

**Marin County
Employees' Retirement System**

Experience Study

Produced by **Cheiron**

January 14, 2015

TABLE OF CONTENTS

Letter of Transmittal	i
Section I - Executive Summary.....	1
Purpose.....	1
Summary of Economic Assumption Analysis	1
Summary of Demographic Assumption Analysis	2
Cost of Economic and Demographic Assumption Changes	2
Section II - Economic Assumptions.....	4
Introduction.....	4
Inflation.....	4
Investment Return.....	6
Administrative Expenses	8
Payroll Growth.....	8
COLA Growth	9
Section III - Demographic Assumptions	11
Mortality Rates	11
Merit Salary Increases	15
Rates of Retirement	17
Disability Rates	23
Termination Rates	26
Refund Rates and Reciprocity	30
Family Composition	31
Terminal Service and Payloads.....	31
Methodology	33
Purposes of the Experience Study	33
Scope of Report	33
Importance of Reliable Assumptions.....	34
Methodology (Economic Assumptions)	34
Methodology (Demographic Assumptions).....	34

LETTER OF TRANSMITTAL

January 14, 2015

Retirement Board of
Marin County Employees' Retirement Association
1 McInnis Parkway, Suite 100
San Rafael, CA 94903

Dear Members of the Board:

At your request, we have completed an experience study of the assumptions used in the valuations of the Marin County Employees' Retirement Association (MCERA). The economic assumptions studied were the investment return, administrative expenses, and wage, payroll and COLA inflation. The demographic study compares assumed versus actual experience for the three-year period from July 1, 2011 through June 30, 2014.

This report presents the results of our analysis as well as recommendations for the assumptions to be used in performing the July 1, 2014 actuarial valuation. In preparing our report, we relied on information (some oral and some written) supplied by MCERA. This information includes, but is not limited to, the plan provisions, employee data, and financial information.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

Cheiron's experience study was prepared exclusively for the Retirement Board of Marin County Employees' Retirement Association for a specific and limited purpose. It is not for the use or benefit of any third party for any purpose. Any third party recipient of Cheiron's work product (other than the Fund's auditor, attorney, third party administrator or other professional when providing professional services to the fund or any governmental agency to which this certification is required to be submitted by law or regulation) who desires professional guidance should not rely upon Cheiron's work product, but should engage qualified professionals for advice appropriate to its own specific needs.

We are available to answer any questions about the contents of this report or the process used in our analysis.



Sincerely,
Cheiron

Robert McCrory, FSA, EA, MAAA
Principal Consulting Actuary

Graham Schmidt, ASA, EA, MAAA
Consulting Actuary

EXECUTIVE SUMMARY

PURPOSE

Actuarial assumptions (economic and demographic) are intended to be long-term in nature, and should be both individually reasonable and consistent in the aggregate. The purpose of this experience study is to evaluate whether or not the current assumptions adequately reflect the long-term expectations for the Marin County Employees' Retirement Association (MCERA), and if not, then recommend any adjustments that might be needed. It is important to note that frequent and significant changes in the actuarial assumptions from year-to-year are not typically implemented, unless there are known fundamental changes in expectations of the economy, or with respect to MCERA's membership or assets, that would warrant such frequent or significant change.

The plan's economic assumptions were reviewed. The economic assumptions include the assumed rates of inflation, COLA increases, investment return, active payroll growth and administrative expense assumptions.

The Plan's demographic experience – observed rates of retirement, withdrawal, termination, disability, and death, as well as other assumptions – is compared with the experience expected under the actuarial assumptions currently used to determine Plan liabilities and cost, and revised assumptions are recommended as appropriate.

SUMMARY OF ECONOMIC ASSUMPTION ANALYSIS

The specific economic assumptions analyzed in this report are wage inflation, investment return, administrative expense assumptions, payroll growth, and COLA growth. These assumptions have a significant impact on the contribution rates in the short-term and the risk of negative outcomes in the long-term.

A review of the Plan's economic assumptions based on the allocation of Plan assets and the history of the financial markets indicates that the current economic assumptions of a nominal 7.50% annual rate of return and a 3.25% annual rate of inflation are reasonable, but we recommend lowering the assumptions to 7.25% and 2.75%, respectively.

We have performed additional analyses based on the future expectations of the Plan's investment consultant, as well as other investment consultants. We have also reviewed market expectations for inflation as revealed in the Inflation Curve published by the Federal Reserve Bank of Cleveland and other sources, and we are familiar with the economic assumptions being adopted by pension plans nationwide.

This evidence further strengthens our belief that the Retirement Board should reduce the assumed inflation rate (from 3.25% to 2.75%), and reduce the nominal return assumption (from 7.50% to 7.25%). However, other combinations of inflation and return assumptions would also be reasonable, including the current set. Assuming the inflation assumption is reduced, we are recommending a reduction in the payroll growth assumption (from 3.25% to 3.00%, which reflects the introduction of a 0.25% real wage growth assumption), and revised rates of expected COLA growth, depending on the COLA cap applicable to each tier.

We are also recommending that MCERA continue to include an additional cost item for expected annual administrative expenses in the actuarial cost calculation. In addition to providing a more

transparent approach for determining plan costs, this change also has the benefit of bringing the determination of Plan liabilities in line with new GASB accounting standards.

SUMMARY OF DEMOGRAPHIC ASSUMPTION ANALYSIS

The specific demographic assumptions analyzed in this report are merit salary increases, retirement rates, mortality rates, disability rates, termination rates, refund rates, reciprocity percentage and family composition. The details of the analysis for each of these assumptions are provided later in the report, but the most significant recommended changes are for mortality rates.

Mortality rates and the tools used to analyze them have continued to improve. As such, we are recommending changes to the mortality assumptions. We are proposing the use of the new CalPERS base mortality rates, in conjunction with the new Projection Scale MP-2014 improvement tables using generational mortality. This change is discussed in further detail in Section III.

We are proposing minor adjustments to other demographic assumptions, including lowering retirement rates at higher ages for Miscellaneous and Safety members, a reduction in female Miscellaneous duty disability rates, an increase in female Miscellaneous termination rates, and adjustments to the terminal service loads.

COST OF ECONOMIC AND DEMOGRAPHIC ASSUMPTION CHANGES

The table on the next page summarizes the estimated impact on the normal cost and Unfunded Actuarial Liability (UAL) rates for MCERA, based on the recommended changes to economic and demographic assumptions. These estimates are for MCERA as a whole; the cost impact will differ for individual employers and tiers. These cost estimates are based on MCERA's recently adopted funding policy, wherein changes in the UAL from assumption changes are amortized over a 22-year period, which includes a three-year ramping up and down of the amortization rates. The initial contribution rates are based on the results of the preliminary Actuarial Valuation as of June 30, 2014, and are subject to change.

The first column (Normal Cost) shows the expected change in the Normal Cost rate – which is expected to be shared by the employers and the employees. However, in this table we have applied the full amount of the Normal Cost change to the employer contribution rate; these changes will be offset by changes in the employee contribution rates, which will be shown in the final valuation report.

The second column (UAL Amortization with Phase-In) shows the expected increase in the UAL rate in the first year under the three-year phase-in policy, and the third column (Total) shows the total expected impact from the change in Normal Cost and UAL amortization in the current year.

The final column shows the expected increase in the UAL rate if a 20-year flat level percentage of payroll amortization schedule were used (i.e. the impact on the UAL rate without phase-in). Under the phase-in policy, the employer should expect that the contribution rate will increase by

a similar amount over the following two years to that shown in the third column. However, these cost increases will be offset by the phase-in of gains over the next four years, primarily from asset gains that had been previously deferred through the asset smoothing method.

Contribution Rate Increase from Recommended Assumption Changes				
Assumption	Normal Cost	UAL Amortization (with Phase-In)	Total	UAL Amortization (20 year level % of Pay, no Phase-In)
Final Employer Contribution Rate as of June 30, 2013 Valuation	12.32%	19.06%	31.38%	
Preliminary Employer Contribution Rate as of June 30, 2014 Valuation	12.37%	17.57%	29.94%	
Economic Assumptions	+0.53%	+0.34%	+0.87%	+1.01%
Mortality Rates	+1.10%	+1.34%	+2.44%	+3.89%
Longevity Pay	+0.74%	-0.05%	+0.69%	-0.06%
Retirement Rates	-0.25%	-0.16%	-0.41%	-0.45%
Disability Rates	-0.13%	+0.01%	-0.12%	+0.02%
Termination Rates	-0.12%	+0.01%	-0.11%	+0.02%
Withdrawal / Reciprocity Rates	-0.05%	+0.01%	-0.04%	+0.01%
Family Composition	+0.03%	+0.01%	+0.04%	+0.04%
Sick Leave Loads	+0.07%	+0.03%	+0.10%	+0.08%
Total	+1.92%	+1.54%	+3.46%	+4.56%
Preliminary Employer Contribution Rate after Assumption Changes (before Employee Contribution Rate changes)	14.29%	19.11%	33.40%	

The body of this report provides additional detail and support for our conclusions and recommendations.

ECONOMIC ASSUMPTIONS

INTRODUCTION

Economic assumptions utilized in the development of actuarial liabilities and costs for a defined benefit plan include:

- The inflation assumption;
- The real investment return assumption;
- The real growth in pay relative to inflation; and
- COLA increases relative to inflation.

While we look to the past for indications of future economic behavior, we must also consider how the future may be expected to be different. In order to reflect the long-term nature of defined benefit plan funding in the development of these economic assumptions, it is appropriate to focus on long term trends.

INFLATION

While historical trends are not entirely indicative of the future, they do serve as a useful guide in the determination of assumptions. However, there are elements of the future economic environment that may differ from the past due to structural changes. An important and fundamental case in point is the rate of inflation, which underlies each of the three elements of economic assumptions listed above.

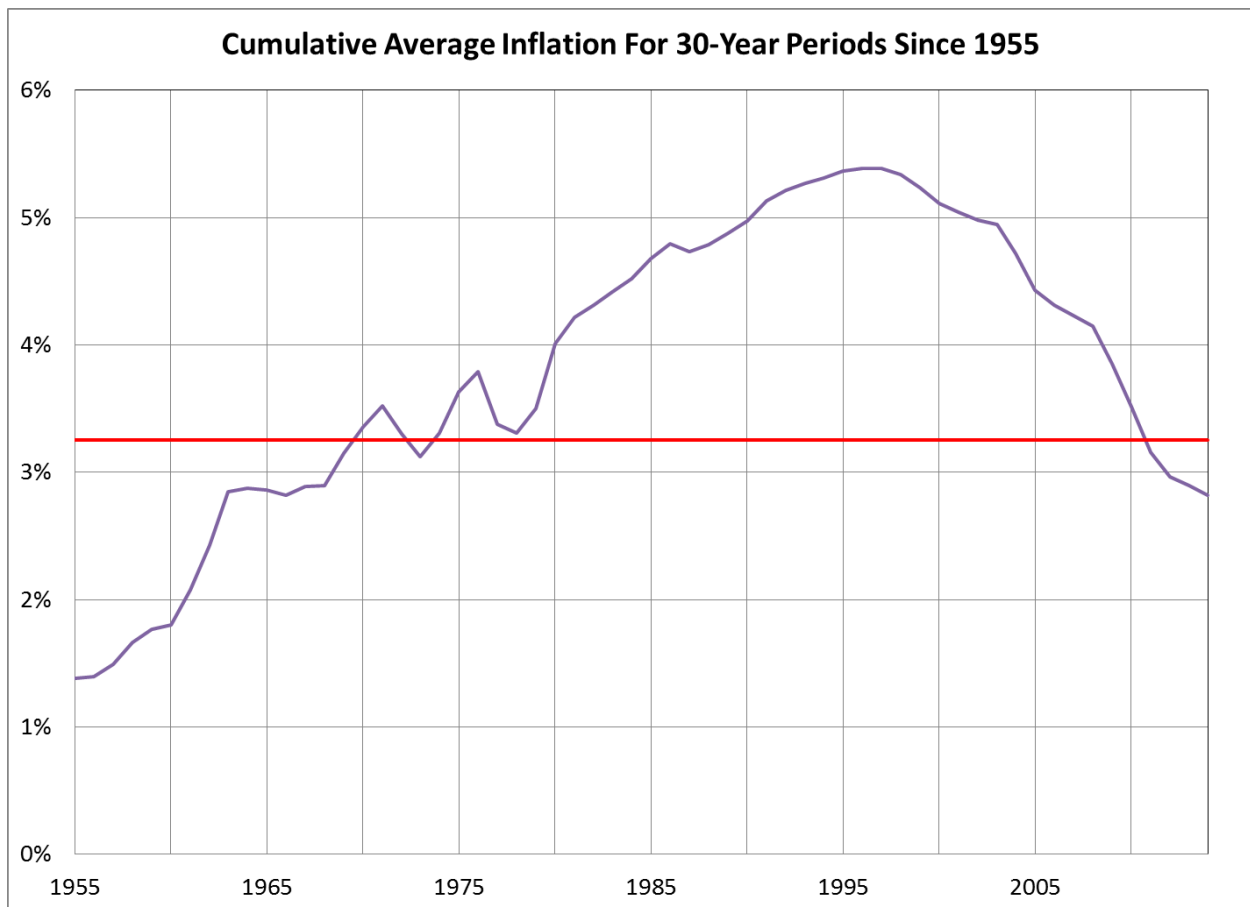
Chart II-1 on the next page shows the average rate of inflation over 30-year periods, with the earliest such period ending in 1955 and the latest ending in 2014. We note in the chart that inflation seemed to be increasing steadily until the 1990's when it leveled off and began to decrease. Examination of Chart II-1 may lead to the conclusion that there is a potential for inflation to be quite high, exceeding 4% to 5% annually.

However, there are a number of reasons to believe that future inflation levels will not be as high as Chart II-1 would seem to suggest.

- An important reason for the high rate of inflation in the averages above is the nine-year period 1973-81 when inflation averaged 9.2% per year.
- The years 1973-81 featured unprecedented levels of household formation. The demand for new houses, cars, office space and equipment caused by the maturation of the post-war baby boom may have largely been responsible for the inflation during these years. Since 1983, increases have been in the range 0.1% to 4.6% with one exception (6.1% in 1990), producing a compounded average of 2.90% per year.
- The population of the United States is aging, which implies a greater likelihood of low inflation in the future. This has been observed in other countries with aging populations, such as Japan.
- Currently, the Federal Open Market Committee has policies in place to control inflation, making future levels more likely to remain relatively low.

- The Survey of Professional Forecasters, a quarterly publication of the Research Department of the Philadelphia Reserve Bank, indicates that national inflation levels are expected to be 2.20% on average over the next ten years.
- Financial markets offer evidence of what investors expect inflation to be in future years. Various securities, such as Treasury inflation-protected securities (TIPS), provide the necessary data for these analyses. As an example, a recent publication by the Federal Reserve Bank of Cleveland attempts to incorporate some of this market data. It contained the 30-year projection of expected inflation rates shown in Chart II-2.
- Callan, the investment consultant retained by MCERA, bases their capital market assumptions on an assumption that average inflation over the next 10 years will be 2.25%. This represents a reduction from the assumption used in their 2013 capital market assumptions (2.50%).

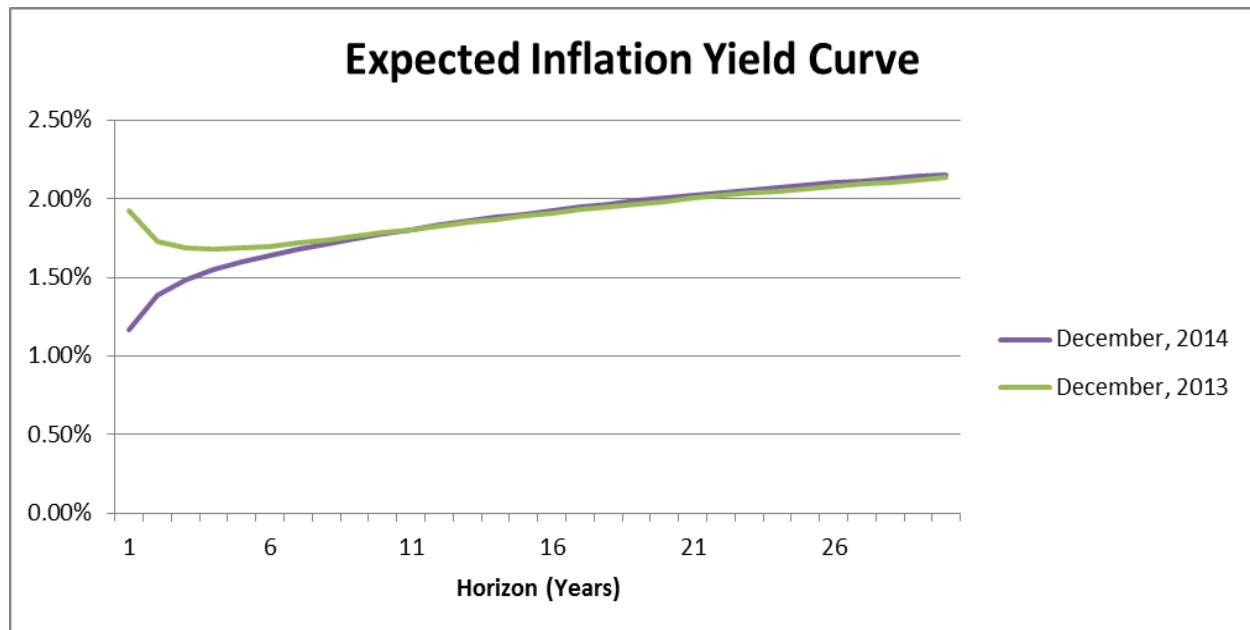
Chart II-1: Average Past Inflation



An assumption below 3% may appear to match well with current market and professional expectations. However, the predictions of future inflation by experts are not unanimous. Some commentators note that the large current and expected future deficits increase the likelihood of

higher levels of inflation in the future. Also, historical data shows that periods of higher inflation can and do occur.

Chart II-2: Expected Inflation



(Source: Cleveland Federal Reserve website. As of December 1, 2014)

We recommend reducing the inflation assumption from 3.25% to 2.75%, a moderate but still significant reduction, representing the mid-point between the current assumption and the assumption reported by the survey of professional forecasters and MCERA's investment advisor. If, at the time of the next experience study, the markets and forecasters continue to indicate lower expectations of future inflation, further reductions in the assumption could be considered.

INVESTMENT RETURN

The investment return assumption depends on the anticipated average level of inflation and the anticipated average *real rate of return*. The real rate of return is the investment return in excess of underlying inflation. The expected average real rate of return is heavily dependent on asset mix.

In Table II-1 on the next page, we have simulated the return derived using MCERA's actual target allocation: 32% domestic equity, 22% non-US equity, 23% fixed income, 15% real estate and 8% private equity. The simulated returns are derived using the following algorithm:

1. The expected returns, standard deviation and correlation matrix for each asset class were gathered from Callan and two other sources: a pair of investment consultants active in other '37 Act systems. These independent data sources were used to provide a return estimate separate from that provided by the MCERA investment consultant.

2. These assumptions were used to model a distribution over portfolio returns over 10- and 30-year time periods, based on an assumption of log-normally distributed returns. Table II-1 shows the computed percentile distributions over these time periods, both on a nominal and real (i.e. net of inflation) basis.

Table II-1: Expected Distribution of Average Annual Passive Investment Returns				
Percentile	10 Years		30 Years	
	Nominal	Real	Nominal	Real
95th	14.87%	12.62%	11.46%	9.21%
75th	10.14%	7.89%	8.78%	6.53%
50th	6.96%	4.71%	6.96%	4.71%
47th	6.61%	4.36%	6.76%	4.51%
25th	3.88%	1.63%	5.17%	2.92%
5th	-0.40%	-2.65%	2.65%	0.40%

The 50th percentile return from this simulation was 6.96%, which is very close to the expected geometric return over a 30-year period (7.00%) based on Callan's assumptions. Using their inflation assumption (2.25%), this results in a 4.75% real return assumption.

As of the 2013 valuation, the expected rate of return is expressed net of investment, but not administrative, expenses. The returns above were modeled based on the expected returns of the portfolio benchmark indices, which are expected to have minimal expenses. The actuarial standards on selecting a return assumption (ASOP 27) state that in general superior or inferior returns (net of fees) should not be assumed for active versus passive management, therefore we do not recommend a significant adjustment to the modeled returns for the fees of the asset managers. However, a slight margin is appropriate to reflect the investment related expenses other than those of the investment managers, which would include the investment advisor and custodian.

We recommend a 4.50% real return assumption which, when combined with the 2.75% recommended inflation assumption, yields a nominal annual return assumption of 7.25%. This represents a reduction in the nominal return of 0.25%, but an increase in the real return by 0.25%. A 4.50% real return provides a very small margin versus the median return (i.e. the 47th percentile, as opposed to the 50th), based on Callan's capital market assumptions. We believe a small margin is appropriate, given the small adjustment appropriate for non-manager fees discussed above (roughly 3 basis points, based on recent fees and current asset size), and as a desired goal of the Plan being able to meet the return objective more often than not.

To obtain another data point we simulated the return of the MCERA asset allocation using the capital market assumptions of two other investment advisors active in the '37 Act systems. The mean compound nominal returns for these assumption sets were 7.0% and 7.4%. This provides additional assurance that a 7.25% nominal return is in a reasonable range under the capital market outlook of other investment professionals.

ADMINISTRATIVE EXPENSES

The returns discussed above are expected to be net of investment expenses; administrative expenses are not addressed. According to Article 31580.2 of the '37 Act, administrative expenses (excluding certain technology expenses) may not exceed 0.21% of the *accrued liabilities* of the retirement system.

Effective with the June 30, 2013 actuarial valuation, MCERA began to include an additional cost item for expected annual administrative expenses in the actuarial cost calculation. For the valuation as of June 30, 2014, we recommend maintaining the assumption of \$4.50 million in annual administrative expenses, based on an analysis of administrative expense items that have been paid out of Plan assets over the past three years.

PAYROLL GROWTH

Components of the payroll growth assumptions are:

- Inflation, and
- Payroll growth above inflation.

Such increases are often attributed to productivity gains. Other factors contributing to non-inflationary base salary increases include growth in the active workforce, bargaining pressures, competition among local employers, and workforce demographic issues.

The inflationary component is the assumed CPI, with a recommended rate of 2.75%. In general we recommend that long range gains due to productivity, the collective bargaining process or other pressures should be assumed to be zero or minimal. While productivity tends to increase in many sectors of the economy, any long-term assumption of salary growth beyond inflation carries with it an assumed improvement in *relative* standard of living.

It is acceptable to assume some additional level of base payroll increase beyond general inflation. Potential reasons contributing to the increase may include the presence of strong union representation in the collective bargaining process, competition in hiring among other similar employers, and regional factors – such as the local inflation index exceeding the national average, as has sometimes proven the case in parts of California. Also, historically the US as a whole witnessed 0.9% annual real growth in wages from 1970-2010, and the Social Security Administration projects real wage growth of 0.5% - 1.1% going forward in their Social Security solvency projections.

However, governmental entities remain under financial stress, and other areas of employee compensation – most notably health care costs and pension contributions – have continued to increase faster than the CPI. The Social Security Administration noted in their most recent report that the real wage differential has actually been negative (-0.2%) over the most recent economic cycle (2007-2013).

Cheiron recommends introducing a small non-inflationary base payroll growth assumption of 0.25% annually. Therefore, the annual expected increase in base payroll would be 3.00%, reduced from 3.25% in the most recent valuation. This increase will be applied to all continuing

active members, and to starting pay for new entrants when projections of future populations are required. This increase will also be used in the calculation of the unfunded liability amortization payment as a level percentage of payroll.

COLA GROWTH

Most members of MCERA are eligible to receive automatic Cost of Living Adjustments (COLAs), based on the growth in the Bay Area Consumer Price Index (CPI-U) and reflecting various caps on the annual COLA increase. These caps depend on the Tier and bargaining group of the member, and can be 2%, 3% or 4% annually. Any increase in the CPI above the maximum increase can be banked for future years in which the change in the CPI is below the maximum increase.

We have produced statistical simulations of inflation and then modeled how the COLA maxima and the banking process interact with the changes in CPI. For each long-term estimate of inflation (2.75%, 3.0% or 3.25%) we used two sets of inputs and then blended the results: a 50% autocorrelation factor with 1.5% annual inflation volatility, and a 25% autocorrelation factor with 1.0% annual inflation volatility. A starting inflation level of 2.25% was used in all simulations, to reflect the low level of current inflation.

It is necessary to determine an assumed rate of COLA growth, reflecting both inflation (i.e. the growth in the CPI) and the interaction of the CPI with the COLA cap and banking mechanism. Our simulations tell us that the average growth in the COLA is expected to be below the cap, even if the expected increase in the CPI (2.75% based on our earlier recommendation) is higher than the cap itself. This is because if there is not a significant bank already in existence (such as in the early years of retirement) and there are years in which inflation is below the cap, this shortfall will not be made up in future years.

Based on a blending of the results under various inflation assumptions, we recommend the assumed COLA growth rates shown in the table below. The recommended assumptions are shown by cap rate for each long-term inflation assumption. We have modified the recommended rates for the prior inflation assumption (3.25%) based on updates to our simulations, including the current levels of banking and recent inflation experience.

**Table II-2: Recommended COLA Growth Assumptions by
Cap Rate**

CPI Assumption	Cap on COLA		
	2%	3%	4%
3.25% (Prior)	1.9%	2.7%	3.0%
3.25% (Updated)	1.9%	2.8%	3.1%
3.00%	1.9%	2.7%	2.9%
2.75% (Recommended)	1.9%	2.6%	2.7%

DEMOGRAPHIC ASSUMPTIONS

MORTALITY RATES

Mortality assumptions are developed separately for active employees, healthy annuitants, and disabled annuitants. Within each of these groups, mortality rates are developed separately for males and females. Unlike most of the other demographic assumptions that rely exclusively on the experience of the plan, for mortality, standard mortality tables are used with standard modifications so that the aggregate experience matches the plan's experience.

Historically we have proposed assumption changes when the Actual-to-Expected (A/E) ratio for the current assumption is less than 100%. However, for this Study we are recommending a change in this approach going forward, where the proposed assumptions are intended to track closely to actual experience (i.e. an A/E ratio close to 100%, but with a ratio slightly less than 100% still being reasonable). However, as described below, this new approach also includes an expectation that the assumed mortality rates will automatically become more conservative each year, since the actual mortality rates are also expected to decrease over time.

We also historically recommended the same or a related table for active employees and healthy annuitants, which has been the current practice for MCERA. However, recent mortality studies by the Society of Actuaries and others have shown significantly lower rates of mortality for active employees versus those of the same age who are no longer working, therefore this year we have suggested using separate tables for active versus retired members.

In the prior study, MCERA elected to continue using the following assumptions:

Healthy active members, retirees and beneficiaries	RP 2000 Combined Healthy mortality projected to 2010 with Scale AA, set back three years for active males and females, one year for inactive males and two years for inactive females
Disabled members	RP 2000 Combined Healthy mortality projected to 2010 with Scale AA, set forward three years for males and females

Since the prior study, the Society of Actuaries' Retirement Plans Experience Committee (RPEC) has released a new mortality improvement scale, Scale MP-2014. The mortality improvements included in the currently used projection scale - Scale AA - were found to produce some unsatisfactory results in projecting mortality. Scale MP-2014 reflects more up-to-date data, approximately 20 years more current than that used in the development of Scale AA, and it was reviewed against a significant amount of data drawn from California public plan experience.

MP-2014 represents the Society of Actuaries' most advanced actuarial methodology in incorporating mortality improvement trends with actual recent mortality rates, by using rates that vary not only by age but by calendar year – known as a two-dimensional approach to projecting mortality improvements. Scale MP-2014 was designed with the intent of being applied to mortality on a generational basis. The effect of this is to build in an automatic expectation of future improvements in mortality.

This is a different approach from building in a margin for conservatism in the current rates to account for the expectation that the same rates will be applied in future years, when mortality experience has improved. Recent reports issued by RPEC suggest that using generational mortality is a preferable approach, as it allows for an explicit declaration of the amount of future mortality improvement included in the assumptions.

RPEC has also recently released a new set of base mortality rate tables – the RP-2014 tables, which are intended to replace the RP-2000 tables and are based on a recent study of US defined benefit plan mortality experience. However, RPEC excluded all public pension plan data in the construction of these tables - including a large amount of California public sector data - because there were significant differences between the private and public sector retirement experience, and the new tables are expected to be used by private sector plans to meet accounting and federal funding requirements specific to private plans.

Fortunately, there is an alternative set of assumptions that have been recently developed that may serve as a logical basis for developing mortality assumptions for MCERA. As part of an Experience Study completed in 2014, CalPERS adopted a new set of mortality tables for active, retired and disabled members. MCERA's experience over the past six years matches well with the new CalPERS rates, after removing the improvement projections included by CalPERS and replacing them with the new MP-2014 mortality improvement projections through the mid-point of the six year period (2008-2014). As such, we are recommending the following assumptions:

Active members, retirees and beneficiaries	CalPERS 2014 Pre-Retirement Non-Industrial Death rates (plus Duty-Related Death rates for Safety Members), with the 20-year static projection used by CalPERS replaced by generational improvements using Scale MP-2014.
Healthy retirees and beneficiaries	CalPERS 2014 Post-Retirement Healthy Mortality rates, adjusted by 110% for Safety Males and 95% for Miscellaneous and Safety Females, with the 20-year static projection used by CalPERS replaced by generational improvements using Scale MP-2014.
Disabled members	CalPERS 2014 Disability Mortality rates (Non-Industrial rates for Miscellaneous members and Industrial Disability rates for Safety members), adjusted by 90% for Males and Females (Miscellaneous and Safety) with the 20-year static projection used by CalPERS replaced by generational improvements using Scale MP-2014.

As shown in Table III-1 below, our proposed mortality rates for healthy annuitants are very close to recent experience. As we have done in prior experience studies, we have combined the experience of the past three years with that of the prior three year period in order to have a more robust dataset to review. To perform our comparisons, the CalPERS rates (without projection) were projected from their base year (2009) to the midpoint of the combined six-year study period (2011).

The match between the actual and expected experience across all statuses (active, retired, disabled) is very close under the proposed assumptions: 96.0%. It may appear that the match under the prior assumptions is even closer (97.8%); however, the prior assumptions do not include any assumptions or margins for future improvement in mortality. We are comfortable that the ratio of active to expected deaths is less than 100% within some subgroups, since as described above, the use of generational mortality assumptions will automatically result in mortality assumptions that decrease over time. In particular, the number of deaths among the disabled members and the female Safety members and beneficiaries is somewhat lower than expected, but these groups have the smallest amount of overall experience.

Table III-1: Mortality Experience (2008-2014)							
	Exposures	Total Actual Deaths	Actual Rates	Current Expected Deaths	Proposed Expected Deaths	Current A/E Ratio	Proposed A/E Ratio
<u>Actives</u>							
Misc Male	4,827	14	0.29%	11.5	10.0	122.1%	140.5%
Misc Female	7,359	8	0.11%	15.6	10.2	51.2%	78.1%
Safety Male	3,006	3	0.10%	3.2	3.7	94.0%	81.4%
Safety Female	523	1	0.19%	0.5	0.5	216.6%	211.9%
Total Actives	15,715	26	0.17%	30.7	24.4	84.6%	106.7%
<u>Retired and Surviving Spouse</u>							
Misc Male	3,442	108	3.14%	107.0	107.0	100.9%	100.9%
Misc Female	6,769	204	3.01%	199.4	207.3	102.3%	98.4%
Safety Male	1,893	30	1.58%	25.2	30.4	119.0%	98.7%
Safety Female	832	14	1.68%	18.3	19.5	76.6%	71.6%
Total Ret/Surv	12,936	356	2.75%	349.9	364.3	101.7%	97.7%
<u>Disabled</u>							
Misc Male	372	12	3.23%	10.1	12.5	118.9%	96.1%
Misc Female	515	6	1.17%	9.5	11.2	63.5%	53.7%
Safety Male	1,083	11	1.02%	19.1	14.7	57.7%	74.8%
Safety Female	161	0	0.00%	0.9	0.9	0.0%	0.0%
Total Disabled	2,131	29	1.36%	39.5	39.2	73.4%	73.9%
TOTAL	30,782	411	1.34%	420.1	427.9	97.8%	96.0%

In addition to being used to compute the liabilities of the Plan, mortality assumptions are also required in the calculation of member contribution rates and in circumstances where an actuarial

equivalence calculation is required (such as in the optional form adjustment factors used in the Plan's benefit administration software).

There are administrative reasons why using a generational mortality table may prove difficult to implement currently, because of the nuances of the laws governing the calculation of employee rates for Legacy members or because of the requirements of the Plan's benefit administration software. Fortunately, it is possible to approximate the use of a generational mortality table by the use of a static table, and projecting mortality improvement from the base period to the average duration of the projected benefit payments.

For MCERA, the average duration of the benefit payments for active members is approximately 20 years. Therefore, for the calculation of Legacy member rates we recommend the use of the same base tables as recommended above (blended 40%/60% M/F for Miscellaneous members and 85%/15% M/F for Safety members), but with a static projection to the year 2037 (the midpoint of the valuation dates to which these assumptions are expected to apply, plus 20-year duration). The calculation of the member rates for the PEPRA tiers does not require a static projection, as the assumptions used to develop these member rates is based upon the same assumptions used to compute the total normal cost rates as part of the actuarial valuation.

For actuarial equivalence calculations required in the calculation of optional benefit forms, we will work with the provider of MCERA's benefit administration software and review their capacity to use generational mortality tables. If they are unable to implement the recommended generational assumptions, we will work with them to develop an appropriate static table based on the approaches described above.

MERIT SALARY INCREASES

Salary increases consist of three components: Increases due to cost of living maintenance (inflation), increases related to non-inflationary pressures on base pay (such as productivity increases), and increases in individual pay due to merit, promotion, and longevity. Increases due to cost of living and non-inflationary base pay factors were addressed in an earlier section of this report.

Charts III-1 and III-2 on the following pages compare the current pay patterns for Miscellaneous and Safety members compared to the current pay data. Only increases due to merit (promotion and longevity) are considered here. In the graphs, the average pay of the active members of MCERA as of July 1, 2014 is plotted against service. A curve is then fitted to the average pay data, and this curve is used to determine a pay increase due to merit.

This is a *transverse* study of longevity and promotion pay increases: Salaries are examined at one point in time (the valuation date), as opposed to being observed over a number of years (a *longitudinal* study). For a more detailed description of this type of study and its advantages, see the Methodology section at the end of this report.

Chart III-1 below shows the average pay by years of service under the current assumption (green line) compared to the actual experience (purple dots) for Miscellaneous employees. We have also proposed a replacement set of assumptions (red line), which reflect higher pay increases in the first five years of service and provide a closer match with the actual pattern reflected in the data.

Chart III-1

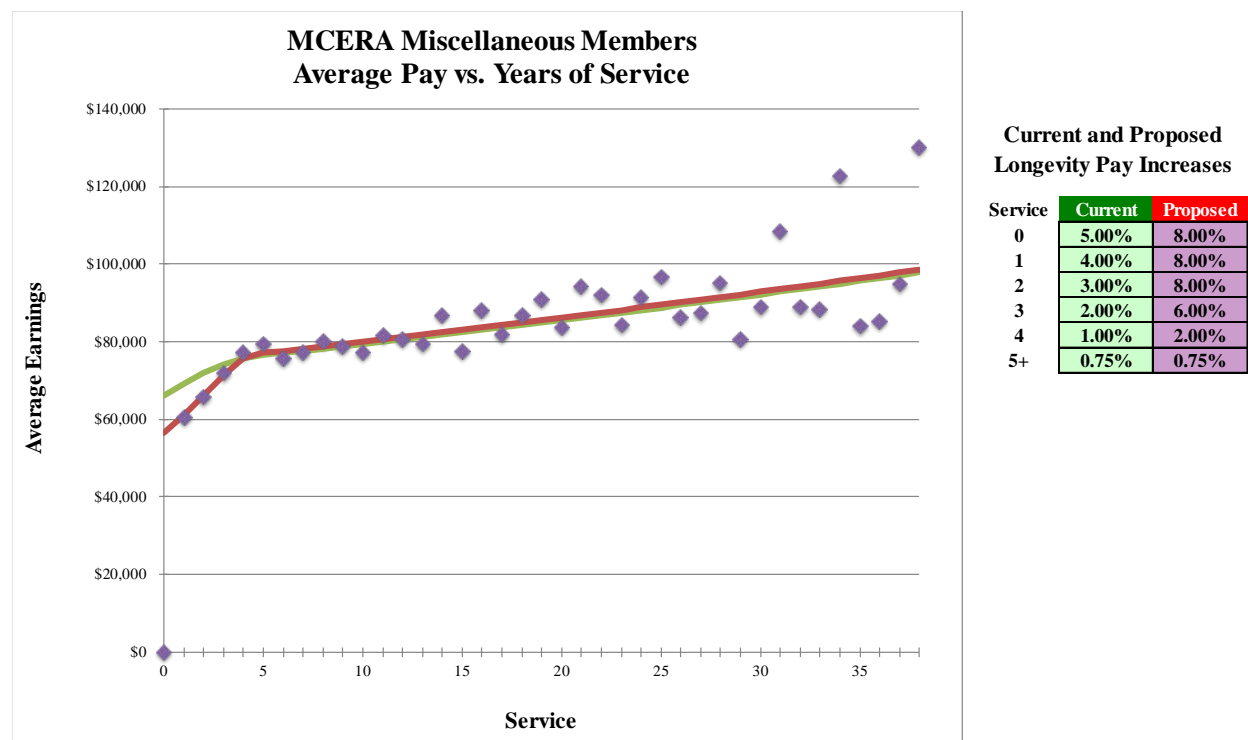
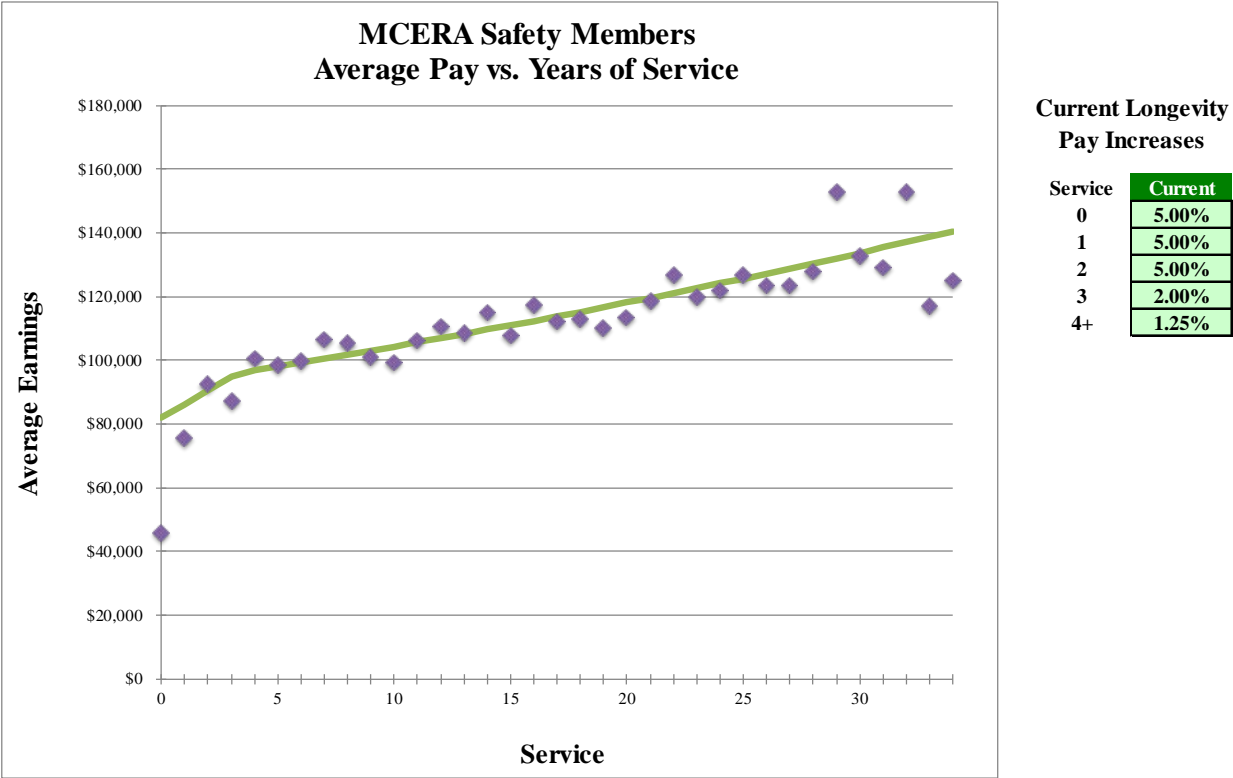


Chart III-2 below shows the average pay by years of service under the current assumption (green line) compared to the actual experience (purple dots) for Safety employees.

Chart III-2



Since the actual pay data is in close accord with the assumed rates of merit increase for Safety employees, no change to the assumed rates is recommended.

RATES OF RETIREMENT

In this section, we develop our analysis of rates of retirement. For each membership group studied, we determined the ratio of the actual number of retirements at each age compared to the expected number of retirements. If the assumption is perfect, this ratio will be 100%. We generally propose assumption changes when the current assumption is clearly outside a reasonable range of the observed experience.

However, adjustments are made to account for differences between future expectations and historical experience, to account for the past experience represented by the current assumption, and to maintain a neutral to slight conservative bias in the selection of the assumption. For this Study, we have combined the experience of the past three years (2011-2014) with that of the prior Study period (2008-2011) to obtain a more robust dataset.

The assumptions for Miscellaneous County Tier 3A, Courts Tier 4 and San Rafael Tier 2 employees start at age 55 with 10 years of service, while the assumptions for Miscellaneous Legacy employees in all other plans start at age 50 with 10 years of service. Normal Retirement assumptions for Miscellaneous PEPRA employees start at age 52 with 5 years of service. All non-PEPRA Miscellaneous members may retire at any age with 30 years of service, and all Miscellaneous members may retire without a service requirement at age 70.

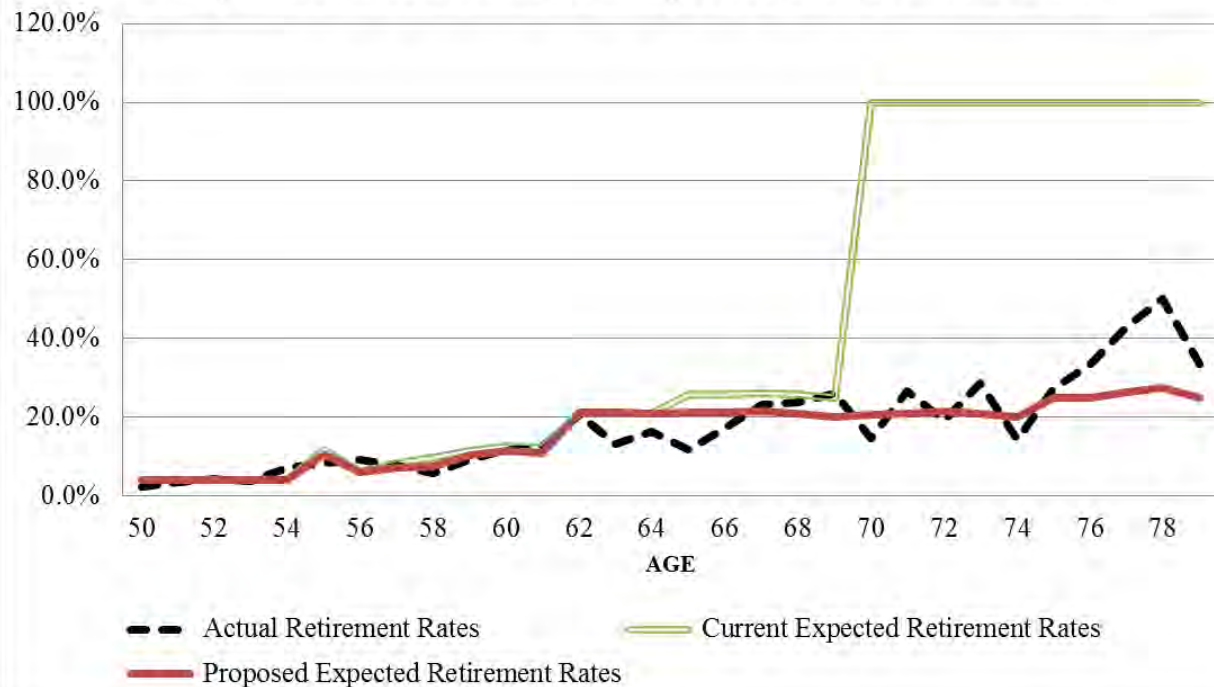
In general, the retirement rates for the Miscellaneous members have been lower than assumed over the past six years. As there is yet no retirement experience among PEPRA Miscellaneous members, we continue to recommend the same set of retirement assumptions for this group, with the caveat that they will only be applied once a member is eligible to retire (i.e. at age 52 with 5 years of service).

Previously, once a MCERA Miscellaneous employee reached age 70, we assumed 100% probability of retirement. Based on recent experience, we have extended the age at which a 100% retirement probability is applied to Miscellaneous employees to age 80.

We have also proposed moderate reductions in the Miscellaneous retirement rates for those between the ages of 55 and 61 with less than 20 years of service, and reductions in the Miscellaneous retirement rates at ages 65 and above for those with less than 30 years of service.

Chart III-3 on the next page shows a graphical comparison of the actual, current and proposed rates of retirement by age for Miscellaneous members. Chart III-4 shows additional comparisons, demonstrating that the proposed assumptions also provide a closer match between the assumptions and actual experience when analyzed by the amount of service at retirement, rather than age.

**Chart III-3: MCERA Miscellaneous
Comparison of Actual and Expected Retirement Rates**



**Chart III-4: MCERA Miscellaneous
Comparison of Actual and Expected Retirements**

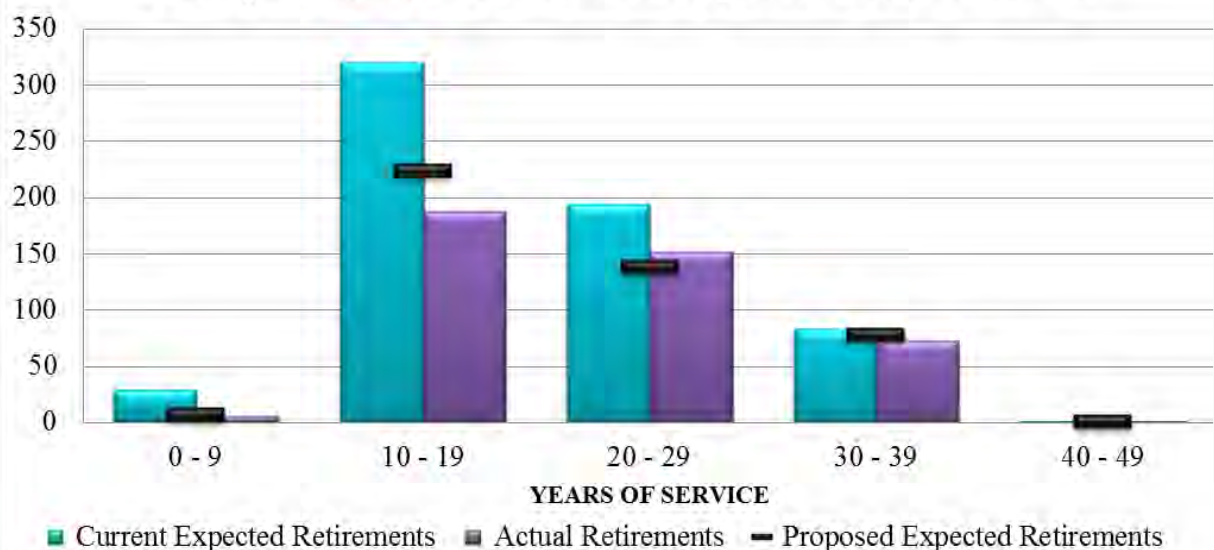


Table III-2 shows more detail on these calculations, including actual to expected ratios and retirement ages, and demonstrates that the proposed unisex assumptions provide a reasonable match for both genders.

Table III-2: Miscellaneous Retirement Experience (2008-2014)							
	Eligible Exposures	Actual Retirements	Actual Rates	Current Expected Retirements	Proposed Expected Retirements	Current A/E Ratio	Proposed A/E Ratio
Male	1,625	161	9.91%	223.5	171.9	72.0%	93.7%
Female	2,458	258	10.50%	402.7	272.2	64.1%	94.8%
Combined	4,083	419	10.26%	626.2	444.1	66.9%	94.4%
Average Retirement Age							
			Actual	Current Expected	Proposed Expected		
Male			60.9	62.7	60.6		
Female			62.1	64.9	62.3		
Combined			61.7	64.1	61.6		

Table III-3 provides the details on the current and proposed assumptions at each age and service level.

Table III-3
Current and Proposed Miscellaneous Retirement Rates

Age	Current		Proposed		
	<30 Years of Service	30+ Years of Service	<20 Years of Service	20-29 Years of Service	30+ Years of Service
50-54	4.00%	4.00%	4.00%	4.00%	4.00%
55	10.00%	25.00%	8.00%	10.00%	25.00%
56	4.00%	25.00%	4.00%	4.00%	25.00%
57	6.00%	25.00%	4.00%	6.00%	25.00%
58	8.00%	25.00%	4.00%	8.00%	25.00%
59	10.00%	25.00%	8.00%	10.00%	25.00%
60-61	10.00%	35.00%	8.00%	10.00%	35.00%
62-64	20.00%	35.00%	20.00%	20.00%	35.00%
65-69	25.00%	35.00%	20.00%	20.00%	35.00%
70-74	100.00%	100.00%	20.00%	20.00%	35.00%
75-79	100.00%	100.00%	25.00%	25.00%	35.00%
80+	100.00%	100.00%	100.00%	100.00%	100.00%

Normal Retirement assumptions for Safety employees start at age 50 with 10 years of service (5 years for PEPRAs members). All non-PEPRA Safety members may retire at any age with 20 years of service, and all Safety members may retire without a service requirement at age 70.

Overall, the retirement rates for the Safety members have been close to the number assumed over the past six years. However, we have proposed revised rates which would have predicted a similar number of total retirements, but provided a closer match at particular age intervals. We have not analyzed the experience by gender – as there is little female Safety data – but we have continued to analyze the retirement data separately for those with the 3% at 50 versus 3% at 55 benefit formulas. As there is yet no retirement experience among PEPRA Safety members, we continue to recommend the use of the 3% at 55 retirement assumptions for this group.

Previously, once a Safety Miscellaneous employee reached age 60, we assumed 100% probability of retirement. Based on recent experience, we have extended the age at which a 100% retirement probability is applied to age 65.

We have also proposed the introduction of a moderate retirement rate for those ages of 40 to 49 with at least 20 years of service. For the 3% at 55 members, we have proposed an increase in the retirement rates for those ages 50 to 53 with at least 30 years of service, and increase for those ages 55 to 59 with at least 20 years of service. Minor changes were also proposed for those ages 55 to 59 with less than 20 years of service.

Chart III-5 shows a graphical comparison of the actual, current and proposed rates of retirement by age for Safety members.

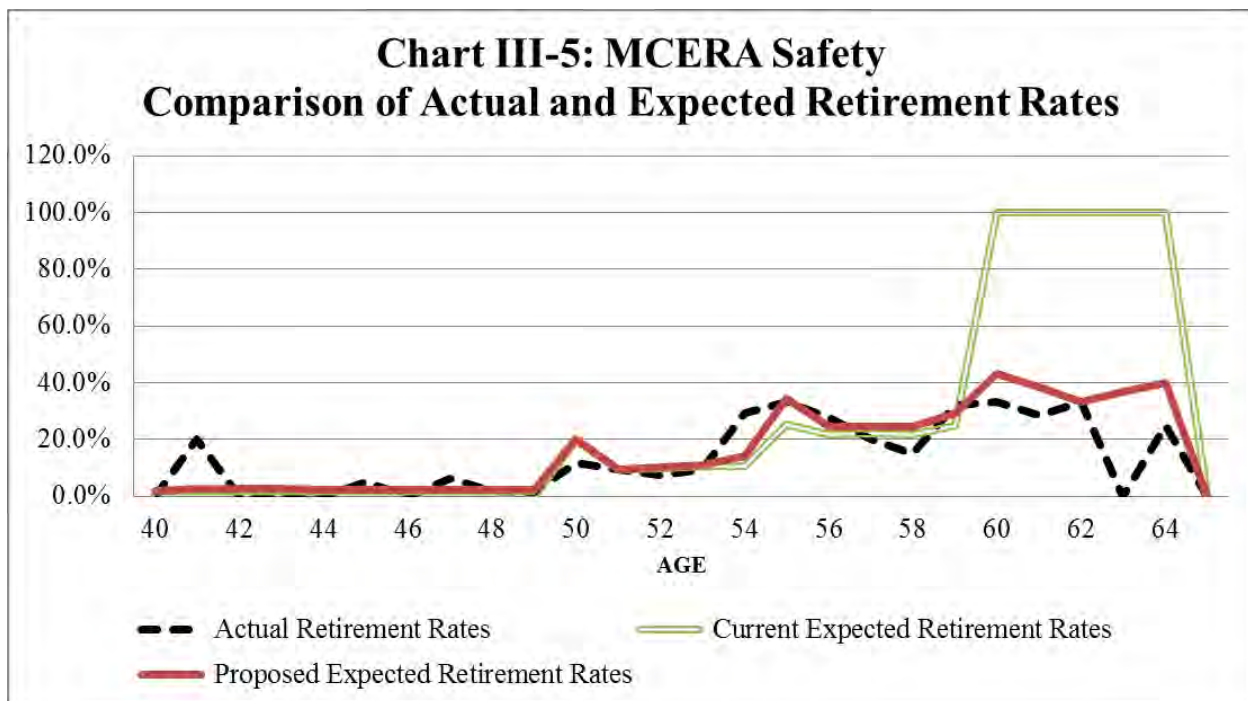


Chart III-6 shows additional comparisons by age, demonstrating that the proposed assumptions also provide a closer match at various age intervals.

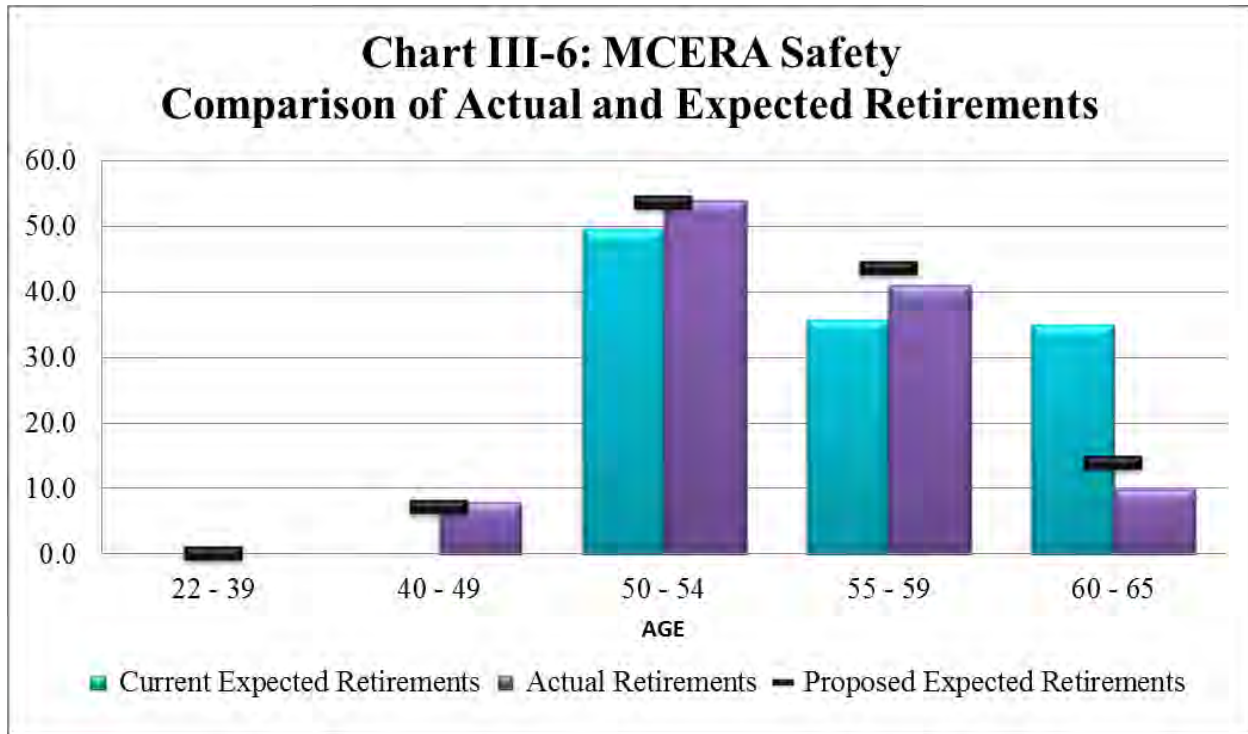


Table III-4 shows the more detail on these calculations, including actual to expected ratios and retirement ages, and demonstrates that the proposed assumptions provide a reasonable match for both benefit formulas.

Table III-4: Safety Retirement Experience (2008-2014)							
	Eligible Exposures	Actual Retirements	Actual Rates	Current Expected Retirements	Proposed Expected Retirements	Current A/E Ratio	Proposed A/E Ratio
3% @ 50	522	65	12.45%	69.9	69.3	93.1%	93.8%
3% @ 55	393	48	12.21%	50.6	48.9	95.0%	98.2%
Combined	915	113	12.35%	120.4	118.2	93.9%	95.6%
Average Retirement Age							
			Actual	Current Expected	Proposed Expected		
3% @ 50			53.4	54.8	53.4		
3% @ 55			55.3	57.4	55.4		
Combined			54.2	55.9	54.3		

Tables III-5 and III-6 provide the details on the current and proposed assumptions at each age and service level.

Table III-5
Current and Proposed 3% @ 50 Safety Retirement Rates

Age	Current		Proposed		
	<30 Years of Service	30+ Years of Service	<20 Years of Service	20-29 Years of Service	30+ Years of Service
40-49	0.00%	0.00%	0.00%	3.00%	3.00%
50	25.00%	50.00%	25.00%	25.00%	50.00%
51-54	10.00%	20.00%	10.00%	10.00%	20.00%
55-59	25.00%	50.00%	25.00%	25.00%	50.00%
60-64	100.00%	100.00%	50.00%	50.00%	50.00%
65	100.00%	100.00%	100.00%	100.00%	100.00%

Table III-6
Current and Proposed 3% @ 55 (and PEPRA) Safety Retirement Rates

Age	Current		Proposed		
	<30 Years of Service	30+ Years of Service	<20 Years of Service	20-29 Years of Service	30+ Years of Service
40-49	0.00%	0.00%	0.00%	1.00%	1.00%
50-53	5.00%	25.00%	5.00%	5.00%	30.00%
54	5.00%	25.00%	5.00%	15.00%	30.00%
55	15.00%	30.00%	20.00%	40.00%	50.00%
56	15.00%	30.00%	10.00%	30.00%	50.00%
57-59	15.00%	30.00%	10.00%	20.00%	50.00%
60-64	100.00%	100.00%	30.00%	30.00%	50.00%
65	100.00%	100.00%	100.00%	100.00%	100.00%

DISABILITY RATES

This section analyzes the incidence of disability by the age of the employee. We determined the ratio of the actual number of disabilities at each age compared to the expected number of disabilities. To produce a larger dataset, we combined experience from the current study period (2011-2014) with that of the prior study (2008-2011). Exposures for ordinary disabilities are counted once members are eligible for an ordinary disability: after earning five years of service. Exposures for duty-related disabilities are included at all years of service, since there is no service requirement for a duty disability.

As shown in Table III-7 and Table III-8 on the following pages, the incidence of duty disability for Miscellaneous females and ordinary disability for Safety members have been lower than the current assumptions, while the incidence of disability for other groups was reasonably close to expected. We have recommended reducing the Miscellaneous female duty disability rates by 50%, as the number of actual disabilities was significantly lower than the number assumed (2 actual versus over 10 assumed). However, we have not recommended a change to the Safety ordinary disability rates, as the actual and expected number of disabilities are both quite low (4 actual versus 6.3 assumed), which means that a small number of additional disabilities could change the A/E ratios significantly.

We recognize that some of the proposed A/E ratios – particularly for the Safety ordinary disabilities, Miscellaneous male ordinary and female duty disabilities - are still significantly below 100%. However, the disability rates were also reduced significantly at the time of the last experience study, and the incidence of disability is quite low.

Table III-7: Duty Disability Experience (2008-2014)							
	Eligible Exposures	Actual Duty Disab	Actual Rates	Current Expected Disabilities	Proposed Expected Disabilities	Current A/E Ratio	Proposed A/E Ratio
Misc Male	4,827	5	0.10%	6.7	6.7	74.1%	74.1%
Misc Female	7,359	2	0.03%	10.2	5.1	19.6%	39.2%
Misc Combined	12,186	7	0.06%	17.0	11.8	41.3%	59.1%
Safety	3,514	21	0.60%	22.7	22.7	92.4%	92.4%
<u>Average Disability Age</u>							
			Actual	Current Expected	Proposed Expected		
Misc Male			49.8	52.0	52.0		
Misc Female			60.0	52.5	52.5		
Misc Combined			52.7	52.3	52.2		
Safety			47.2	47.2	46.9		

Table III-8: Ordinary Disability Experience (2008-2014)

	Eligible Exposures	Actual Ord Disab	Actual Rates	Current Expected Disabilities	Proposed Expected Disabilities	Current A/E Ratio	Proposed A/E Ratio
Misc Male	3,712	1	0.03%	2.6	2.6	38.9%	38.9%
Misc Female	5,555	5	0.09%	4.1	4.1	121.0%	121.0%
Misc Combined	9,267	6	0.06%	6.7	6.7	89.6%	89.6%
Safety	2,880	4	0.14%	6.3	6.3	63.5%	63.5%
Average Disability Age							
			Actual	Current Expected	Proposed Expected		
Misc Male			57.0	57.9	57.9		
Misc Female			58.8	58.8	58.8		
Misc Combined			58.5	58.5	58.5		
Safety			50.0	47.4	47.4		

Tables III-9 and III-10 provide the details on the current and proposed assumptions at sample ages.

Table III-9
Current and Proposed Duty Disability Rates

Age	Miscellaneous			Safety
	Male	Female Current	Female Proposed	
20	0.0250%	0.0250%	0.0125%	0.0605%
25	0.0400%	0.0400%	0.0200%	0.0825%
30	0.0650%	0.0650%	0.0325%	0.1980%
35	0.0800%	0.0800%	0.0400%	0.3025%
40	0.1050%	0.1050%	0.0525%	0.6490%
45	0.1300%	0.1300%	0.0650%	0.6270%
50	0.1550%	0.1550%	0.0775%	0.7040%
55	0.1650%	0.1650%	0.0825%	2.1450%
60	0.1850%	0.1850%	0.0925%	0.0000%
65	0.1950%	0.1950%	0.0975%	0.0000%

Table III-10
Current Ordinary Disability Rates (no changes proposed)

Age	Miscellaneous	Safety
20	0.0000%	0.0200%
25	0.0025%	0.0300%
30	0.0050%	0.0500%
35	0.0075%	0.0700%
40	0.0125%	0.1600%
45	0.0225%	0.2600%
50	0.0450%	0.3600%
55	0.0775%	0.4600%
60	0.1275%	0.0000%
65	0.1975%	0.0000%

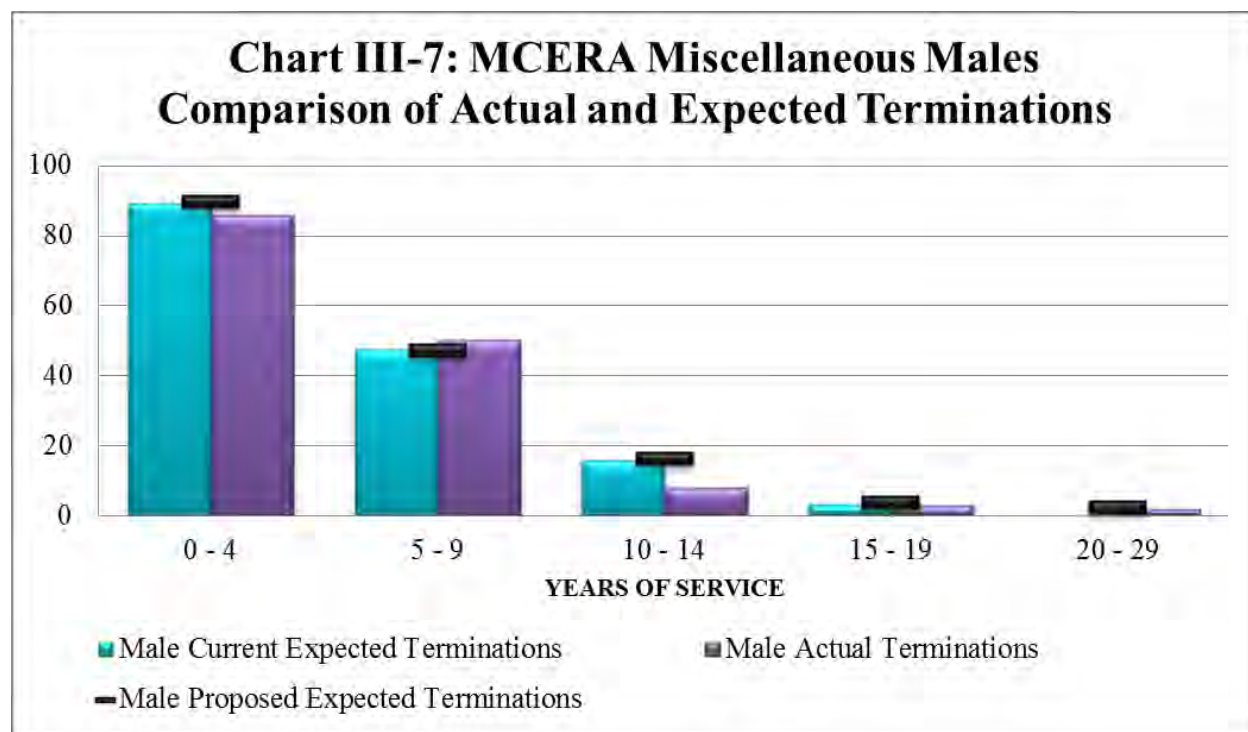
TERMINATION RATES

Rates of termination from active employment for reasons other than death, disability and retirement have a significant impact on the cost of the plan. For this assumption, we have again included in our analyses the last six years of experience (from 2008-2014), rather than reviewing the information over the past three years. This allows us to formulate a larger, more robust dataset, and will also reduce the impact of any unusual termination experience which may have happened over the past few years.

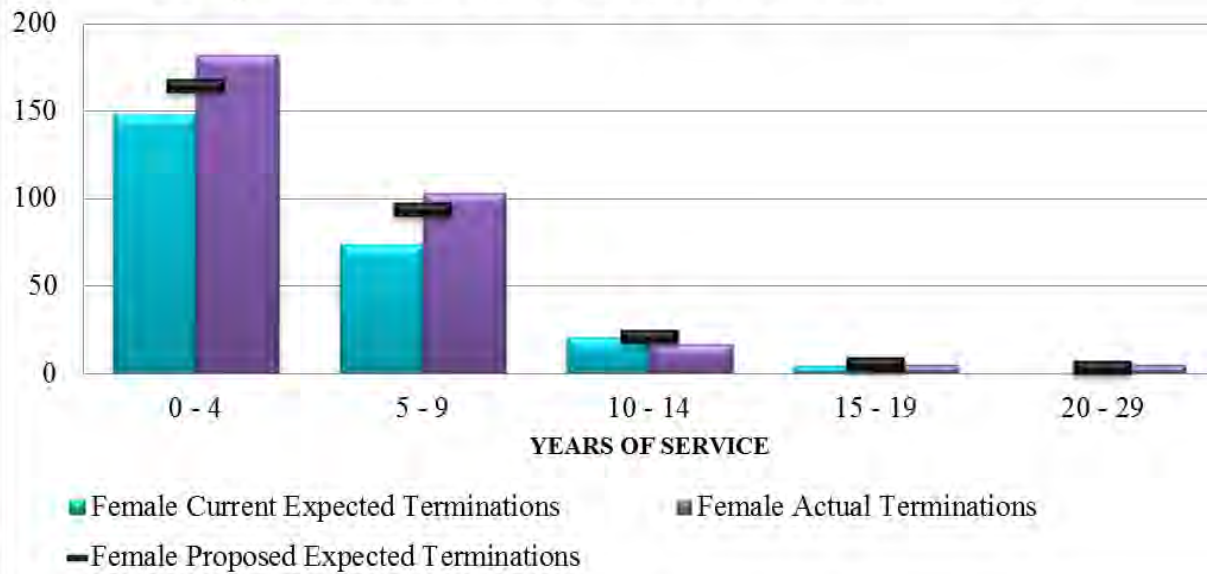
We analyzed the experience and recommend continuing the practice of applying separate rates for the first five years of service, and then applying age-based rates after that. Termination rates are not applied once a member is eligible for service retirement.

Over the past six years we have found that the termination rates for Miscellaneous females have been somewhat higher than males, so we have proposed increased termination rates for females with less than ten years of service. We have also proposed extending the age-based termination rates for Miscellaneous members that apply to members with 10 to 19 years of service to those with 20 to 29 years of service, as there have been a few terminations at those service levels. We have proposed no changes to the Safety termination rates, other than the addition of a very low rate of termination (0.1%) from ages 55 to 59 with 5 to 9 years of service.

The tables and charts below show the actual experience (over the past six years) compared to the current and recommended assumptions.



**Chart III-8: MCERA Miscellaneous Females
Comparison of Actual and Expected Terminations**



**Chart III-9: MCERA Safety
Comparison of Actual and Expected Terminations**

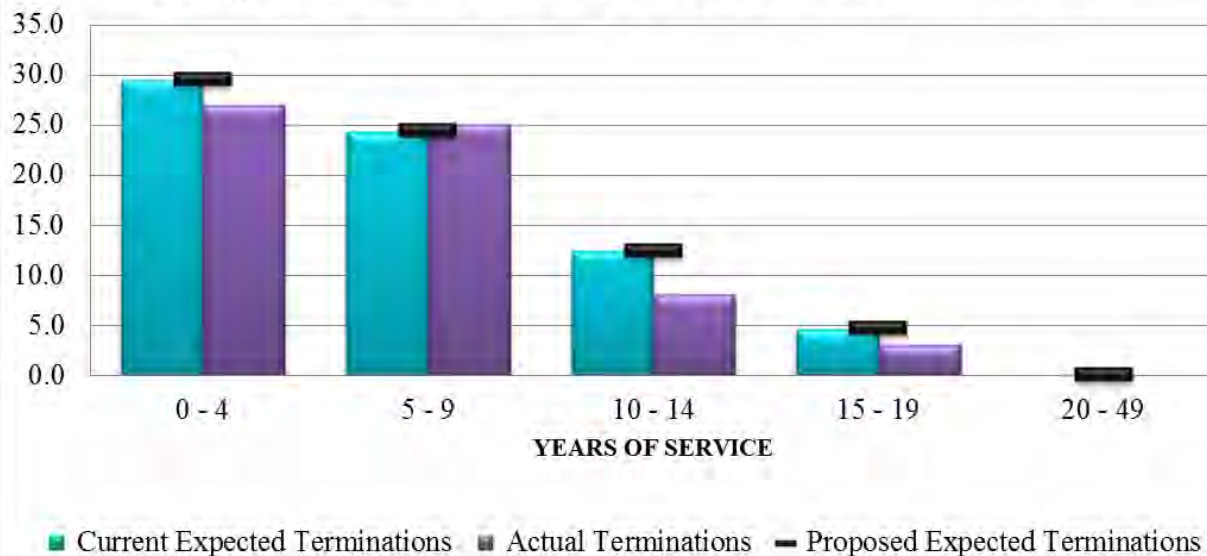


Table III-11: Termination Experience (2008-2014)

	Eligible Exposures	Actual Terminations	Actual Rates	Current Expected Terminations	Proposed Expected Terminations	Current A/E Ratio	Proposed A/E Ratio
Misc Male	3,202	149	4.65%	156.1	157.5	95.5%	94.6%
Misc Female	4,901	312	6.37%	246.6	284.9	126.5%	109.5%
Misc Combined	8,103	461	5.69%	402.7	442.4	114.5%	104.2%
Safety	2,599	69	2.65%	70.9	70.9	97.3%	97.3%
<u>Average Termination Age</u>							
			Actual	Current Expected	Proposed Expected		
Misc Male			46.4	41.7	42.0		
Misc Female			43.4	41.5	42.2		
Misc Combined			44.4	41.6	42.1		
Safety			37.0	35.1	35.1		

Tables III-12, III-13, and III-14 provide the details on the current and proposed assumptions at sample ages.

Table III-12

Current and Proposed Termination Rates (less than five years of service)

Service	Miscellaneous			Safety
	Male	Female Current	Female Proposed	
0	15.00%	15.00%	15.00%	8.00%
1	9.00%	9.00%	10.00%	5.00%
2	7.00%	7.00%	8.00%	4.00%
3	7.00%	7.00%	8.00%	4.00%
4	7.00%	7.00%	8.00%	4.00%

Table III-13

Current and Proposed Miscellaneous Termination Rates (five or more years of service)

Age	Current (Unisex)			Proposed					
				Males			Females		
	5-9 Years of Service	10-14 Years of Service	15-19 Years of Service	5-9 Years of Service	10-14 Years of Service	15-29 Years of Service	5-9 Years of Service	10-14 Years of Service	15-29 Years of Service
20	7.95%	5.30%	3.00%	7.00%	5.30%	3.00%	7.75%	5.30%	3.00%
25	7.95%	5.30%	3.00%	7.00%	5.30%	3.00%	7.75%	5.30%	3.00%
30	7.95%	5.30%	3.00%	7.00%	5.30%	3.00%	7.75%	5.30%	3.00%
35	6.75%	4.50%	2.50%	6.75%	4.50%	2.50%	7.75%	4.50%	2.50%
40	4.80%	3.20%	2.00%	4.80%	3.20%	2.00%	5.80%	3.20%	2.00%
45	3.75%	2.50%	1.70%	3.75%	2.50%	1.70%	4.75%	2.50%	1.70%
50	2.10%	0.00%	0.00%	2.10%	0.00%	0.00%	3.10%	0.00%	0.00%
55	1.20%	0.00%	0.00%	1.20%	0.00%	0.00%	2.20%	0.00%	0.00%
60	1.20%	0.00%	0.00%	1.20%	0.00%	0.00%	2.20%	0.00%	0.00%

Table III-14

Current and Proposed Safety Termination Rates (five or more years of service)

Age	Current 5-19 Years of Service	Proposed 5-19 Years of Service
20	2.06%	2.06%
25	2.24%	2.24%
30	3.53%	3.53%
35	3.41%	3.41%
40	1.14%	1.14%
45	1.70%	1.70%
50	0.27%	0.27%
55	0.00%	0.10%
60	0.00%	0.00%

REFUND RATES AND RECIPROCITY

When a vested member terminates employment, they have the option of receiving a refund of contributions with interest or a deferred annuity. If an employee terminates employment and works for a reciprocal employer, the employee's retirement benefit is ultimately based on the employee's service with MCERA and Final Compensation based on employment with any reciprocal employer.

Tables III-15 and III-16 on the next page show the results of our analysis of withdrawals for Miscellaneous and Safety, for the combined period from 2008-2014. We are recommending the rates of withdrawal for vested Miscellaneous members be reduced from 40% to 30% for less than five years of service, and reduced from 25% to 15% for those with more than five years of service. We recommend maintaining the assumption that 25% of Safety members with less than 10 years of service will withdraw their contributions, and adding an assumption that 5% of those with more than 10 years of service will withdraw (previously all were assumed to leave their contributions in the system).

The current assumption is that 25% of Miscellaneous and 40% of Safety non-withdrawal terminating employees work for reciprocal employers and receive salary increases equal to the payroll growth assumption. We propose maintaining this reciprocity assumption for Safety, but reducing the percentage slightly (to 20%) for Miscellaneous.

Table III-15
Analysis of Refund and Reciprocity Rates - Miscellaneous

	Withdrawals as % of Terminations		Transfers as a % of Non-Withdrawals
	<5 Years of Service	5+ Years of Service	
Actual Experience			
Misc Male	30.95%	10.61%	23.97%
Misc Female	31.28%	18.64%	12.50%
Misc Combined	31.18%	15.76%	16.10%
Assumption			
Current	40.00%	25.00%	25.00%
Recommended	30.00%	15.00%	20.00%

Table III-16
Analysis of Refund and Reciprocity Rates - Safety

	Withdrawals as % of Terminations		Transfers as a % of Non-Withdrawals
	<10 Years of Service	10+ Years of Service	
Actual Experience			
Safety Combined	30.77%	7.69%	35.42%
Assumption			
Current	25.00%	0.00%	40.00%
Recommended	25.00%	5.00%	40.00%

FAMILY COMPOSITION

Members who are married at the time of retirement are entitled to an unreduced 60% joint and survivor annuity. An analysis of members who retired in the last six years and elected an unmodified form of benefit showed that 73.4% of males and 51.3% of females had spouses or domestic partners eligible to receive the subsidized survivor's benefit. The current assumption is that 70% of male and 50% of female service retirees and disabilities have an eligible spouse; we recommend maintaining these assumptions.

An analysis of these same retired members showed that males are 3.5 years older than their spouses and female members are 1.4 years younger than their spouses. The current assumption is that all males are three years older than their spouses. We recommend decreasing the assumption for female members to assume that they are one year younger than their spouse and maintaining the current assumption for male members.

TERMINAL SERVICE AND PAY LOADS

A load is currently applied to the projected benefits for active members, to account for anticipated conversions of sick leave, end-of-career service purchases, or other terminal earnings to retirement service credit or final compensation.

We reviewed the information of 226 retirement calculations over the past six years for whom we had complete data. We compared the amount of service used in the member's actual benefit calculation with the amount from the most recent actuarial valuation prior to retirement (projected to the member's actual termination date). We computed the average unexpected increase in service for each member, adjusting for the fact that employees would have contributed their share of the normal cost for some types of service increases (i.e. service purchases and contribution redeposits for prior service).

Table III-17 shows the results of our analysis. We recommend increasing the load for County members from 1.0% to 1.2%. We also recommend introducing a load for Courts and other Special Districts of 1.2%. Although the recent data for the Special Districts indicated a higher average service increase than we have recommended (2.18%), this only represented three retirement calculations. We recommend increasing the load for San Rafael to 2.5%, representing a blending of the prior assumption and the recent experience.

Table III-17
Analysis of Terminal Service Loads

Group	Current Load	# of Calcs	Average Service Load	Recommended Load
County	1.00%	171	1.30%	1.20%
Courts	0.00%	13	1.42%	1.20%
Other Special Districts	0.00%	3	2.18%	1.20%
Novato Fire	3.00%	5	1.20%	3.00%
San Rafael	2.20%	34	2.74%	2.50%

For Novato Fire, members are also eligible to cash out vacation pay earned and payable in their final service period, and may therefore have an additional increase in pensionable compensation not necessarily reflected in their most recent valuation data. MCERA is in the process of reviewing recent retirement calculations for Novato to determine the effect of vacation and other cashouts. As a result, we recommend continuing the 3.0% load applied to Novato members until the analysis has been completed.

METHODOLOGY

PURPOSES OF THE EXPERIENCE STUDY

The first goal of this Experience Study is to review the recent past demographic experience of the Plan. We seek to understand the behavior of the participating members so that we can recommend actuarial assumptions concerning future demographic experience.

The second goal of this Study is to recommend economic assumptions to be used in computing liabilities and costs. These economic assumptions include the expected rate of return on Plan assets and the anticipated rate of increase in the Consumer Price Index (CPI). These assumptions are determined based on the investment strategy adopted by the Plan and on the past behavior of the capital markets and the CPI, and on future expectations.

Once adopted, the assumptions recommended by this Study will be used to determine future liabilities and costs and for purposes of evaluating prospective changes in benefits, eligibility conditions, and other aspects of the Plan's operations.

SCOPE OF REPORT

Demographic assumptions relate to all behavioral characteristics of the group. Behavioral characteristics do not include the assumptions concerning future inflation, the real rates of return of the investments in the trust fund, or the anticipated growth in the underlying payroll of the members.

Demographic assumptions include the following:

- Probability of retirement from active service,
- Probability of termination of employment prior to retirement (with the member receiving a deferred vested benefit or receiving a contribution refund),
- Probability of disability among active employees (either ordinary or duty related),
- Probability of deferred vested members working for a reciprocal employer,
- Family composition, and
- Rates of mortality among active, retired, disabled members and their beneficiaries.

In addition, demographic assumptions include the merit (longevity and promotion) component of individual pay increases. This does not include the inflationary element in pay increases. For example, if inflation is 3.2% and the employee receives a 4.7% pay increase, 1.5% of this increase is deemed "merit".

Economic assumptions include the rate of increase in the cost of living (inflation), which is a part of the overall pay increase assumption discussed above. In addition, a crucial economic assumption is the real rate of return on plan assets -- the return on assets above the rate of inflation.

IMPORTANCE OF RELIABLE ASSUMPTIONS

The liabilities and costs calculated in actuarial valuations and cost studies are based on a projection of future conditions. The actuary makes assumptions concerning the rates of retirement, withdrawal, termination, disability, and death among plan members. In addition, the actuary must project future earnings on plan assets, inflation, and growth in the pay of active members.

The actuary sets his or her assumptions based on past experience and future expectations. In setting demographic assumptions, such as rates of retirement, the past experience of the covered group of employees is often the best predictor of future behavior. When establishing economic assumptions, such as the expected return on plan assets, the historical behavior of the investment markets can serve as a guide.

Actuarial funding methods are designed so that, if the actuarial assumptions are met, plan costs will generally be a predictable percentage of member pay from year to year. If actual economic or demographic experience varies from our assumptions, plan costs will rise or fall accordingly. Therefore, it is worth the effort to make our best estimate of future conditions so that the plan costs computed by the actuary will be as stable and predictable as possible.

METHODOLOGY (ECONOMIC ASSUMPTIONS)

The Plan's economic assumptions are critically important in computing actuarial liabilities and costs. A careful determination of these assumptions requires an analysis of the past performance of the capital markets and the Plan's future investment outlook.

To this end, we proceed as follows:

- Based on a detailed analysis of recent past history and reasonable expectations for the future, a long term projection of the rate of inflation is determined.
- Based on the Plan's investment strategy and rates of return on various asset classes (provided by the investment consultant) the long term *real* rate of return on assets is simulated. This is the return on assets in excess of inflation.
- The projected rate of inflation is combined with the assumption concerning merit pay increases to project future members' pay.
- The rate of inflation is combined with the estimated real return on assets to determine the overall return on assets.

Any estimate of future inflation and asset returns is difficult. Over time, there will be actuarial gains and losses as experience deviates from our assumptions. As past and recent capital market experience has shown, these gains and losses can have a substantial impact on cost volatility.

METHODOLOGY (DEMOGRAPHIC ASSUMPTIONS)

One goal of this study is to compute the probability of death, disability, retirement, withdrawal, or termination leading to a vested benefit at each age for active members and the probability of death at each age for inactive members.

To this end, we proceed as follows:

- We count the number of members leaving for each cause during the term of the study. This is the number of decrements.
- We count the number of members who could have left for each cause during the study. This is the exposure.
- When the exposure is sufficient, we divide the number of decrements by the exposure at each combination of age and service for an employee group to determine the probability of leaving due to the cause in question.
- Where feasible, experience has been examined separately by gender. In some cases, experience has been combined when male and female experience is similar or when there is insufficient data to produce reliable rates by sex.

A unique challenge is presented by members who are on Active Leave as of the date of each annual valuation. These members have an uncertain status each year, since some will have applications for retirement or disability that are pending. For purposes of this study, these members are included in the total exposures and are recognized as a decrement based on the final resolution of their status when their applications for disability or retirement have been fully adjudicated.

When there is insufficient exposure to derive statistically reliable rates by age and service, we may combine exposures and decrements for groups of ages and service. Alternatively, we may compare the total number of actual decrements with the total number of decrements predicted by a standard actuarial table, and adopt a table that predicts decrements, in total, reasonably close to those that have been observed.

Where the rate of decrement is low and the underlying causes of the decrement in question are not expected to change significantly with time we may combine the most recent experience with data from prior experience studies.

For the study of the merit (longevity and promotion) components of individual pay increases, we generally choose to use a *transverse* study. A reliable way to assess average increases in pay due to merit is to analyze average pay versus service for the current active members of a plan. With a homogeneous group of any size at all, the pattern of promotions and longevity increases during the career of an average employee is clearly visible in this analysis. This is a transverse study of longevity and promotion pay increases: The data is taken as of a particular point in time.

Longitudinal studies, which use changes in pay collected over several years, are often unreliable when used on a stand-alone basis due to the effects of inflation, collective bargaining, and management decisions during the term of the study.