Marin County Employees' Retirement Association

Actuarial Experience Study
July 1, 2008 through June 30, 2011

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Contents

Executive Summary

Purpose

The purpose of this Actuarial Experience Study is to review the actuarial experience of the Marin County Employees' Retirement Association (MCERA, the Plan) during the period from July 1, 2008 through June 30, 2011.

As part of this Study, the plan's economic assumptions were reviewed. The economic assumptions include the assumed rates of inflation, COLA increases, investment return, and active pay growth.

The Plan's demographic experience – observed rates of retirement, withdrawal, vested termination, transfer, disability, and death – were compared with the experience expected under the actuarial assumptions adopted to determine Plan liabilities and cost, and revised assumptions are recommended as appropriate.

For most of these assumptions, we combined the data from the current study with that from the prior analysis (July 1, 2006 – June 30, 2008) to provide a more robust dataset.

Other assumptions and methods used in the actuarial valuation, such as longevity/merit pay increase assumptions, terminal pay/service loads and the actuarial cost method, were also reviewed.

The purpose of this Section of the Study is to give the reader a quick summary of the major conclusions that have been reached. Details are presented in later sections of this Report.

Summary of Experience and Impact on Plan Costs

In the table shown on the following page, we present a summary of experience, the new proposed assumptions where applicable, and the impact of the proposed assumption changes on the overall current Plan cost (separately for the County / Special Districts, Novato Fire Protection District and San Rafael) as a percentage of payroll.

Should the recommendations in this Report be adopted, the employee contributions will also be recomputed as a result of the revised assumptions, and may offset some of the cost changes for the employer.

These assumptions will not determine the ultimate level of employer contributions; instead, the required contributions will depend on the *actual* future demographic and financial experience of the Plan. The goal of an experience study is 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.

Assumption	Experience	Recommendation	Impact on Total Plan Cost (as a % of payroll) County	Novato	San Rafael
Economic Assumptions	Current inflation (3.50%) assumption is high. Nominal return assumption (7.75%) is optimistic.	Reduce inflation and nominal return assumption by 0.25% each. Real return assumption remains 4.25%.	+ 1.2%	+ 0.4%	+ 1.8%
Service Retirement	Retirements were very close to expectations.	No change proposed	0.0%	0.0%	0.0%
Termination	Total termination rates close to those expected, distribution among vested terminations, withdrawals and transfers differed from expectations.	Combine withdrawal and vested termination rates, lower withdrawal percentage and lower percentage of Miscellaneous members who transfer.	+ 0.1%	0.0%	+ 0.1%
Disability	Fewer than expected duty and Miscellaneous ordinary disabilities.	Reduce duty and Miscellaneous ordinary disability rates by 50%.	- 0.9%	- 2.5%	- 1.5%
Mortality	Mortality has not changed significantly since the last experience study.	No change proposed.	0.0%	0.0%	0.0%
Longevity and Promotion Pay Increases	Miscellaneous promotion / longevity pay increases are close to expectations; Safety experience suggests higher ultimate increase.	Changes to Safety rates, with higher rates after initial service period. Apply increases after age 60 for all members.	+0.8%	+2.9%	+1.5%
Terminal Pay Load	Historical pay and benefit calculation data insufficient to adequately determine loads.	No change proposed	0.0%	0.0%	0.0%
Funding Method Change		The funding method was changed to Entry Age Normal to Final Decrement	- 0.8%	- 3.2%	- 1.5%
		Total Change	+ 0.4%	- 2.4%	+ 0.4%

Organization of Report

The first section of the Report concerns economic assumptions.

The second section of the Report deals with decrements among active members and also includes consideration of the merit component of pay increases, terminal pay/service loads, and actuarial cost methods.

The third section of the Report deals with mortality among active and inactive members.

A final section presents methodological details.

The report has been prepared in accordance with generally accepted actuarial methods and procedures. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. EFI will be happy to answer any questions from MCERA Board or staff regarding its methodology or conclusions.

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Economic Assumptions

Introduction

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

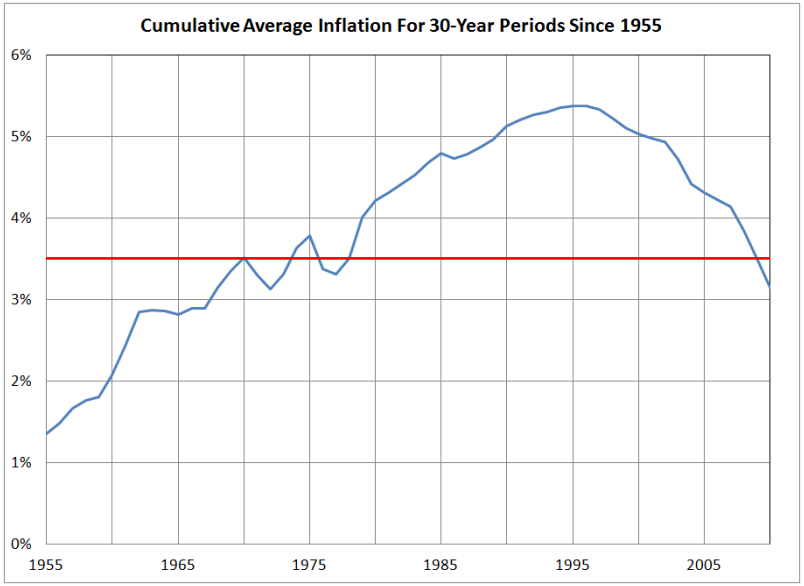
- The inflation assumption;
- The real investment return assumption;
- The real growth in pay relative to inflation; and
- COLA increases relative to inflation.

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 often serve as a useful guide in 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 four elements of economic assumptions listed above.

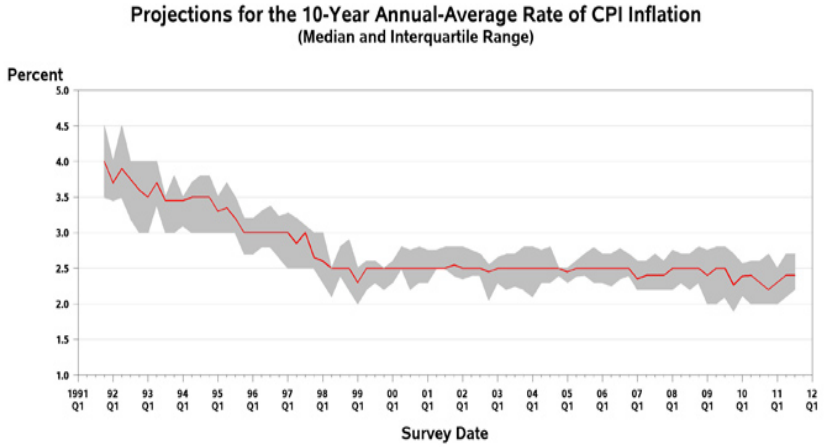
The graph below shows the average rate of inflation over 30-year periods, with the earliest such period ending in 1955 and the latest ending in 2010. We note in the chart that average inflation seemed to be increasing steadily until the 1990's when it leveled off and began to decrease. An examination of historical inflation could lead to the assumption that inflation is likely to be quite high, with the current assumption of 3.5% quite reasonable.



However, there are a number of reasons to believe that future inflation levels will not be as high as above graph 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 high inflation during these years. Since 1982, increases have been in the range 0.1% to 4.6% with one exception (6.1% in 1990), averaging near 3.0% 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.
- The Federal Open Market Committee has policies in place to control inflation, making future levels more likely to remain relatively low.
- Financial markets offer evidence of what investors expect inflation to be in future years. Various securities, such as Treasury inflation-protected securities (TIPS), provide 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 a 30-year projection of expected inflation rates, shown in the top graph at the right.

Source: Haubrich, Pennacchi, Ritchken (2008).
http://www.clevelandfed.org/research/data/inflation_expectations/2011/October/image3.gif



http://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/2011/survq311.cfm

- A long term inflation assumption of 2.00% may appear to match well with the Cleveland Fed projections. However, the predictions of future inflation by experts are not unanimous. Another data source to consider is the Survey of Professional Forecasters. Their 2011 3rd quarter survey of inflation expectations, shown in the bottom graph above, indicates an consensus assumption closer to 2.5% over the next 10 years.
- 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 2.50%.

A change from the current 3.50% assumption to a 2.50% assumption in one step would represent a large, immediate change in the assumptions, which is usually not advisable. In addition, some commentators note that significant current and expected future federal budget deficits increase the likelihood of higher levels of inflation in the future. Finally, historical data shows that periods of higher inflation can and do occur.

Therefore, we recommend reducing the inflation assumption from 3.50% to 3.25%, a moderate reduction. 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 investment return in excess of underlying inflation. The expected average real rate of return is heavily dependent on asset mix: The portion of assets in stocks, bonds, and cash.

For purposes of this Study, we have simulated the return derived using MCERA's final target allocation [33% Domestic Equity, 21% Global Equity, 26% Domestic Fixed Income, 12% Real Estate, 8% Private Equity.] Returns are derived by simulation, using the following algorithm:

1. The expected returns, standard deviation and correlation matrix for each asset class were provided by the investment consultant (Callan).
2. The expected returns are adjusted for assumed administrative and investment expenses.
3. 10,000 simulation trials for repeated ten year periods were run, and the mean geometric return was computed for each of them.
4. Given the distribution of returns, we can compute the likelihood of the geometric mean return for a specific trial exceeding a specified assumption over a ten year period.

As described in Step #2, before performing our simulation we must first adjust the expected returns for the assumed impact of administrative, otherwise authorized and investment expenses, because the assumption is stated to be net of these expenses. As shown in the table below, over the past five years non-investment expenses have averaged 0.22% per year. The non-investment expenses include some expenses, such as legal and

actuarial fees, that are not counted towards the administrative expense cap under the '37 Act.

FYE	Average Assets ($ in Millions)	Non-Investment Expense ($ in Millions)	Non-Investment Expense as a % of Assets
2006	$ 1,226	$ 1.4	0.11%
2007	1,402	2.0	0.14%
2008	1,466	3.6	0.24%
2009	1,273	3.6	0.28%
2010	1,171	3.8	0.32%
Total	$ 6,537	$ 14.3	0.22%

Investment expenses have been higher – averaging approximately 0.60% per year from 2005-2010. The expected returns by class provided by Callan are intended to represent the expected return for an indexed investment and therefore should be net of most investment expenses. This is a common assumption; generally, actively managed investments are assumed to earn enough "alpha" to cover the additional investment fees.

However, as the following table illustrates, the Plan has underperformed the benchmark return (i.e. the return on the equivalent indexed investments) by an average of 0.52% from 2002-2011. The values in this table were provided by the investment consultant (Callan).

FYE	Plan Return	Benchmark Return	Excess
2002	-6.91%	-6.38%	-0.53%
2003	0.60%	2.67%	-2.07%
2004	17.91%	17.27%	0.64%
2005	9.55%	9.60%	-0.05%
2006	12.05%	11.59%	0.46%
2007	17.89%	17.66%	0.23%
2008	-6.63%	-5.85%	-0.78%
2009	-20.09%	-18.58%	-1.51%
2010	8.29%	10.87%	-2.58%
2011	23.53%	22.58%	0.95%
Average			-0.52%

The Actuarial Standard of Practice governing the selection of economic assumptions (ASOP 27) suggests using caution when assuming significantly different performance based on active management:

> *"Anticipating superior (or inferior) investment manager performance may be unduly optimistic (or pessimistic). Few investment managers consistently achieve significant above-market returns net of expenses over long periods. The plan sponsor may replace managers who consistently underperform market indexes. However, in some situations an investment manager who consistently underperforms under varying market*

conditions is unlikely to be replaced, so continued underperformance may be expected."

We suggest lowering the real expected return for assumed investment expenses that are not expected to be fully covered through additional returns from active management. However, based on the above comments, we propose lowering the assumed real return by less than the full amount of historical underperformance (0.52%); instead reducing the expected return by 0.25%. When combined with the expected administrative expenses, this results in a 0.47% reduction (0.25% for performance plus 0.22% for administrative expenses) to the expected return for each asset class.

After adjusting for expenses, we perform our simulation using 10,000 independent trials. The mean return from this simulation was 6.76%, indicating a real return of 4.26%, based on a 2.5% inflation assumption. This is extremely close to the current real return assumption of 4.25% (7.75% - 3.50%). This would translate to a nominal return of 7.51%, given a 3.25% inflation assumption. Callan has provided their expected average 10-year geometric return for the portfolio of 7.39%, resulting in a real return of 4.38% (after adjusting for expenses) - close to that indicated above.

The median return for the simulation is 6.77%; meaning that a real return of greater than 4.26% is expected to be achieved in half of the simulated 10-year trials. A lower return assumption would result in a higher likelihood of achieving the expected return.

ASOP 27 describes the construction of a **best-estimate investment return range**, by using a simulation method such as that described above. The best-estimate range is *"the narrowest range within which the actuary reasonably anticipates that the actual results, compounded over the measurement period, are more likely than not to fall".*

Under this definition, the best-estimate range is equivalent to the returns falling between the 25th and 75th percentile of the simulation; this range is approximately 1.67% - 6.82% under our simulation. This corresponds to a 4.92% - 10.07% nominal return best estimate range, based on a 3.25% inflation assumption.

We noted above that our recommended inflation assumption is 3.25%. We recommend a nominal return assumption of 7.50%, which is in the middle of the best estimate range. This assumption represents retaining the real return assumption of 4.25%, along with a 0.25% reduction in the inflation assumption.

We note that more conservative assumptions for the expected real and nominal rates of return would also be reasonable.

- With respect to the real return of return, we have surveyed a number of other investment advisors, and many of them have lower expected returns for the asset classes in

MCERA's portfolio. Based on simulations we performed using the expected return data from several other investment consultants, the mean expected real return ranged from 3.17% to 4.47%, after adjusting for expenses.

- With regards to the inflation assumption, we have shown above that the investment markets currently assume a level of inflation well below 3.25%.

Our recommended nominal return (7.50%) represents a moderate reduction from the current rate (7.75%). The Trustees would certainly be justified in making such a reduction, and then continuing to monitor market expectations and revisit the return assumption at the next experience study or earlier.

Real Growth in Pay

Components of the pay growth assumptions are:

- Inflation, and
- Other pay growth in excess of 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. Together, the elements of wage growth above inflation are known as real wage growth.

The inflationary component is the assumed CPI, with a recommended rate of 3.25%. 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.

Counter arguments to an assumption of minimal real wage growth can certainly be made: historically, the US as a whole has witnessed 0.7% annual real wage growth from the period from 1970-2009. In addition, the Social Security Administration projects real wage growth of 0.6% to 1.8% going forward in their Social Security solvency projections.

However, all levels of government, from the smallest political subdivisions to counties, states, and the federal government, are under unprecedented financial stress. All of the usual sources of revenue have been seriously reduced.

Furthermore, at least over the short to medium term, it is expected that other areas of employee compensation – most notably health care costs and pension contributions – are expected to increase faster than general inflation. This is likely to crowd out other possible increases in compensation, including wage growth.

Based on these factors, we expect that wages of MCERA members are unlikely to keep up with inflation in the near to mid-term, let alone increase above inflation. Accordingly, EFI recommends assuming that member pay will increase in line with inflation, with no pay increases for productivity. We will continue to monitor this assumption; if inflationary pay increases resume, we will review the possibility of productivity increases in the future.

Therefore, the annual expected increase in base payroll would be 3.25%, reduced from 3.5% 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. It will also affect the calculation of the amortization payment under level percentage of payroll amortization.

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) 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.

It is necessary to determine an assumed rate of COLA growth, reflecting both inflation (the growth in the CPI) and the interaction of the CPI with the COLA cap and banking mechanism.

We have produced statistical simulations of inflation, similar to our modeling of the investment return assumption, and then modeled how the COLA maxima and the banking process for each group interact with the changes in CPI.

Our simulations tell us that the average growth in the COLA is expected to be below the cap, even if the expected average increase in the CPI (3.25% based on our earlier recommendation) is higher than the cap itself. This occurs because there is often not a significant bank already in existence (such as in the early years of retirement); therefore, when there are years in which inflation is below the cap the shortfall is often not made up in future years.

Based on various inflation assumptions, we recommend the assumed COLA growth rates shown in the table below. We have modified the recommended rates for the current inflation assumption (3.5%) based on updates to our simulations, including the current levels of banking and recent inflation experience.

Assumed Annual CPI Increase	Recommended COLA Growth Assumption		
	2% Maximum	3% Maximum	4% Maximum
3.00%	1.90%	2.60%	2.90%
3.25% (recommended)	**1.90%**	**2.70%**	**3.00%**
3.50% (current)	1.90%	2.70%	3.20%

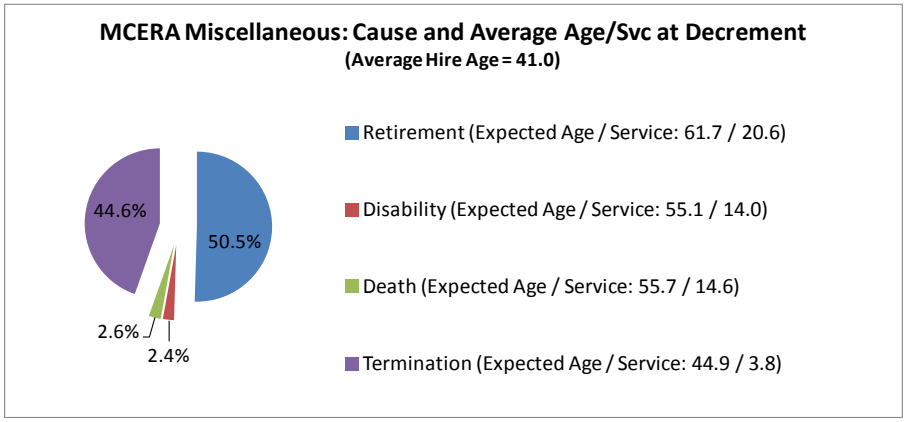
Active Decrements

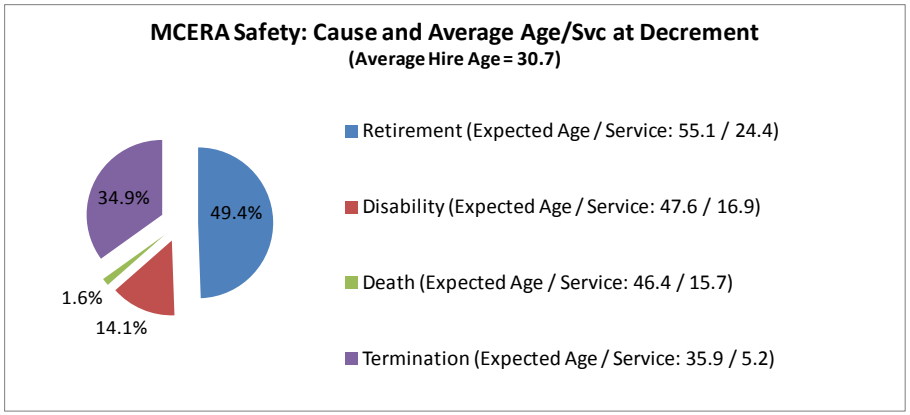
Decrement Causes and Averages

The results on the following pages show an analysis of how the actual number of decrements compares to the expected number of decrements, and suggests changes that can be made to the assumptions to get the expected number of decrements more in line with recent experience. The following two charts show some context regarding the final recommended assumptions.

The two charts to the right were compiled by taking all new entrants during the 2010 fiscal year and calculating their expected career path, using the assumptions recommended in this report. For these populations, the average age at hire for the Miscellaneous members was 41 and around age 31 for Safety.

Roughly half of all new participants in the MCERA Miscellaneous (50.5%) and Safety (49.4%) plans are expected to retire with a Plan benefit. Of the remaining members, most will leave due to termination – either withdrawing contributions with no further Plan benefit, receiving a deferred vested benefit, or going to work for a reciprocal employer.





Service Retirement

Current Assumption, Miscellaneous

Summary of Experience versus Current Assumptions (Ages 45-69, 10+ Years of Service, 2006-2011)

	Eligible Exposure	Actual Retirements	Expected Retirements	Actual to Expected Ratio
Males	1,326	111	125.7	88.3%
Females	1,850	188	196.0	95.9%
Combined	**3,176**	**299**	**321.7**	**92.9%**

	Actual Average Age	Expected Average Age
Males	59.0	59.4
Females	60.8	61.1
Combined	**60.1**	**60.4**

- Miscellaneous members are currently eligible to retire at age 50 (age 55 for some members) with 10 years of membership or at any age with 30 or more years of Eligibility Service.
- We have combined experience from the most recent study period (2008-2011) with the data from the prior study (2006-2008).
- We excluded the exposures and decrements for those age 70 and above, as all such members are assumed to retire immediately. Over the past five years less than 1.5% of all exposures were for members age 70 and above, so the data continues to support this practice.
- The total number of retirements over the past five years was close to the number expected, and the pattern of rates by age is reasonable (see Chart A-1); therefore we propose no changes to the assumptions.

Current Assumption, Safety

Summary of Experience versus Proposed Assumptions (Ages 45-59, 10+ Years of Service, 2006-2011)

	Eligible Exposure	Actual Retirements	Expected Retirements	Actual to Expected Ratio
3% @ 50	362	43	44.2	97.4%
3% @ 55	371	32	28.2	113.5%
Combined	**733**	**75**	**72.4**	**103.7%**

	Actual Average Age	Expected Average Age
3% @ 50	52.6	53.2
3% @ 55	55.2	54.7
Combined	**53.7**	**53.8**

- Safety members are currently eligible to retire at age 50 with 10 years of service or at any age with 20 or more years of service.
- We have combined experience from the most recent study period (2008-2011) with the data from the prior study (2006-2008). We separately analyzed members receiving benefits under 31664.1 (3% @ 50) and 31664.2 (3% @ 55).
- Members age 60 and above are excluded; all are assumed to retire immediately. Over the past five years only 1.5% of all exposures were for members age 60 and above.
- The number of retirements over the past five years was close to the number expected, and the pattern of rates by age is reasonable (see Chart A-2); therefore no changes are proposed.

Miscellaneous Retirement Rates – Current

Age	10-29 Years of Service	30+ Years of Service
50	4.0%	4.0%
51	4.0%	4.0%
52	4.0%	4.0%
53	4.0%	4.0%
54	4.0%	4.0%
55	10.0%	25.0%
56	4.0%	25.0%
57	6.0%	25.0%
58	8.0%	25.0%
59	10.0%	25.0%
60	10.0%	35.0%
61	10.0%	35.0%
62	20.0%	35.0%
63	20.0%	35.0%
64	20.0%	35.0%
65	25.0%	35.0%
66	25.0%	35.0%
67	25.0%	35.0%
68	25.0%	35.0%
69	25.0%	35.0%
70+	100.0%	100.0%

Safety Retirement Rates – Current

Service:	3% @ 50		3% @ 55	
Age	10-29 Years of Service	30+ Years of Service	10-29 Years of Service	30+ Years of Service
50	25.0%	50.0%	5.0%	25.0%
51	10.0%	20.0%	5.0%	25.0%
52	10.0%	20.0%	5.0%	25.0%
53	10.0%	20.0%	5.0%	25.0%
54	10.0%	20.0%	5.0%	25.0%
55	25.0%	50.0%	15.0%	30.0%
56	25.0%	50.0%	15.0%	30.0%
57	25.0%	50.0%	15.0%	30.0%
58	25.0%	50.0%	15.0%	30.0%
59	25.0%	50.0%	15.0%	30.0%
60+	100.0%	100.0%	100.0%	100.0%

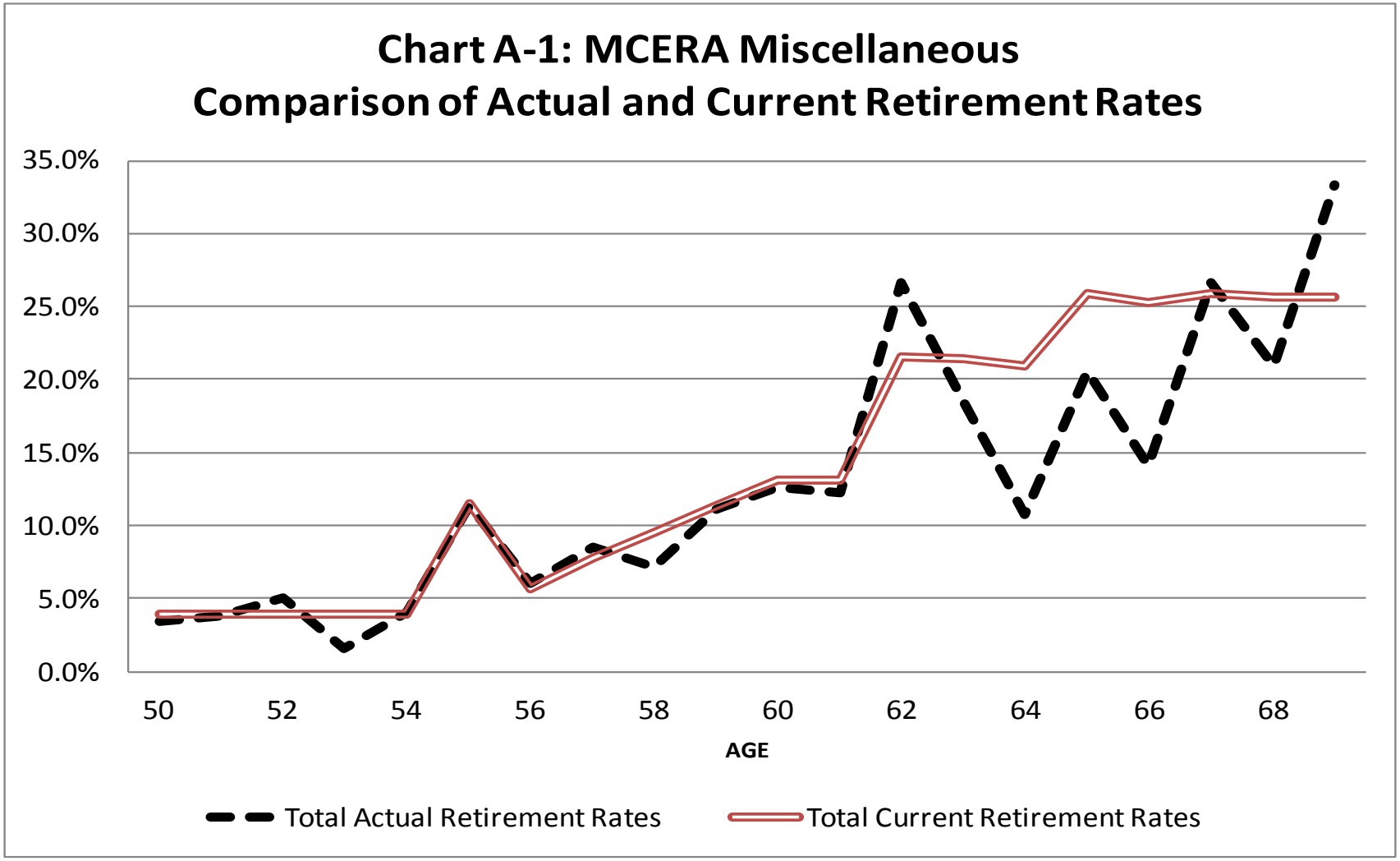
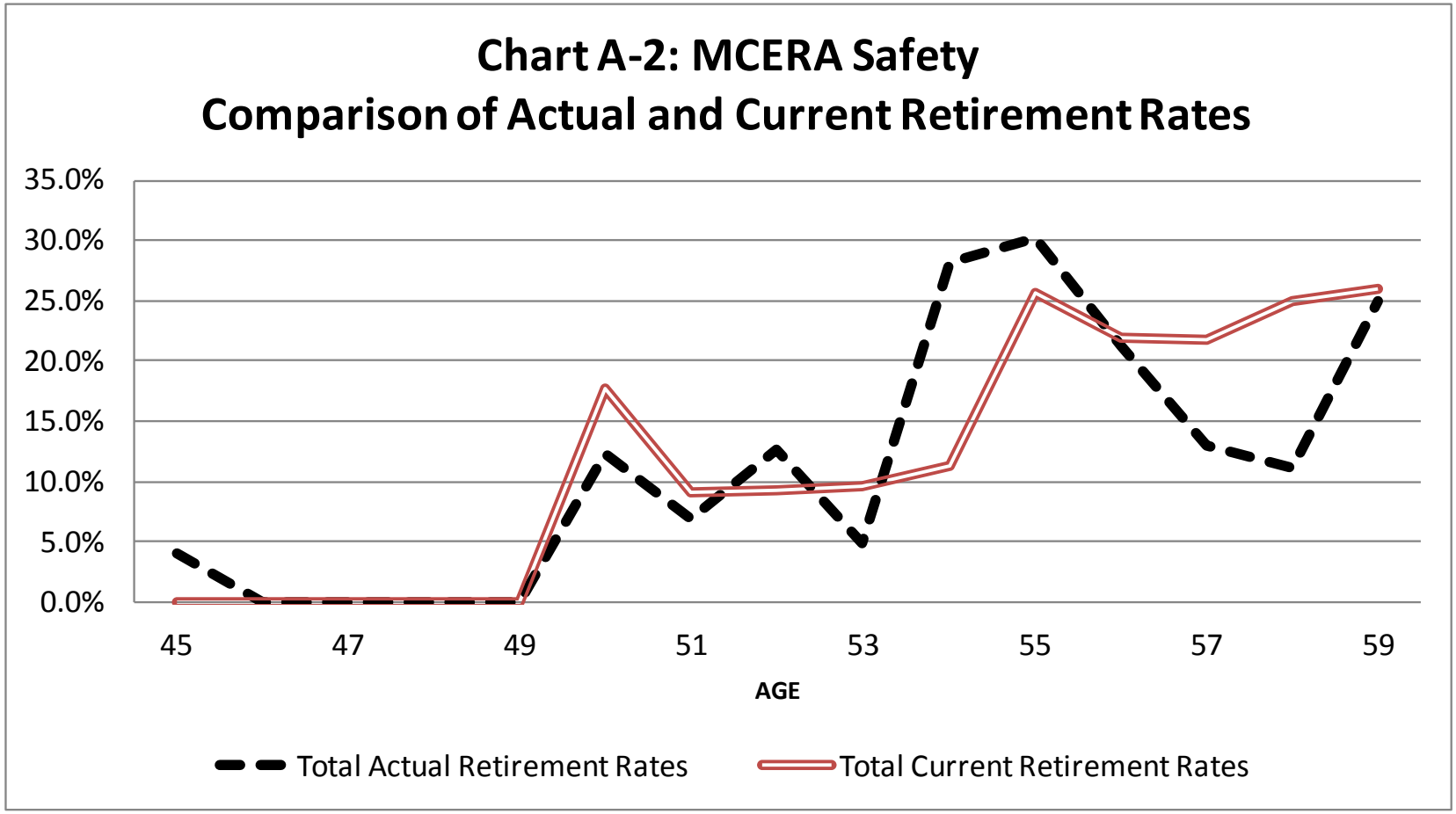


Chart A-1: MCERA Miscellaneous
Comparison of Actual and Current Retirement Rates
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
50
52
54
56
58
60
62
64
66
68
AGE
Total Actual Retirement Rates
Total Current Retirement Rates



In reviewing Charts A-1 and A-2, we can see that the current assumptions reasonably match actual experience.

Termination – Withdrawals, Vested and Non-Vested Terminations, and Transfers (Miscellaneous)

Current Assumption

Summary of Experience versus Current Assumptions (2006-2011)

	Eligible Exposure	Actual Terminations	Expected Terminations	Actual to Expected Ratio
Males	1,326	111	125.7	88.3%
Females	1,850	188	196.0	95.9%
Combined	**3,176**	**299**	**321.7**	**92.9%**

Actual Average Age	Expected Average Age
40.7	42.6

- A withdrawal occurs when a member terminates employment and withdraws his or her member contributions. A vested or non-vested termination applies to active members (vested or non-vested) who terminated and leave their member contributions on deposit with the Plan. A transfer occurs if the terminated member continues working with a reciprocal employer.
- For this analysis, we have combined the withdrawal, termination and transfer assumptions to develop a single assumption for terminations. Separately, we have analyzed the percentages of those terminating who withdrawal, leave contributions on deposit, and/or transfer.
- Currently, service-based termination rates are assumed for those with less than five years of service, and age based rates are assumed thereafter.
- The current assumptions predicted the overall number of terminations reasonably well over the past five years (within about 7%), with good agreement between the rates at different service levels. Male and female rates continue to be similar.
- The percentage of members terminating and receiving a contribution refund has declined. In the past, a member needed five years of service (including service with reciprocal employers) in order to leave contributions on deposit and receive a deferred vested benefit. However, now any member who reaches age 70 can receive a benefit from the Plan if they have left their contributions on deposit.

  In addition, members who terminate and leave their contributions on deposit now receive interest credits equal to the valuation earnings assumption, making this a more attractive option.

Recommendation

- We recommend maintaining the current overall termination rates.
- We recommend assuming that 40% of those terminating with less than five years of service will take a refund, as will 20% of those terminating with five or more years of service.
- Among those assumed to leave their contributions on deposit, we recommend reducing the percentage assumed to transfer to a reciprocal employer from 40% to 25%.
- We recommend maintaining the assumption that no terminations will occur once a member reaches 20 years of service (only two did so over the past five years).
- Chart A-3 demonstrates that the current overall termination rates have done a reasonable job of predicting the rates of termination by service.

Miscellaneous Withdrawal Rates – Current Rates

Service	All Ages
0	15.0%
1	9.0%
2	7.0%
3	7.0%
4	7.0%

Representative Rates for 5 or More Years of Service

Age	Withdrawal		Vested Termination / Transfer	
	5 – 9 Years of Service	10 – 14 Years of Service	5 – 9 Years of Service	10 – 19 Years of Service
22	3.5%	2.3%	4.5%	3.0%
27	3.5%	2.3%	4.5%	3.0%
32	3.5%	2.3%	4.5%	3.0%
37	3.0%	2.0%	3.8%	2.5%
42	1.8%	1.2%	3.0%	2.0%
47	1.2%	0.8%	2.4%	1.6%
52	0.0%	0.0%	1.8%	0.0%
57	0.0%	0.0%	1.2%	0.0%
62	0.0%	0.0%	1.2%	0.0%

40% of those leaving their contributions on deposit are assumed to transfer to a reciprocal employer.

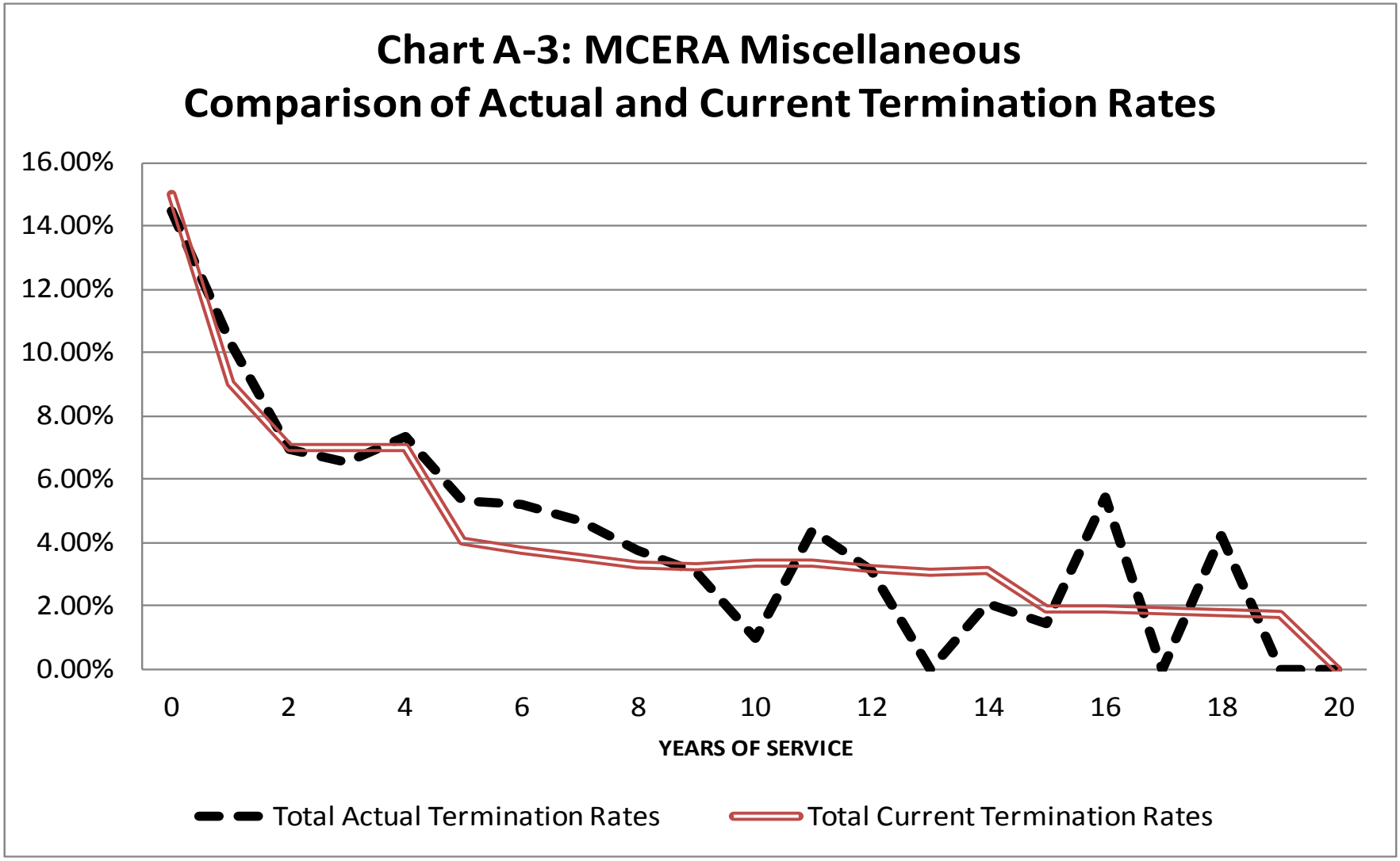
Miscellaneous Termination Rates (All Types) – Proposed Rates

Age	Years of Service					
	0	1	2 - 4	5 - 9	10 – 14	15 – 19
22	15.0%	9.0%	7.0%	7.9%	5.3%	3.0%
27	15.0%	9.0%	7.0%	7.9%	5.3%	3.0%
32	15.0%	9.0%	7.0%	7.9%	5.3%	3.0%
37	15.0%	9.0%	7.0%	6.8%	4.5%	2.5%
42	15.0%	9.0%	7.0%	4.8%	3.2%	2.0%
47	15.0%	9.0%	7.0%	3.6%	2.4%	1.6%
52	15.0%	9.0%	7.0%	1.8%	0.0%	0.0%
57	15.0%	9.0%	7.0%	1.2%	0.0%	0.0%
62	15.0%	9.0%	7.0%	1.2%	0.0%	0.0%
65	15.0%	9.0%	7.0%	0.0%	0.0%	0.0%

40% of terminations with less than five years of service are assumed to take a refund of contributions, as well as 25% of those with five of more years of service.

25% of those leaving their contributions on deposit are assumed to transfer to a reciprocal employer.

No terminations are assumed for members eligible for a service retirement or with 20 or more years of service.



In reviewing Chart A-3, we can see that the current assumptions reasonably match actual experience.

Termination – Withdrawals, Vested and Non-Vested Terminations, and Transfers (Safety)

Current Assumption

Summary of Experience versus Current Assumptions (2006-2011)

Eligible Exposure	Actual Terminations	Expected Terminations	Actual to Expected Ratio
2,239	58	64.7	89.6%

Actual Average Age	Expected Average Age
37.6	35.1

- Similar to the Miscellaneous members, for this analysis we have combined the withdrawal, termination and transfer assumptions to develop a single assumption for terminations. Separately, we have analyzed the percentages of those terminating who withdrawal, leave contributions on deposit, and/or transfer.
- Currently, service-based termination rates are assumed for those with less than five years of service, and age based rates are assumed thereafter.
- As with the Miscellaneous members, the percentage of members who terminate and elect to receive a contribution refund has declined.
- The current assumptions predicted the overall number of terminations reasonably well over the past five years (within about 10%), with good agreement between the rates at most service levels. There were more terminations than expected among new hires (i.e. those with less than one year of service), but this may have been a temporary occurrence due to workforce factors. We will revisit the rates of termination for new hires at the next experience study.

Recommendation

- We recommend maintaining the current overall termination rates.
- We recommend assuming that 25% of those terminating with less than ten years of service will take a refund, and none of those with ten or more years of service will take a refund (all will leave their contributions on deposit).
- Among those assumed to leave their contributions on deposit, we recommend retaining the percentage assumed to transfer to a reciprocal employer at 40% (the data has shown approximately 35% over the five year period).
- We recommend maintaining the assumption that no terminations will occur once a member reaches 20 years of service (none did so over the past five years).
- Chart A-4 demonstrates that the current overall termination rates have done a reasonable job of predicting the rates of termination by service.

Safety Withdrawal Rates – Current Rates

Service	All Ages
0	8.0%
1	5.0%
2	4.0%
3	4.0%
4	4.0%

Representative Rates for 5 – 19 Years of Service

Age	Withdrawal	Vested Termination / Transfer
22	0.00%	1.90%
27	0.00%	2.37%
32	0.00%	3.99%
37	0.00%	2.42%
42	0.00%	0.91%
47	0.00%	1.36%
50+	0.00%	0.00%

No withdrawals are assumed for participants with 5 or more years of service, and no vested terminations or transfers are assumed with 20 or more years of service.

Safety Termination Rates (All Types) – Proposed Representative Rates

Age	Years of Service				
	0	1	2 - 4	5 - 9	10 - 19
22	8.0%	5.0%	4.0%	1.90%	1.90%
27	8.0%	5.0%	4.0%	2.37%	2.37%
32	8.0%	5.0%	4.0%	3.99%	3.99%
37	8.0%	5.0%	4.0%	2.42%	2.42%
42	8.0%	5.0%	4.0%	0.91%	0.91%
47	8.0%	5.0%	4.0%	1.36%	1.36%
52	8.0%	5.0%	4.0%	0.09%	0.00%

25% of terminations with less than ten years of service are assumed to take a refund of contributions, and none of those with ten of more years of service.

40% of those leaving their contributions on deposit are assumed to transfer to a reciprocal employer.

No terminations are assumed for members eligible for a service retirement or with 20 or more years of service.

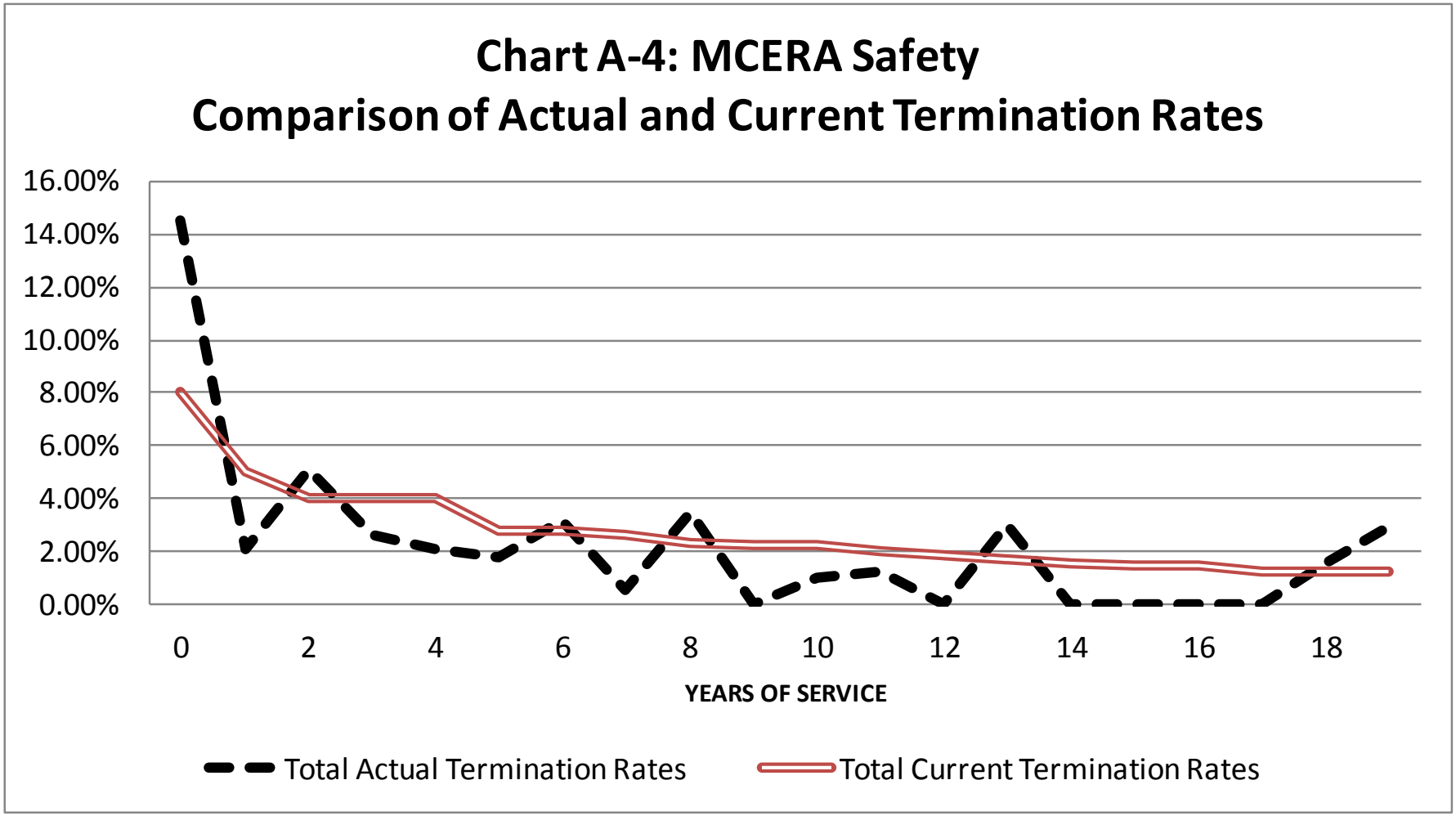


Chart A-4 shows the actual versus expected terminations (including vested and non-vested terminations, reciprocal transfers and withdrawals) by service for Safety members.

Non-Duty Disability (Miscellaneous)

Current Assumption

Summary of Experience versus Current Assumptions (2006-2011)

	Eligible Exposure	Actual Disabilities	Expected Disabilities	Actual to Expected Ratio
Males	2,929	0	3.8	0.0%
Females	4,351	3	6.5	46.2%
Combined	**7,280**	**3**	**10.3**	**29.1%**

- Members are eligible for non-duty disability retirement if they are permanently disabled after five years of service.
- Current assumptions are based on age, and are applied to those with at least five years of service.
- We combined experience from the current study period (2008-2011) with the prior period (2006-2008). Even so, the experience is still limited.
- The number of actual male and female duty-related disabilities was below the expected number in the most recent five-year period.

Recommendation

Summary of Experience versus Proposed Assumptions (2006-2011)

	Eligible Exposure	Actual Disabilities	Expected Disabilities	Actual to Expected Ratio
Males	2,929	0	1.9	0.0%
Females	4,351	3	3.2	92.4%
Combined	**7,280**	**3**	**5.1**	**58.3%**

- Due to the low number of non-duty disabilities, the current rates were reduced by 50% to produce new rates. These rates produce a lower overall number of expected disabilities.
- Because of the paucity of the experience, we propose combining the experience of the current period with that of the next period (and possibly other '37 Act systems) to obtain a more robust sample from which to formulate conclusions.

Misc Non-Duty Disability – Current and Proposed Assumption

Age	Curent	Proposed
20	0.000%	0.000%
25	0.005%	0.003%
30	0.010%	0.005%
35	0.015%	0.008%
40	0.025%	0.013%
45	0.045%	0.022%
50	0.090%	0.045%
55	0.155%	0.078%
60	0.255%	0.128%

Non-Duty Disability (Safety)

Current Assumption

Summary of Experience versus Current Assumptions (2006-2011)

Eligible Exposure	Actual Disabilities	Expected Disabilities	Actual to Expected Ratio
2,285	6	5.2	116.2%

- Members are eligible for non-duty disability retirement if they are permanently disabled after five years of service.
- Current assumptions are based on age, and are applied to those with at least five years of service.
- We combined experience from the current study period (2008-2011) with the prior period (2006-2008). Even so, the experience is still limited.
- The number of non-duty disabilities was close to the number expected during the most recent five-year period.

Recommendation

- We propose maintaining the current assumptions. Because of the paucity of the experience, we propose combining the experience of the current period with that of the next period (and possibly other '37 Act systems) to obtain a more robust sample from which to formulate future conclusions.

Safety Non-Duty Disability – Current Assumption

Age	Current
20	0.020%
25	0.030%
30	0.050%
35	0.070%
40	0.160%
45	0.260%
50	0.360%
55	0.460%
60	0.000%

Duty Disability (Miscellaneous)

Current Assumption

Summary of Experience versus Current Assumptions (2006-2011)

	Eligible Exposure	Actual Disabilities	Expected Disabilities	Actual to Expected Ratio
Males	4,135	4	11.5	34.9%
Females	6,379	2	17.7	11.3%
Combined	**10,514**	**6**	**29.2**	**20.6%**

- Members are eligible for duty disability retirement if they are permanently disabled in the line of duty; there is no service requirement
- Current assumptions are based on age.
- We combined experience from the current study period (2008-2011) with the prior period (2006-2008). Even so, the experience is still limited.
- The number of actual male and female duty-related disabilities was below the expected number in the most recent five-year period.

Recommendation

Summary of Experience versus Proposed Assumptions (2006-2011)

	Eligible Exposure	Actual Disabilities	Expected Disabilities	Actual to Expected Ratio
Males	4,135	4	5.7	69.7%
Females	6,379	2	8.8	22.6%
Combined	**10,514**	**6**	**14.6**	**41.2%**

- Due to the low number of duty disabilities, the current rates were reduced by 50% to produce new rates. These rates produce a lower overall number of expected disabilities.
- Because of the paucity of the experience, we propose combining the experience of the current period with that of the next period (and possibly other '37 Act systems) to obtain a more robust sample from which to formulate conclusions.

Miscellaneous Duty Disability – Current and Proposed Assumption

Age	Curent	Proposed
20	0.050%	0.025%
25	0.080%	0.040%
30	0.130%	0.065%
35	0.160%	0.080%
40	0.210%	0.105%
45	0.260%	0.130%
50	0.310%	0.155%
55	0.330%	0.165%
60	0.370%	0.185%

Duty Disability (Safety)

Current Assumption

Summary of Experience versus Current Assumptions (2006-2011)

Eligible Exposure	Actual Disabilities	Expected Disabilities	Actual to Expected Ratio
2,972	10	38.9	25.7%

- Members are eligible for duty disability retirement if they are permanently disabled in the line of duty; there is no service requirement
- Current assumptions are based on age.
- We combined experience from the current study period (2008-2011) with the prior period (2006-2008). Even so, the experience is still limited.
- The number of actual Safety duty-related disabilities was well below the expected number in the most recent five-year period.

Recommendation

Summary of Experience versus Proposed Assumptions (2006-2011)

Eligible Exposure	Actual Disabilities	Expected Disabilities	Actual to Expected Ratio
2,972	10	19.5	51.4%

- Due to the low number of duty disabilities, the current rates were reduced by 50% to produce new rates. These rates produce a lower overall number of expected disabilities.
- Because of the paucity of the experience, we propose combining the experience of the current period with that of the next period (and possibly other '37 Act systems) to obtain a more robust sample from which to formulate conclusions.

Miscellaneous Duty Disability – Current and Proposed Assumption

Age	Curent	Proposed
20	0.121%	0.061%
25	0.165%	0.082%
30	0.396%	0.198%
35	0.605%	0.302%
40	1.298%	0.649%
45	1.254%	0.627%
50	1.408%	0.704%
55	4.290%	2.145%
60	0.000%	0.000%

Longevity and Promotion Pay Increases

Pay 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. Only increases due to merit (promotion and longevity) are considered here; increases due to cost of living and non-inflationary base pay factors were addressed in the Economics section of this Report.

Current Assumption

Years of Service	Miscellaneous	Safety
0	5.00%	8.00%
1	4.00%	3.00%
2	3.00%	3.00%
3	2.00%	3.00%
4	1.00%	1.00%
5-9	0.50%	1.00%
10+	0.50%	0.75%

- In the charts A-5 and A-6 below, the average pay of the active members as of June 30, 2011 has been plotted against service.
- In addition, a line of best fit is applied to the average pay data, and this line is used to determine a pay increase due to merit.
- For both groups, the current rates do not include any increases after age 60.

Recommendation

Years of Service	Miscellaneous	Safety
0	5.00%	5.00%
1	4.00%	5.00%
2	3.00%	5.00%
3	2.00%	2.00%
4	1.00%	1.25%
5-9	0.50%	1.25%
10+	0.50%	1.25%

- As can be seen in Chart A-5, the current pattern of service-related longevity assumptions have done a reasonable job of predicting pay increases throughout a member's career.
- New Safety rates have been proposed with slight adjustments to the rates in the first five years of service, and a higher rate of increase after ten years. This adjustment to the current rates makes the assumptions line up more closely with actual experience.
- The proposed rates for Miscellaneous and Safety remove the assumption that no merit increases occur after age 60; increases at ages above 60 are assumed to follow the service-related patterns shown above.

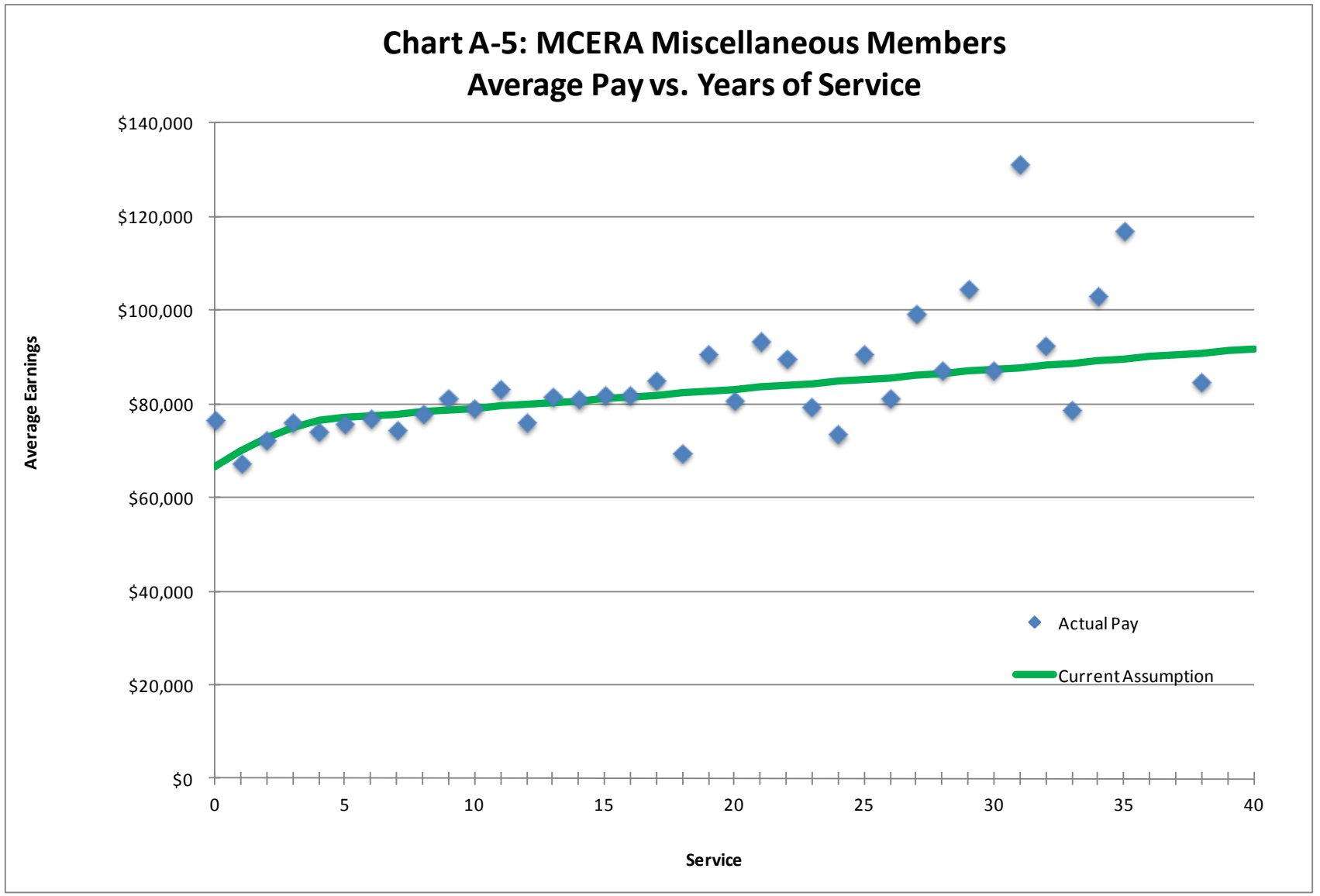
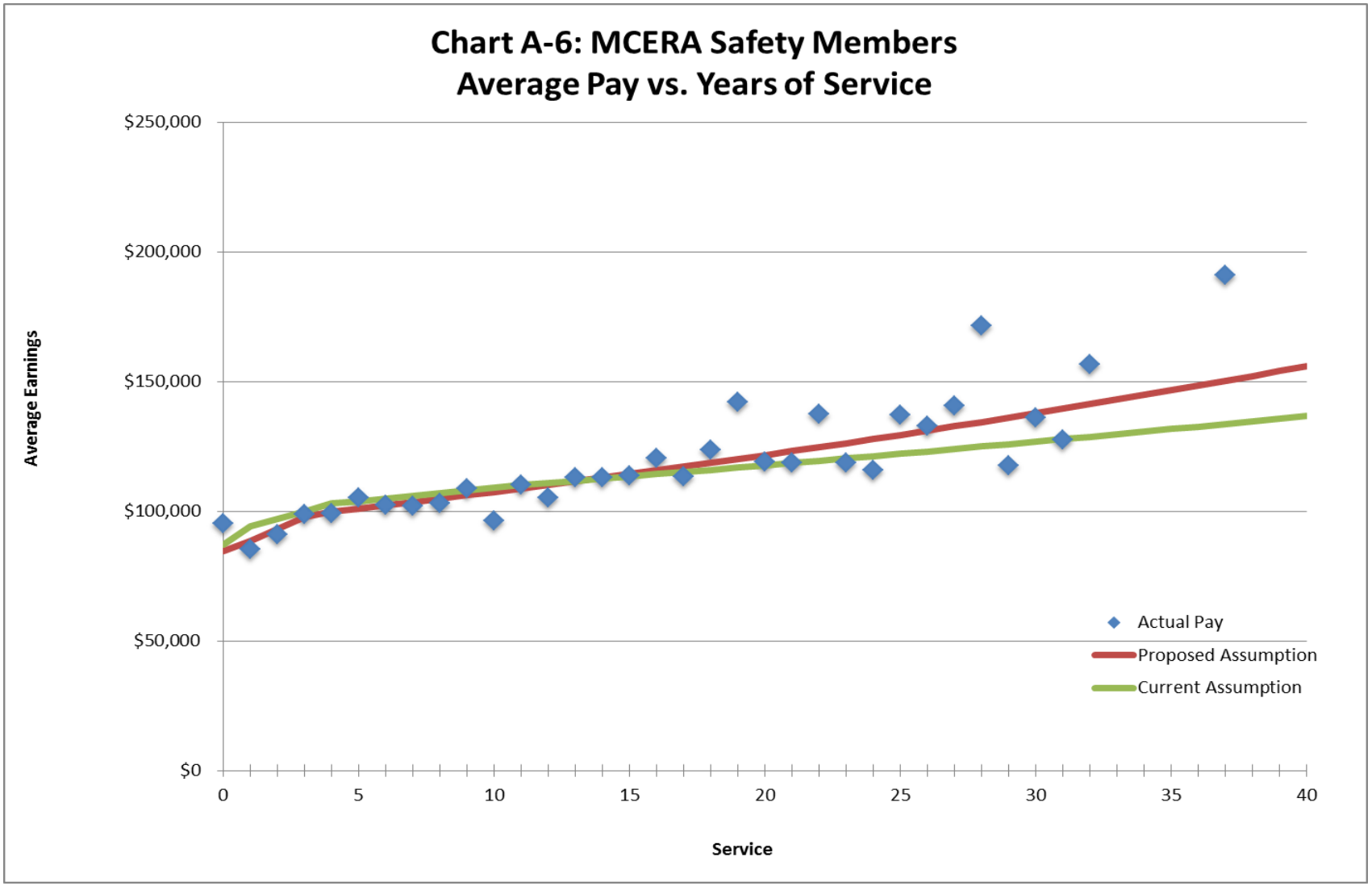


Chart A-5: MCERA Miscellaneous Members
Average Pay vs. Years of Service
Average Earnings
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$0
0
5
10
15
20
25
30
35
40
Service
Actual Pay
Current Assumption



In reviewing Chart A-6, we can see that the proposed assumptions do a better job anticipating the continued late-career pay increases that appear to be occurring among Safety members.

Other Demographic Assumptions and Methods

Terminal Pay/Service Load

- For some groups – particularly Novato – members have the opportunity to convert unused sick leave into service credit at retirement. If this service does not appear in the data until the member retires, it could be necessary to apply a load to the projected retirement benefits, so that the benefits associated with this service will be properly funded during the member's career.
- Similarly, if there are any pay amounts that are reflected in Member's retirement calculations, but are not included in the data provided to the Actuary, a load to the final compensation could be necessary.
- Currently, the following loads are applied to the projected benefits of the members to account for terminal pay and service amounts:

Group	Rate
Marin County	1.00%
Marin Courts	0.00%
Special Districts	0.00%
Novato	3.00%
San Rafael	2.20%

- We performed an analysis of the retirement calculations that occurred during the prior three years. As part of this analysis, we compared the final average pay and service in the actual benefit calculations to the expected final compensation and service based on the data from the valuation prior to the member's retirement.

Recommendation

- Although the data indicated that adjustments to the current terminal pay loads could be warranted, we recommend maintaining the current assumptions for now.
- MCERA is in the process of implementing a new benefits administration system (CPAS), which should provide additional compensation information, particularly with respect to pay amounts that are not easily identified in the current administration system, such as holiday pay for Safety officers.
- The data for some groups – particularly Novato and the Special Districts – was extremely limited, making it difficult to produce reliable assumptions.
- We will continue to monitor terminal service and pay experience and adjust this assumption as necessary. Modifications may also be necessary if there are any changes to the covered compensation policies, or if there are any changes to the policies that govern the accumulation or conversion of leave.

Actuarial Cost Method

- When EFI assumed the role of the actuarial consultant to the Plan, a change was implemented to the methodology used to compute the entry age normal cost. Under this methodology (known as Entry-Age-to-Decrement), the costs are completed as a level percentage of pay for each individual benefit type (retirement, disability, etc.), spread over the period of time during which the member is eligible for that benefit. Under the traditional approach (known as Entry-Age-to-Final-Decrement), costs are computed for all benefits as a whole, spread over the entire expected career length of the member.
- EFI's alternate methodology (known as Entry-Age-to-Decrement) remains an acceptable method for determining an actuarially sufficient funding contribution. However, the Government Accounting Standards Board has proposed changes to the pension accounting standards that will require the use of the traditional, career-length approach to Entry Age Normal liability calculations.
- Under Entry-Age-to-Final-Decrement, the normal cost for an individual should remain level throughout their career. However, even if all assumptions are met exactly, the funded ratio for each individual will fluctuate above and below 100% during their career.
- Under Entry-Age-to-Decrement funding, the normal cost for an individual will decline somewhat over time, as the member moves past eligibility for certain benefits, while the funded ratio will remain constant at 100% if all assumptions are met.
- For a plan with a relatively stable population, the *total* normal cost should remain fairly level if all assumptions are met. In the case of a closed plan (i.e. a plan without new hires), a gradual decline in the normal cost could be seen as desirable.
- Under Entry-Age-to-Decrement funding, a comparison of the normal cost between Tiers with different benefit levels may prove difficult: the Tier with the richer benefits may appear to have a lower normal cost if the population of this Tier is closer to retirement age on average.

Recommendation

- We recommend a change to the funding methodology for determining the actuarial cost of the Plan: using an individual normal cost calculation for each member and calculating the entry age on a full career basis (Entry-Age-to-Final-Decrement), rather than for each potential individual benefit.
- Although Entry-Age-to-Decrement remains an acceptable funding method, changing to the Final-Decrement approach will avoid the problem of having separate and distinct liability calculations for the Plan's funding requirements versus the accounting statements.
- The impact on current cost from changing methods is relatively minor, and the long-term impact should be negligible, since benefit payments and investment earnings will determine the ultimate contribution requirements.

Mortality

Current Assumptions

Summary of Experience versus Current Assumptions (2006-2011)

ACTIVE	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
General (M)	4,171	10	9.1	110.3%
General (F)	6,476	6	12.7	47.2%
Safety (M)	2,585	2	2.7	73.8%
Safety (F)	433	1	0.3	293.8%
Combined	**13,665**	**19**	**24.8**	**76.5%**

RETIRED & SURVIVING SPOUSES	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
General (M)	2,588	102	81.0	125.9%
General (F)	5,181	169	148.5	113.8%
Safety (M)	1,378	21	17.1	123.0%
Safety (F)	605	15	13.1	114.7%
Combined	**9,752**	**307**	**259.7**	**118.2%**

DISABLED	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
General (M)	269	5	9.5	52.6%
General (F)	98	1	3.4	29.7%
Safety (M)	382	7	13.2	52.9%
Safety (F)	113	0	3.0	0.0%
Combined	**862**	**13**	**29.1**	**44.6%**

- The current actuarial assumption is that members will experience mortality in accordance with the RP 2000 Combined Healthy Mortality Tables, projected to the year 2010 using Scale AA. An adjustment is made to the age of each member, either setting their age forward or backward, based on whether the member is anticipated to experience longer or shorter life expectancy versus the adjusted RP 2000 Tables. For example, using a two year set-back indicates a longer life expectancy than using unadjusted rates.
- The following table summarizes these adjustments:

	Table	Active Members	Retired Members and Survivors	Disabled Members
Males	RP 2000 Male	3 year set back	1 year set back	3 year set forward
Females	RP 2000 Female	3 year set back	2 year set back	3 year set forward

- All deaths among active Safety members are assumed to occur in the line of duty. All deaths among active Miscellaneous members are assumed to be non-duty-related. We recommend retaining this assumption.

Recommendation

- We propose continuing to use the same mortality assumptions, including the age adjustments described above.
- We generally prefer to have a positive margin between the actual number of deaths and the predicted number of deaths for two reasons:
  1. Overall mortality is expected to improve in future years.
  2. The RP2000 Tables were designed using benefit-weighted (rather than participant-weighted) data. This is because members with larger benefits tend to have lower mortality rates, at least at younger ages. Applying the tables on a participant basis, while accurately predicting the *number* of deaths, will tend to underestimate the liabilities.
- The current assumptions provide a reasonable margin between the number of actual deaths and the number expected, at least for the retired members, beneficiaries and disabled members. There were fewer deaths than expected among the active members, but the rates of death for active employees are quite low.
- The data does not indicate a significant difference in mortality rates between Miscellaneous and Safety members; the margin between the actual and expected deaths based on the current assumptions is similar between the two groups. Therefore, we suggest maintaining the practice of using the same mortality assumptions for both groups.
- We will continue to monitor mortality experience, and determine if further projections or adjustments may be needed in future years.

Methodology

Purposes of the Experience Study

The first goal of this Study is to recommend economic assumptions to be used in computing liabilities and costs. The 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 future expectations for the capital markets and CPI.

The second 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.

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.

Importance of Accurate 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 assumptions based on 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, but future expectations may differ from past experience.

Actuarial funding methods are designed so that, if the actuarial assumptions are met, plan costs will be as predictable as possible from year to year. If actual economic or demographic experience varies from that assumed, 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 Plans' investment strategy and expected rates of return on various asset classes, the long term *real* rate of return

on assets is projected. 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 projected rate of inflation is combined with a model of the COLA provisions to project future growth in retiree benefits.
- 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.

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.

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 due to the effects of inflation, collective bargaining, and management decisions during the term of the study.