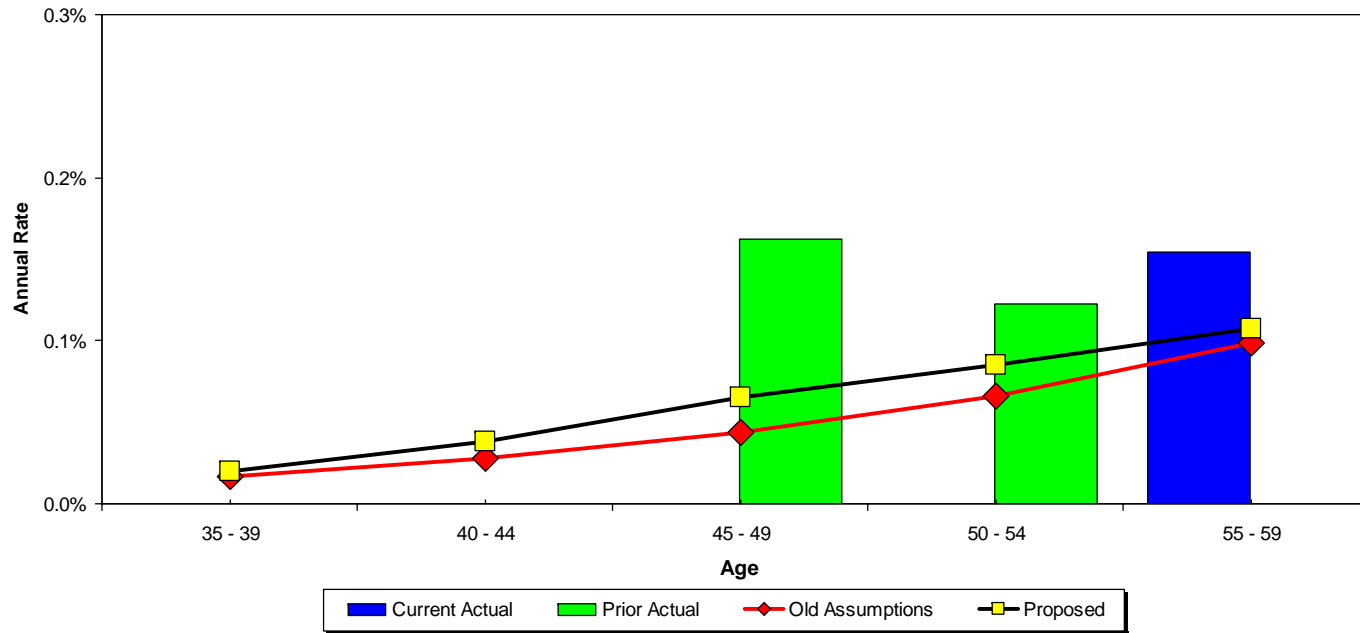


	Old Assumptions	Actual	Proposed
Total Count	81	36	45
Actual/Expected	44%		80%

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
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Exhibit 8

**Disability Retirement
University Members**



	Old Assumptions	Actual	Proposed
Total Count	4	2	5
Actual/Expected	50%		40%

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
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Section 5

Other Terminations of Employment

Assumption Format

Termination rates are currently based on two factors:

- Service, and
- Membership in the Montana University System (MUS).

Based on our experience in evaluating rates of termination with virtually all of our clients, termination varies by years of service. That experience is borne out in this study. However, for the second study in a row the experience of the university members was very close to the general members. In addition, there are becoming very few university members with less than 25 years of service. For both these reasons we are recommending the same assumption be used for both general members and university members.

We have lowered the probabilities of termination for members with longer service to be closer to actual experience. For the most part the recommended rates are about halfway between the current assumptions and the experience in the study period.

We did not have experience for the last 3 months of the six year period. Since terminations do not happen evenly through the year we excluded experience after July 1, 2006 and used a five year study period of July 1, 2001 to July 1, 2006.

Results and Recommendations

Exhibit 9: Other Terminations of Employment – General Members

Experience matches the shape of the current assumption. We are recommending a decrease in the probability of termination for members with longer service.

Exhibit 10: Other Terminations of Employment – University Members

Again, experience matches the shape of the current assumption. We are recommending a decrease in the probability of termination for members with longer years of service. The experience of the university members is similar to the general members. This was also true in the last study. The number of university members with less than 25 years of service is also rapidly decreasing. Therefore we are recommending the two groups be combined for the purpose of setting and applying this assumption.

Other Terminations of Employment Summary					
Member Type	Actual	Expected	Actual/ Expected	Proposed	Actual/ Proposed
General Members	7,157	6,597	108%	6,892	104%
University Members	61	74	82%	64	95%
Total	7,218	6,671	108%	6,956	104%

Reader's Note

The recommended assumptions are expressed in numerical format in Section 8.

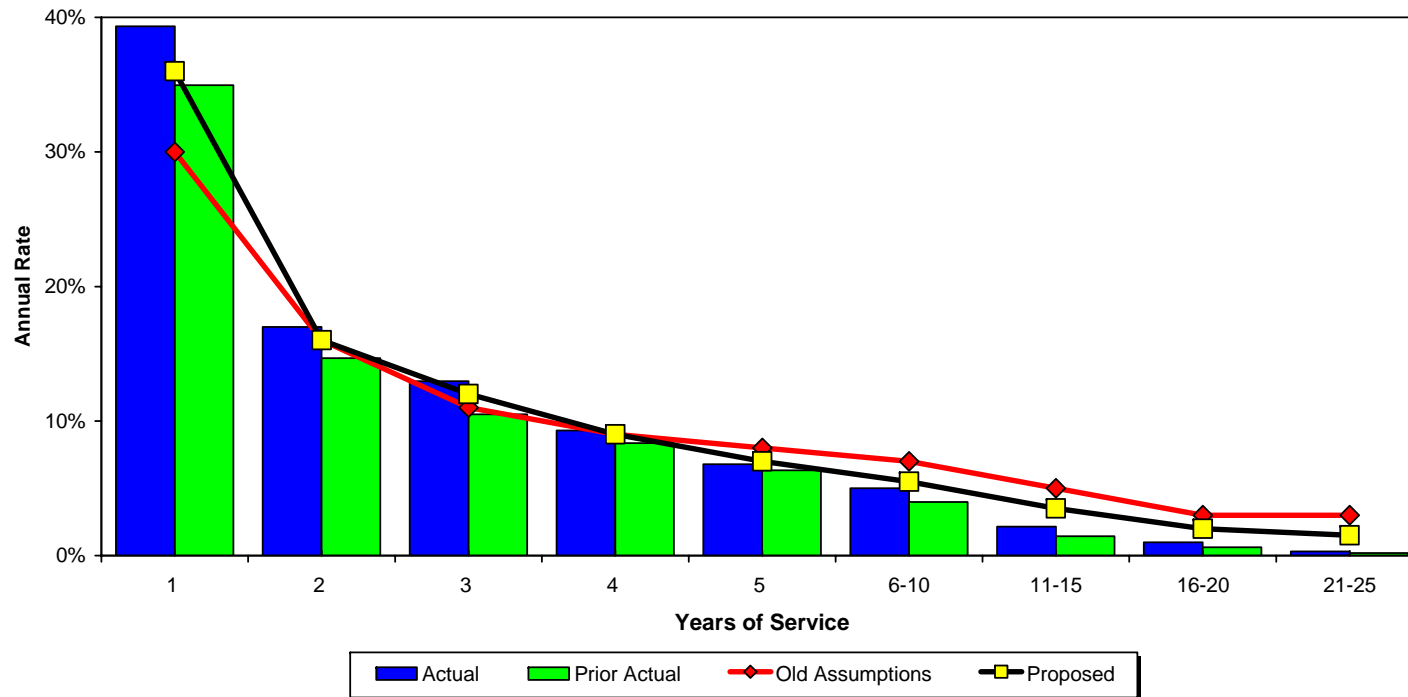


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TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 9

Other Terminations of Employment General Members

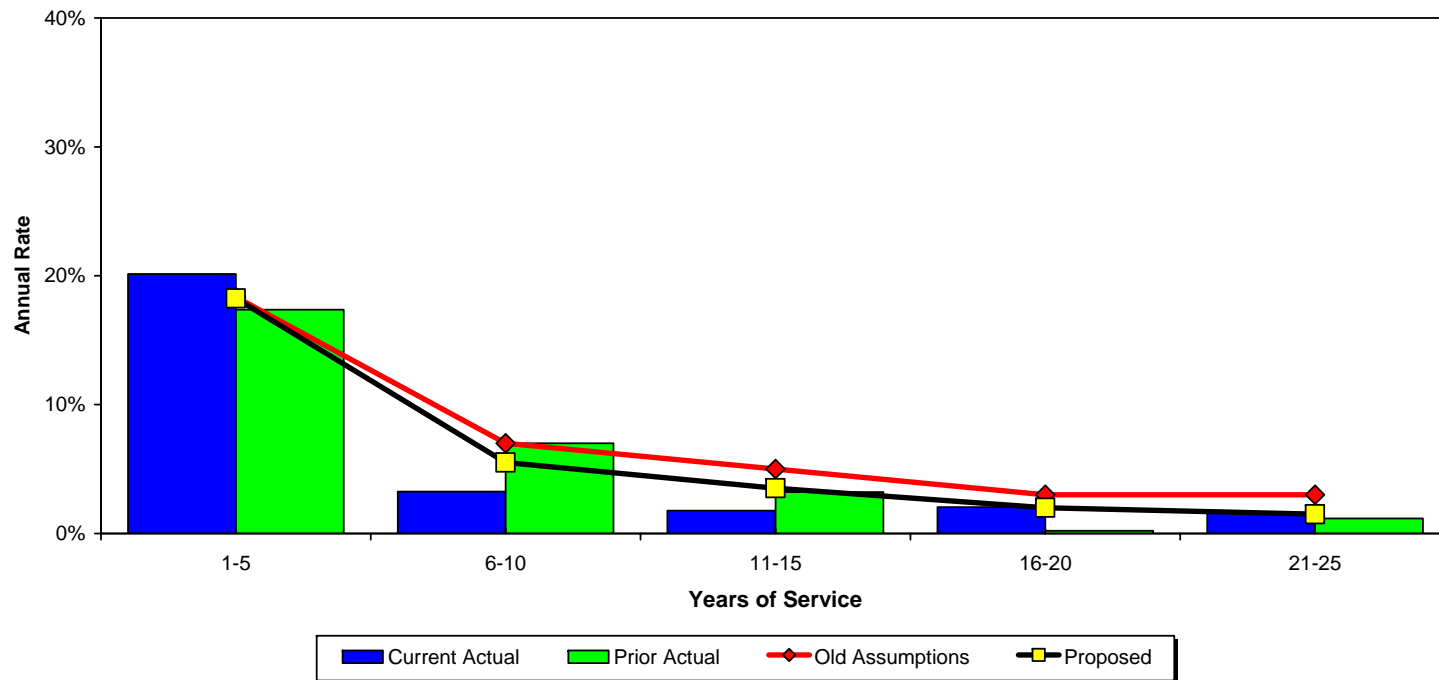


	Old Assumptions	Actual	Proposed
Total Count	6,597	7,157	6,892
Actual/Expected	108%		104%

TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Exhibit 10

Other Terminations of Employment University Members



	Old Assumptions	Actual	Proposed
Total Count	74	61	64
Actual/Expected	82%		95%

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
2001 - 2007 INVESTIGATION OF EXPERIENCE**

Section 6

**Probability of Retaining Membership in the System
Upon Vested Termination**

This section of the report deals with the rates at which vested employees choose to retain their membership in the System by leaving their contributions in the System upon termination of service.

General Recommendation

We recommend a single assumption continue to be used for general and university members. Experience has been close between these two groups in the past. The number of university members impacted by this assumption is rapidly decreasing since most university members are now eligible for an immediate retirement. We are recommending no changes to this assumption.

Results

*Exhibit 11: Probability of Retaining Membership in the System Upon Vested Termination
– All Members*

Actual experience over the six-year period has not been significantly different than expected. Therefore, we are recommending no changes.

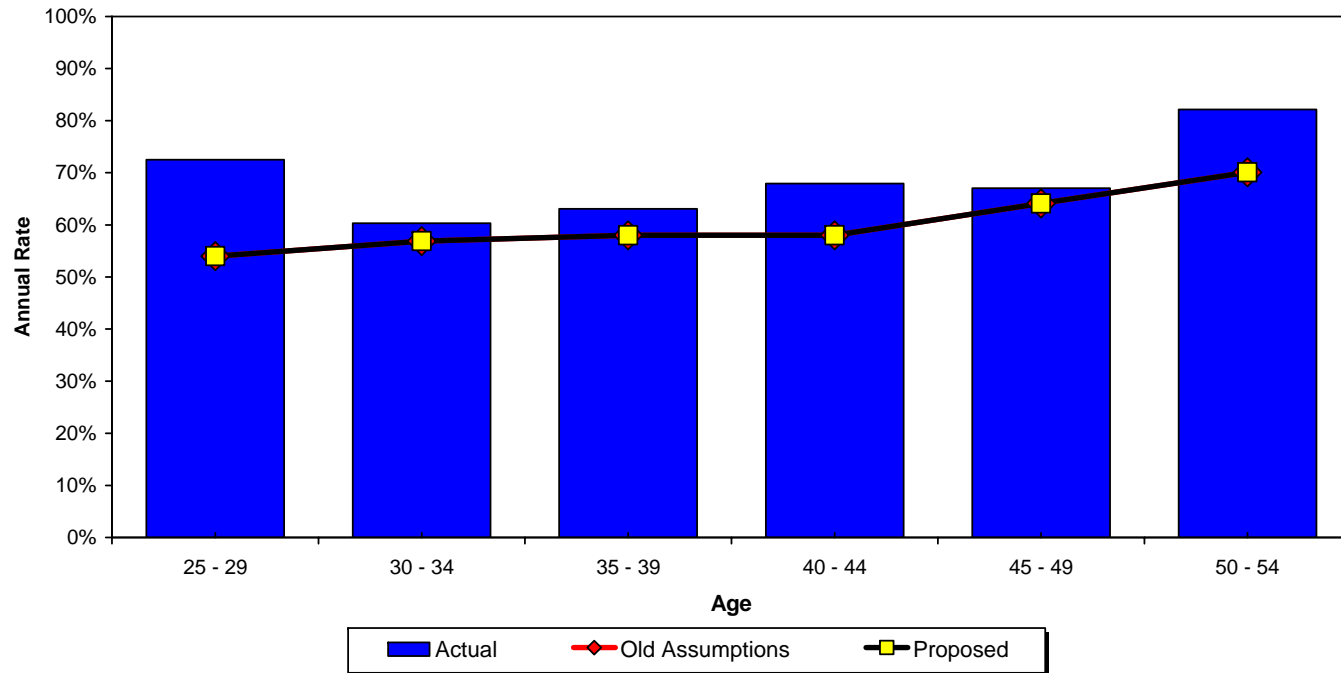
Reader's Note

The recommended assumptions are expressed in numerical format in Section 8.

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
2001 - 2007 INVESTIGATION OF EXPERIENCE**

Exhibit 11

**Probability of Retaining Membership in the System Upon Vested Termination
All Members**



	Old Assumptions	Actual	Proposed
Total Count	543	595	543
Actual/Expected	110%		110%

TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA 2001 - 2007 INVESTIGATION OF EXPERIENCE

Section 7

Methodology

This appendix provides some additional technical comments with regard to the investigation of experience.

General

- Only experience of contributing members was studied.
- All expected values are based on the July 1, 2007 actuarial valuation assumptions.

Data

All data was provided to us by TRS staff. The data included experience from July 1, 2001 through July 1, 2007. We made the following edits prior to performing the experience study:

- Retirements and other decrements occurring on July 1, 2001 were excluded. We included July 1, 2007 occurrences. The effect is a true six-year study including retirements occurring at the end of the period.
- When terminations occurred while the member was eligible for retirement, the member was included with the retirements during that period.
- The last 3 months of termination data was not available. Since teacher terminations do not happen uniformly through the year we excluded the last year from our study of terminations. The termination study therefore covers the five years of experience from July 1, 2001 to July 1, 2006.

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
2001 - 2007 INVESTIGATION OF EXPERIENCE**

Section 8

Summary of Valuation Assumptions

Note: The following is a summary of the valuation assumptions recommended to be used for the July 1, 2008 actuarial valuation, if the Retirement Board adopts the changes recommended in this report.

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
2001 - 2007 INVESTIGATION OF EXPERIENCE**

Table A-1

**Summary of Valuation Assumptions
(July 1, 2008)**

I. Economic assumptions	
A. General wage increases* (Adopted July 1, 2004)	4.50%
B. Investment return (Adopted July 1, 2004)	7.75%
C. Price Inflation Assumption (Adopted July 1, 2004)	3.50%
D. Growth in membership	0.00%
E. Postretirement benefit increases (Starting three years after retirement)	1.50%
F. Interest on member accounts (Adopted July 1, 2004)	5.00%
II. Demographic assumptions	
A. Individual salary increase due to promotion and longevity (General Member assumptions adopted July 1, 2002) (University Member assumptions adopted July 1, 2000)	Table A-2
B. Retirement (adopted July 1, 2008)	Table A-3
C. Disablement (adopted July 1, 2008)	Table A-4
D. Mortality among contributing members, service retired members, and beneficiaries For Males: RP 2000 Combined Mortality Table for Males, set back 3 years, with mortality improvements projected by Scale AA to 2008 (adopted July 1, 2006). For Females: RP 2000 Combined Mortality Table for Females, set back 2 years, with mortality improvements projected by Scale AA to 2008 (adopted July 1, 2006).	Table A-5
E. Mortality among disabled members For Males: RP 2000 Disabled Mortality Table for Males, set back 3 years, with mortality improvements projected by Scale AA to 2008 (adopted July 1, 2006). For Females: RP 2000 Disabled Mortality Table for Females, set forward 3 years, with mortality improvements projected by Scale AA to 2008 (adopted July 1, 2006).	Table A-5
F. Other terminations of employment (adopted July 1, 2008)	Table A-6
G. Probability of retaining membership in the System upon vested termination (adopted July 1, 2002)	Table A-7

* *Montana University System (MUS) members are assumed to have a 0.63% higher average final compensation to account for the larger than average annual compensation increases observed in the years immediately preceding retirement.*

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
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Table A-2

Future Salaries

Years of Service	General Members			University Members		
	Individual Merit & Longevity	General Wage Increase	Total Salary Increase	Individual Merit & Longevity	General Wage Increase	Total Salary Increase
1	4.51%	4.50%	9.01%	1.00%	4.50%	5.50%
2	4.09	4.50	8.59	1.00	4.50	5.50
3	3.46	4.50	7.96	1.00	4.50	5.50
4	2.94	4.50	7.44	1.00	4.50	5.50
5	2.52	4.50	7.02	1.00	4.50	5.50
6	2.21	4.50	6.71	1.00	4.50	5.50
7	1.89	4.50	6.39	1.00	4.50	5.50
8	1.68	4.50	6.18	1.00	4.50	5.50
9	1.47	4.50	5.97	1.00	4.50	5.50
10	1.31	4.50	5.81	1.00	4.50	5.50
11	1.16	4.50	5.66	1.00	4.50	5.50
12	1.00	4.50	5.50	1.00	4.50	5.50
13	0.84	4.50	5.34	1.00	4.50	5.50
14	0.68	4.50	5.18	1.00	4.50	5.50
15	0.58	4.50	5.08	1.00	4.50	5.50
16	0.47	4.50	4.97	1.00	4.50	5.50
17	0.37	4.50	4.87	1.00	4.50	5.50
18	0.26	4.50	4.76	1.00	4.50	5.50
19	0.21	4.50	4.71	1.00	4.50	5.50
20	0.16	4.50	4.66	1.00	4.50	5.50
21	0.11	4.50	4.61	1.00	4.50	5.50
22 & Up	0.00	4.50	4.50	1.00	4.50	5.50

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
2001 - 2007 INVESTIGATION OF EXPERIENCE**

Table A-3

**Retirement
Annual Rates**

Age	General Members			University Members		
	Eligible for Reduced Benefits	First Year Eligible for Full Benefits	Thereafter	Eligible for Reduced Benefits	First Year Eligible for Full Benefits	Thereafter
45		18.0%	7.0%		9.0%	5.0%
46		18.0	7.0		9.0	5.0
47		12.5	7.0		9.0	5.0
48		12.5	7.0		9.0	5.0
49	*	12.5	7.0	*	9.0	5.0
50	3.0%	12.5	7.0	1.9%	9.0	5.0
51	3.0	16.0	7.5	2.2	9.0	5.0
52	3.0	16.0	8.0	2.5	9.0	5.0
53	3.0	16.0	8.5	2.8	9.0	5.0
54	3.0	16.0	9.0	3.1	9.0	5.0
55	5.0	24.0	11.0	3.4	15.0	5.0
56	5.0	24.0	12.0	3.7	15.0	6.0
57	5.0	24.0	13.0	4.0	15.0	6.0
58	5.0	24.0	14.0	4.3	15.0	6.0
59	5.0	24.0	16.0	4.7	15.0	7.0
60	*	17.0	21.0	*	15.0	10.0
61		21.0	21.0		14.0	14.0
62		25.0	25.0		20.0	20.0
63		22.0	22.0		14.0	14.0
64		23.0	23.0		20.0	20.0
65		33.0	33.0		28.0	28.0
66		26.0	26.0		21.0	21.0
67		22.0	22.0		21.0	21.0
68		20.0	20.0		21.0	21.0
69		20.0	20.0		21.0	21.0
70		**	**		**	**

* All benefits are unreduced after attaining age 60. Reduced benefits are not available before age 50.

** Immediate retirement is assumed at age 70 or over.

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
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Table A-4

**Disablement
Annual Rates**

<u>Age</u>	<u>All Members</u>
25	.010%
30	.010
35	.020
40	.030
45	.050
50	.080
55	.100
60	.120

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
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Table A-5

**Mortality
Annual Rates**

Age	Contributing Members, Service Retired Members and Beneficiaries		Disabled Members	
	Men	Women	Men	Women
25	.03%	.02%	1.97%	.68%
30	.04	.02	2.17	.69
35	.05	.04	2.17	.67
40	.09	.05	2.17	.66
45	.11	.08	2.08	.85
50	.15	.12	2.23	1.31
55	.23	.20	2.69	1.89
60	.41	.38	3.32	2.43
65	.78	.73	3.99	3.19
70	1.45	1.29	4.90	4.33
75	2.42	2.17	6.15	6.01
80	4.22	3.55	8.30	8.30
85	7.55	5.91	11.43	11.86

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
2001 - 2007 INVESTIGATION OF EXPERIENCE**

Table A-6

**Other Terminations of Employment
Among Members Not Eligible to Retire
Annual Rates**

<u>Years of Service</u>	<u>All Members</u>
1	36.0%
2	16.0
3	12.0
4	9.0
5	7.0
6	6.5
7	6.0
8	5.5
9	5.1
10	4.7
11	4.3
12	3.9
13	3.5
14	3.2
15	2.9
16	2.6
17	2.3
18	2.0
19	1.9
20	1.8
21	1.7
22	1.6
23	1.5
24	1.5

**TEACHERS' RETIREMENT SYSTEM, STATE OF MONTANA
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Table A-7

**Probability of Retaining Membership in the System
Upon Vested Termination**

<u>Age</u>	<u>Probability of Retaining Membership</u>
25	54%
30	54
35	58
40	58
45	60
50	70
55	75