**The Water and Power Employees'
Retirement Plan of the City of Los Angeles**

ACTUARIAL EXPERIENCE STUDY

**Analysis of Actuarial Experience During the
Period July 1, 2009 through June 30, 2012**

April 17, 2013

Board of Administration
The Water and Power Employees' Retirement Plan of the City of Los Angeles
111 North Hope Street, Room 357
Los Angeles, CA 90012

Re: Actuarial Experience Study for 2009 through 2012

Dear Members of the Board:

We are pleased to submit this report of our review of the actuarial experience of the Water and Power Employees' Retirement Plan for the period from July 1, 2009 through June 30, 2012. This study utilizes the census data from the last four actuarial valuations to analyze experience for the three-year period ending on June 30, 2012. It includes the proposed actuarial assumptions, both economic and demographic, for use in future actuarial valuations, beginning with the July 1, 2013 valuation.

We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.

We look forward to reviewing this report with you and answering any questions you may have.

Sincerely,

Paul Angelo, FSA, MAAA, FCA, EA
Senior Vice President and Actuary

John Monroe, ASA, MAAA, EA
Vice President and Associate Actuary

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I. INTRODUCTION, SUMMARY, AND RECOMMENDATIONS

To project the cost and liabilities of the Retirement Plan, assumptions are made about all future events that could affect the amount and timing of the benefits to be paid and the assets to be accumulated. Each year actual experience is compared against the projected experience, and to the extent there are differences, the future contribution requirement is adjusted.

If assumptions are modified, contribution requirements are adjusted to take into account a change in the projected experience in all future years. There is a great difference in both philosophy and cost impact between recognizing the actuarial deviations as they occur annually and changing the actuarial assumptions. Taking into account one year's gains or losses without making a change in the assumptions means that that year's experience was temporary and that, over the long run, experience will return to what was originally assumed. Changing assumptions reflects a basic change in thinking about the future, and it has a much greater effect on the current contribution requirements than recognizing gains or losses as they occur.

The use of realistic actuarial assumptions is important in maintaining adequate funding, while fulfilling benefit commitments to participants already retired and to those near retirement. The actuarial assumptions used do not determine the "actual cost" of the plan. The actual cost is determined by the benefits and administrative expenses paid out, offset by investment income received. However, it is desirable to estimate as closely as possible what the actual cost will be so as to permit an orderly method for setting aside contributions today to provide benefits in the future, and to maintain equity among generations of participants and taxpayers.

This study was undertaken in order to review the economic and demographic actuarial assumptions and to compare the actual experience with that expected under the current assumptions during the three-year experience period from July 1, 2009 through June 30, 2012. The study was performed in accordance with Actuarial Standard of Practice (ASOP) No. 27, "Selection of Economic Assumptions for Measuring Pension Obligations" and ASOP No. 35, "Selection of Demographic and Other Non-economic Assumptions for Measuring Pension Obligations". These Standards of Practice put forth guidelines for the selection of the various actuarial assumptions utilized in a pension plan actuarial valuation. Based on the study's results and expected near-term experience, we are recommending various changes in the current actuarial assumptions.

We are recommending changes in the assumptions for inflation, investment return, promotional and merit salary increases, retirement from active employment, pre-retirement mortality, healthy life mortality, disabled life mortality and turnover (vested and ordinary).

Our recommendations for the major actuarial assumption categories are as follows:

Ref: Pg. 7   **Inflation** – Future increases in the Consumer Price Index (CPI) which drives investment returns and active member salary increases, as well as cost-of-living adjustments (COLAs) to retired employees. ***Recommendation: Reduce the rate from 3.50% per annum to 3.25% per annum as discussed in Section III(A).***

Ref: Pg. 9   **Investment Return –** The estimated average future net rate of return on current and future assets of the Plan as of the valuation date. This rate is used to discount liabilities. ***Recommendation: Reduce the rate from 7.75% per annum to 7.50% per annum as shown in Section III(B). As the 7.50% recommendation would result in a significant decrease in the margin for adverse deviation under the risk-adjusted model used by Segal to evaluate this assumption, we are also making an alternative recommendation for a 7.25% assumption that is more consistent with the practice followed in the review of this assumption in the previous Actuarial Experience Study.***

Ref: Pg. 18   **Individual Salary Increases** – Increases in the salary of a member between the date of the valuation to the date of separation from active service. This assumption has three components:

> ➤ Inflationary salary increases,
> ➤ Real "across the board" salary increases, and
> ➤ Promotional and merit increases.

Recommendation: Reduce the current inflationary salary increase from 3.50% to 3.25%. Maintain the current real "across the board" salary increase assumption of 0.75%. In addition to the combined inflationary and real "across the board" salary increases of 4.00%, reduce the promotional and merit increase rates overall to those developed in Section III(C).

Ref: Pg. 22   **Retirement Rates** – The probability of retirement at each age at which participants are eligible to retire. ***Recommendation: For active members, adjust the current retirement rates to those developed in Section IV(A).***

Ref: Pg. 28   **Mortality Rates** – The probability of dying at each age. Mortality rates are used to project life expectancies. ***Recommendation: Change the current mortality table by decreasing mortality rates as developed in Section IV(B).***

Ref: Pg. 34 **Termination Rates** – The probability of leaving employment at each age and receiving either a refund of contributions or a deferred vested benefit.

Recommendation: Decrease the current male and female total termination rates to those developed in Section IV(C) and assume that 15% of future terminations for members with more than one year of service are ordinary withdrawals (i.e., refund of member contributions), while the remaining 85% are deferred vested terminations. For members with less than one year of service, assume 100% of terminations are ordinary withdrawals.

Ref: Pg. 39 **Disability Incidence Rates** – The probability of becoming disabled at each age.

Recommendation: Maintain the current rates as shown in Section IV(D).

Ref: Pg. 42 **Future Service Accruals** – The annual increase in service.

Recommendation: Maintain the assumed annual future service increase of 1.0 year as developed in Section IV(E). In addition, maintain the assumption for purchases of other government service at 0.15 years for each future year.

Ref: Pg. 43 **Expected Member Contributions** – Procedure used to estimate expected member contributions that are applied as an offset in determining the employer's contribution rate.

Recommendation: Determine expected member contributions on an individual basis for the year following the valuation date instead of on an aggregate basis reflecting an average rate for all future years, as described in Section V.

We have estimated the impact of proposed assumption changes as if they were applied to the July 1, 2012 actuarial valuation. If all of the proposed assumption changes (including the 7.50% investment return assumption) were implemented, the employer's required contributions would have increased by 8.5% of payroll (or $73 million). If the alternative recommendation for a 7.25% investment return assumption were to be adopted then the total increase would have been 13.5% of payroll (or $118 million). The estimated cost increase is mainly a result of the proposed change to the assumptions for investment return and mortality, offset to some extent by the proposed change to the salary increase assumption.

Section II provides some background on the basic principles and methodology used for the experience study and for the review of economic and demographic actuarial assumptions. A detailed discussion of each assumption and reasons for the proposed changes is found in Section III for the economic assumptions and Section IV for the demographic assumptions. Section V contains information on a proposed change to the method used to estimate the amount of expected member

contributions that are applied as an offset in the determination of the employer's contribution rate. The cost impact of the proposed changes is shown in Section VI.

Note that if these assumptions are adopted by the Board, the actuarial factors used for optional forms of payment, present value calculations, etc. should be reviewed for consistency with the investment return, mortality and other assumptions proposed in this report. This would ensure that the optional forms of payment, etc. are actuarially equivalent to the Full Retirement Allowance form of payment that is used in the determination of employer contribution rates. This work would be a separate project that is beyond the scope of this experience study.

II. BACKGROUND AND METHODOLOGY

In this report, we analyzed both economic and demographic ("non-economic") assumptions. The primary economic assumptions reviewed are inflation, investment return, and salary increases. Demographic assumptions include the probabilities of certain events occurring in the population of members, referred to as "decrements," e.g., termination from service, disability incidence, service retirement, and death after retirement. In addition to decrements, other demographic assumptions reviewed in this study include the percentage of members with an eligible spouse or domestic partner, the spousal age difference, and the assumption used to anticipate future service accruals including the purchase of other government service by active members.

Economic Assumptions

Economic assumptions consist of:

Inflation – Increases in the price of goods and services. The inflation assumption reflects the basic return that investors expect from securities markets. It also reflects the expected basic salary increase for active employees and drives increases in the allowances of retired members.

Investment Return – Expected long term rate of return on the Plan's investments after expenses. This assumption has a significant impact on contribution rates.

Salary Increases – In addition to inflationary increases, it is assumed that salaries will also grow by any real "across the board" pay increases in excess of price inflation. It is also assumed that employees will receive raises above these average increases as they advance in their careers. These are commonly referred to as promotional and merit increases.

The setting of these economic assumptions is described in Section III.

Demographic Assumptions

In order to determine the probability of an event occurring, we examine the "decrements" and "exposures" of that event. For example, taking termination from service, we compare the number of employees who actually terminate in a certain age and/or service category (i.e., the number of "decrements") with those "who could have terminated" (i.e., the number of "exposures"). For example, if there were 500 active employees in the 20-24 age group at the beginning of the year and 50 of them terminate during the year, we would say the probability of termination in that age group is $50 \div 500$ or 10%.

The reliability of the resulting probability is highly dependent on both the number of decrements and the number of exposures. For example, if there are only a few people in a high age category at the beginning of the year (number of exposures), we would not lend as much credence to the probability of termination developed for that age category, especially if it is out of line with the pattern shown for the other age groups. Similarly, if we are considering the death decrement, there may be a large number of exposures in, say, the age 20-24 category, but very few decrements (actual deaths); therefore, we would not be able to rely heavily on the probability developed for that category.

One reason we use several years of experience for such a study is to have more exposures and decrements, and therefore more statistical reliability. Another reason for using several years of data is to smooth out fluctuations that may occur from one year to the next. However, we also calculate the rates on a year-to-year basis to check for any trend that may be developing in the later years.

III. ECONOMIC ASSUMPTIONS

A.   INFLATION

Unless an investment grows at least as fast as prices increase, investors will experience a reduction in the inflation-adjusted value of their investment. There may be times when "riskless" investments return more or less than inflation, but over the long term, investment market forces will generally require an issuer of fixed-income securities to maintain a minimum return which protects investors from inflation.

The inflation assumption is long term in nature, so it is set using primarily historical information. Following is an analysis of 15- and 30-year moving averages of historical inflation rates:

Historical Consumer Price Index – 1930 to 2012
(U.S. City Average – All Urban Consumers)

	25th Percentile	Median	75th Percentile
15-year moving averages	2.6%	3.4%	4.8%
30-year moving averages	3.2%	4.2%	4.9%

The average inflation rates have continued to decline gradually over the last several years due to the relatively low inflationary period over the past two decades. Also, the later of the 15-year averages during the period are lower as they do not include the high inflation years of the mid-1970s and early-1980s.

In the 2011 public fund survey published by the National Association of State Retirement Administrators, the median inflation assumption used by 126 large public retirement funds in their 2010 valuations has decreased to 3.25% from the 3.50% used in the 2009 valuations. In California, CalPERS and LACERA have recently reduced their inflation assumptions to 2.75% and 3.00%, respectively.

LADWP's investment consultant, Pension Consulting Alliance (PCA), anticipates an annual inflation rate of 3.0%, while the average inflation assumption provided by PCA and by eight other investment advisory firms retained by Segal's California public sector retirement system clients was 2.62%. Note that, in general, the investment consultants' time horizon for this assumption is shorter than the time horizon we use for the actuarial valuation.

To find a forecast of inflation based on a longer time horizon, we referred to the 2012 report on the financial status of the Social Security program. The projected average increase in the Consumer Price Index (CPI) over the next 75 years under the intermediate cost assumptions used in that report was 2.8%. We also compared the yields on the thirty-year inflation indexed U. S. Treasury bonds to comparable traditional U. S. Treasury bonds. As of March 2013, the difference in yields is 2.5%, which provides a measure of market expectations of inflation.

Based on all of the above information, we recommend that the current annual inflation assumption of 3.50% be reduced to 3.25% for the July 1, 2013 valuation.

We are also recommending that we maintain the assumption used to value the post-retirement COLA benefit. The current and proposed COLA assumptions are shown below:

Maximum COLA	Current Assumption	Proposed Assumption
3.00%	3.00%	3.00%

Note that in developing these COLA assumptions we also considered the results of a stochastic approach that would attempt to account for the possible impact of low inflation that could occur before COLA banks are able to be established for the member. Although the results of this type of analysis might justify the use of a lower COLA assumption we are not recommending that at this time. The reasons for this conclusion include the following:

> The results of the stochastic modeling are significantly dependent on assuming that lower levels of inflation will persist in the early years of the projections. If this is not assumed, then the stochastic modeling will produce results similar to our proposed COLA assumptions.

> Using a lower long-term COLA assumption based on a stochastic analysis would mean that an actuarial loss would occur even when the inflation assumption of 3.25% is met in a year. We question the reasonableness of this result.

We do not see the stochastic possibility of COLAs averaging less than those predicted by the assumed rate of inflation as a reliable source of cost savings that should be anticipated in our COLA assumptions. Therefore, we continue to recommend setting the COLA assumptions based on the long-term annual inflation assumption, as we have in prior years.

B.   INVESTMENT RETURN

The investment return assumption is comprised of two primary components: inflation and real rate of return, with adjustments for expenses and risk.

Real Rate of Investment Return

This component represents the portfolio's incremental investment market returns over inflation. Theory has it that, as an investor takes a greater investment risk, the return on the investment is expected to also be greater, at least in the long run. This additional return is expected to vary by asset class and empirical data supports that expectation. For that reason, the real rate of return assumptions are developed by asset class. Therefore, the real rate of return assumption for a retirement plan's portfolio will vary with the Board's asset allocation among asset classes.

The next page shows the Plan's recent target asset allocation and the assumed real rate of return assumptions by asset class. The column of returns (except for Real Return, Private Equity, and Covered Calls) represents the average of a broader sample of real rate of return assumptions. The sample includes the expected annual real rate of returns provided to us by PCA and by eight other investment advisory firms retained by Segal's public clients. We believe these assumptions reasonably reflect a consensus forecast of future market returns. Note that the PCA assumption is used for WPERP's Real Return, Private Equity and Covered Calls asset classes.

Current Target Asset Allocation and Assumed Arithmetic Real Rate of Return Assumptions by Asset Class and for the Portfolio

Asset Class	Percentage of Portfolio	Average Real Rate of Return from a Sample of Consultants to Segal's Public Sector Clients[1]
Domestic Equity	33.0%	6.13%
Developed International Equity	21.0%	7.00%
Fixed Income	24.0%	0.77%
Real Estate	5.0%	4.90%
Real Return	6.0%	2.85%[2]
Private Equity	5.0%	9.00%[2]
Covered Calls	5.0%	4.88%[2]
Cash and Cash Equivalents	1.0%	0.00%
Total	100.0%	4.79%[3]

[1] These are based on the projected arithmetic returns provided by the investment advisory firms serving the WPERP, the county retirement systems of Alameda, Contra Costa, Fresno, Orange, Sonoma, Mendocino, the LA City Employees' Retirement System and the LA Fire & Police Pensions.

[2] PCA's assumptions are used for these classes to more closely reflect the underlying investments made specifically for the LADWP Retirement Plan.

[3] The real rate of return assumptions utilized by PCA produce a 4.13% weighted average real rate of return for the portfolio.

Please note that the above are representative of "indexed" returns and do not include any additional returns ("alpha") from active management. This is consistent with the Actuarial Standard of Practice No. 27, Section 3.6.3.e, which states:

> "Investment Manager Performance – Anticipating superior (or inferior) investment manager performance may be unduly optimistic (pessimistic). Few investment managers consistently achieve significant above-market returns net of expenses over long periods."

The following are some observations about the returns provided above:

1. The investment consultants to our California public sector clients have each provided us with their expected real rates of return for each asset class, over various future periods of time. However, in general, the returns available from investment consultants are projected over time periods shorter than the durations of a retirement plan's liabilities.

2. The investment return assumptions utilized by PCA are lower than the average assumptions utilized by the investment consultants to Segal's public clients in the sample.

3. Using an average of expected real rates of return allows the Plan's investment return assumption to reflect a broader range of capital market information and should help produce a more stable investment return assumption.

4. Therefore, we recommend that the 4.79% portfolio real rate of return be used to determine the Plan's investment return assumption. This is 0.65% lower than the return calculated three years ago. The difference is mainly due to changes in the real rate of return assumptions provided to us by the investment advisory firms.

Plan Expenses

The real rate of return assumption for the portfolio needs to be adjusted for investment expenses to be paid from investment income. The following table provides these expenses in relation to the market value of assets for the five years ending June 30, 2012.

**Investment Expenses as a Percentage
of Market Value of Assets (All dollars in 000's)**

Year Ending June 30	Average Market Value of Assets	Total Investment Expenses	Total %
2012	$7,400,794	$17,042	0.23%
2011	6,243,387	14,621	0.23%
2010	5,644,984	17,063	0.30%
2009	6,842,993	14,518	0.21%
2008	7,333,400	19,352	0.26%
Average			0.25%

The experience shows that the average expense during the past five years was 0.25%. Based on this experience, we believe a future expense assumption of 0.25% is reasonable. Note that in prior years, the administrative expenses were also included in this determination. However, since the Department

makes contributions that specifically reimburse the administrative expenses, we believe it is appropriate to exclude administrative expenses in this determination.

Risk Adjustment

The real rate of return assumption for the portfolio generally is adjusted to reflect the potential risk of shortfalls in the return assumptions. The Plan's asset allocation also determines this portfolio risk, since risk levels are driven by this variability of returns for the various asset classes and the correlation of returns among those asset classes. This portfolio risk is incorporated into the real rate of return assumption through a risk adjustment.

The purpose of the risk adjustment (as measured by the corresponding confidence level) is to increase the likelihood of achieving the actuarial investment return assumption in the long term.[1] The 4.79% expected real rate of return developed earlier in this report was based on expected mean or average arithmetic returns. This means there is a 50% chance of the actual return in each year being at least as great as the average (assuming a symmetrical distribution of future returns). The risk adjustment is intended to increase that probability. This is consistent with our experience that retirement plan fiduciaries would generally prefer that returns exceed the assumed rate more often than not.

Three years ago, the Board adopted an investment return assumption of 7.75%. In combination with the inflation, real return and expense components from three years ago, that return implied a risk adjustment of 0.89%, reflecting a confidence level of 61% that the actual average return over 15 years would not fall below the assumed return assuming that the distribution of returns over that period follows the Normal statistical distribution.[2]

In our model, the confidence level associated with a particular risk adjustment represents the likelihood that the Plan's actual mean return would equal or exceed the assumed value over a 15-year period. For example, if we set our real rate of return assumption using a risk adjustment that produces a confidence level of 60%, then there is a 60% chance (3 out of 5) that the average return over 15 years will be equal to or greater than the assumed value. The 15-year time horizon represents an approximation of the

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[1] This type of risk adjustment is sometimes referred to as a "margin for adverse deviation."

[2] Based on an annual portfolio return standard deviation of 12.2% provided by PCA in 2011. Strictly speaking, future compounded long-term investment returns will tend to follow a log-normal distribution. However, we believe the Normal distribution assumption is reasonable for purposes of setting the risk adjustment.

"duration" of the Plan's liabilities, where the duration of a liability represents the sensitivity of that liability to interest rate variations.

If we were to use the same 61% confidence level from the return assumption adopted for the July 1, 2010 valuation to set this year's risk adjustment, based on the current long-term portfolio standard deviation of 12.4% provided by PCA, the corresponding risk adjustment would be 0.90%. Together with the other investment return components, this would result in a preliminary investment return assumption of 6.89%, which is substantially lower than the current assumption of 7.75%.

Because this would be such a substantial change in this long-term assumption, we evaluated the effect on the confidence level of alternative investment return assumptions. In particular, a net investment return assumption of 7.25%, together with the other investment return components, would produce a risk adjustment of 0.54%, which corresponds to a confidence level of 56%. However, because there is no "correct" confidence level and because we believe that the use and the level of a risk adjustment are matters for the Board to evaluate and decide, we are also making a recommendation for a 7.50% assumption. A net investment return assumption of 7.50%, together with the other investment return components, would produce a risk adjustment of 0.29% which corresponds to a confidence level of 53%.

As we have discussed in prior years, the risk adjustment model and associated confidence level is most useful as a means for comparing how the System has positioned itself over periods of time[3]. The use of either a 53% or a 56% confidence level should be considered in context with other factors, including:

1. As noted above, the confidence level as developed in the Segal model is more of a relative measure than an absolute measure, and so can be reevaluated and reset for future comparisons.

2. The confidence level is based on the standard deviation of the portfolio that is determined and provided to us by PCA. The standard deviation is a statistical measure of the future volatility of the portfolio and so is itself based on assumptions about future portfolio volatility and can be considered somewhat of a "soft" number.

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[3] In particular, it would not be appropriate to use this type of risk adjustment as a measure of determining an investment return rate that is "risk-free."

3. A lower level of inflation should reduce the overall risk of failing to meet the investment return assumption. Lowering the confidence level to some extent could be justified as consistent with the change in the inflation assumption.

4. A confidence level of 53% (which is associated with a 7.50% investment return assumption) is at the low end of the range of about 50% to 60% that corresponds to the risk adjustments used by most of Segal's other California public retirement system clients. Most public retirement systems that have recently reviewed their investment return assumptions have considered adopting more conservative investment return assumptions for their valuations, mainly to maintain the likelihood that future actual market return will meet or exceed the investment return assumption. While this may provide argument for a confidence level of 56% (which is associated with a 7.25% investment return assumption), we would also note that a 0.50% reduction in the investment return assumption is a significant reduction in a long-term assumption.

5. As with any model, the results of the risk adjustment model should be evaluated for reasonableness and consistency. This is discussed in the following "Test of Risk Adjustment" section, including (1) a discussion of the relationship between the inflation assumption and the risk adjustment and (2) a comparison with assumptions adopted by similarly situated public sector retirement systems.

Taking into account the factors above, our recommendation is to reduce the net investment return assumption from 7.75% to 7.50%. As noted above, this return implies a risk adjustment of 0.29%, reflecting a confidence level of 53% that the actual average return over 15 years would not fall below the assumed return. As that confidence level is significantly below the 61% used in the last study, the Board should also consider our alternative recommendation of 7.25% with its associated confidence level of 56%, which is more consistent with the Board's prior practice.

Recommended Investment Return Assumption

The following table summarizes the components of the net investment return assumption developed in previous discussion. For comparison purposes, we have also included similar values from the last study.

Calculation of Investment Return Assumption

Assumption Component	Recommended Value	Alternative Recommendation	July 1, 2010 Adopted Value
Inflation	3.25%	3.25%	3.50%
Plus Portfolio Real Rate of Return	4.79%	4.79%	5.44%
Minus Expense Adjustment	(0.25%)	(0.25%)	(0.30%)
Minus Risk Adjustment	(0.29%)	(0.54%)	(0.89%)
Total	7.50%	7.25%	7.75%
Confidence level	53%	56%	61%

Based on this calculation, we recommend that the investment return assumption be decreased from 7.75% to 7.50% per annum with an alternative recommendation for a 7.25% assumption should the Board decide to maintain the confidence level associated with this assumption at a level more consistent with the prior practice.

Test of Risk Adjustment

The original development of the risk adjustment component of our investment earnings assumption model arose from our experience with many retirement boards over many years. Quite simply, combining the boards' inflation assumption with the real return and expense components produced – and produces – a substantially higher assumed return than what the boards actually adopt, regardless of the consulting actuary or the methods involved in the process. This led to the development of a risk adjustment component for our model.

There is a range of risk adjustment methodologies that may be incorporated in the development of an earnings assumption. Ideally, the particular risk adjustment selected should reflect the "downside" risk tolerance of the boards making the decision. This is similar to the volatility risk that boards consider when selecting an appropriate asset allocation.

In addition to the generally risk adverse attitude of retirement boards noted above, we believe another reason for this involves the inflation assumption. As noted earlier, the inflation assumption for actuarial valuations is generally longer term than that used by investment consultants. For many years, that has led to higher actuarial valuation inflation assumptions. A higher inflation assumption has a conservative effect - higher current cost - on the wage increase and COLA assumption, but is <u>less</u>

conservative as part of the investment earnings assumption. In effect, the risk adjustment compensates for this by offsetting the effect of the higher inflation assumption on assumed investment earnings.

One way to test the reasonableness of the risk adjustment incorporated in our recommendation is to compare our risk-adjusted investment return (i.e., 7.50%) against the expected net investment return that would result from using the average of all the capital market assumptions -- including the lower inflation assumption -- of the investment consultants in our sample.

The following table shows that comparison. This table shows how the difference between our recommended return and that derived using the average of all the capital market assumptions of the investment consultants in our sample can be attributed to the relationship between the two different inflation assumptions and the risk adjustment.

Assumption Element:	Risk-Adjusted Method	Average of Investment Consultant Sample	Difference
Inflation	3.25%	2.62%	0.63%
Risk Adjustment	(0.29%)	0.00%	(0.29%)
Real Rate of Return	4.79%	4.79%	0.00%
Expenses	(0.25%)	(0.25%)	0.00%
Total	7.50%	7.16%	0.34%

The 0.34% (34 basis points) difference between the two calculations represents about a 4% lower confidence level under the higher inflation, risk-adjusted method, as compared to the lower inflation result without the risk adjustment. This indicates that the risk adjustment is not providing a significant offset to the effect of the higher inflation assumption on assumed investment earnings.

Comparing with Other Public Retirement Systems

One final test of the recommended investment return assumption is to compare it against those used by other public retirement systems, both in California and nationwide.

We note that this 7.50% investment return assumption is emerging as a common assumption among those California public sector retirement systems that have studied this assumption recently. In particular two of the largest California systems, CalPERS and LACERA, recently adopted a 7.50%

earnings assumption[4]. Note that CalPERS uses a lower inflation assumption of 2.75% while LACERA uses an inflation assumption of 3.00%.

The following table compares the WPERP's recommended net investment return assumption against those of the nationwide public retirement systems that participated in the National Association of State Retirement Administrators (NASRA) 2011 Public Fund Survey:

Assumption	LADWP	NASRA 2011 Public Fund Survey		
		Low	Median	High
Net Investment Return	7.50%	7.00%	8.00%	8.50%

The detailed survey results show that of the systems that have an investment return assumption in the range of 7.50% to 7.90%, over a third of those systems have used an assumption of 7.50%. The survey also notes that several plans have reduced their investment return assumption during the last year, and others are considering doing so. State systems outside of California tend to change their economic assumptions less frequently and so may lag behind emerging practices in this area.

While the recommended assumption of 7.50% provides for a significantly lower confidence level within the risk adjustment model, it is consistent with the System's current practice relative to other public systems.

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[4] The approach adopted by LACERA was to phase in the reduction from their then current 7.75% assumption to their 7.50% assumption over a three-year period.

C.   SALARY INCREASE

Salary increases impact plan costs by increasing the members' benefits (since benefits are a function of the members' highest average pay) and future normal cost collections. The components of the assumption are discussed below.

As an employee progresses through his or her career, increases in pay are expected to come from three sources:

1.   Inflation – Unless pay grows at least as fast as consumer prices grow, employees will experience a reduction in their standard of living. There may be times when pay increases lag or exceed inflation, but over the long term, labor market forces will require an employer to maintain its employees' standards of living.

   As discussed earlier in this report, we are recommending that the assumed rate of inflation be reduced from 3.50% to 3.25%. This inflation component is used as part of the salary increase assumption.

2.   Real "Across the Board" Pay Increases – These increases are sometimes termed "productivity" increases since they are considered to be derived from the ability of an organization or an economy to produce goods and services in a more efficient manner. As that occurs, at least some portion of the value of these improvements can provide a source for pay increases. These increases are typically assumed to extend to all employees "across the board". The State and Local Government Workers Employment Cost Index produced by the Department of Labor provides evidence that real "across the board" pay increases have averaged about 0.5% - 0.75% annually during the last ten to twenty years.

   We also referred to the annual report on the financial status of the Social Security program published in April 2012. In that report, real "across the board" pay increases are forecast to be 1.1% per year under the intermediate assumptions.

   The real pay increase assumption is generally considered a more "macroeconomic" assumption. However, we note that the actual average inflation plus "across the board" increase (i.e., wage inflation) over the three year experience period was 2.95%. This is about 1% higher than the actual price inflation during this three-year period.

Considering these factors, we recommend maintaining the real "across the board" salary increase assumption of 0.75% so that the combined inflation and "across the board" salary increase assumption decreases from 4.25% to 4.00%.

3.   Promotional and Merit Increases – As the name implies, these increases come from an employee's career advances. This form of pay increase differs from the previous two, since it is specific to the individual. For the Retirement Plan, the assumption is structured as a function of an employee's years of service.

The annual promotional and merit increases are determined by measuring the actual increases received by members over the experience period, net of the inflationary and real "across the board" pay increases. This is accomplished by:

> ➤ Measuring each continuing member's actual salary increase over each year of the experience period;

> ➤ Excluding any members with increases of more than 30% or decreases of more than 10% during any particular year.

> ➤ Categorizing these increases according to member demographics;

> ➤ Removing the wage inflation component from these increases (assumed to be equal to the increase in the members' average salary during the year);

> ➤ Averaging these annual increases over the three-year experience period; and

> ➤ Modifying current assumptions to reflect some portion of these measured increases reflective of their "credibility".

The following table compares the actual average promotional and merit increases by years of service with the current assumptions and our proposed assumptions. The table is based on the three-year experience period from July 1, 2009 through June 30, 2012. The actual increases were reduced by the actual inflation plus real "across the board" increases (i.e., wage inflation) for each year over the three-year expense period (2.95% on average).

Promotional and Merit Increases

Years of Service	Current Assumptions	Actual Average Increase	Proposed Assumptions
Less than 1	6.25%	5.37%	6.00%
1	5.25	6.37	5.50
2	4.75	6.16	5.00
3	3.50	4.76	4.00
4	2.00	2.56	2.50
5	1.10	1.97	1.50
6	1.10	1.05	1.10
7	1.10	0.76	1.00
8	1.10	0.62	0.90
9	1.10	0.82	0.80
10 & over	1.10	0.02	0.75

The proposed promotional and merit assumptions are higher than the current assumptions for members with more than one year of service and less than six years of service, and lower for the other service categories.

Chart 1 provides a graphical comparison of the actual promotional and merit increases, compared to current and proposed assumptions.

Chart 1
Promotional and Merit Salary Increase Rates

Years of Service

- Current
- Actual
- Proposed
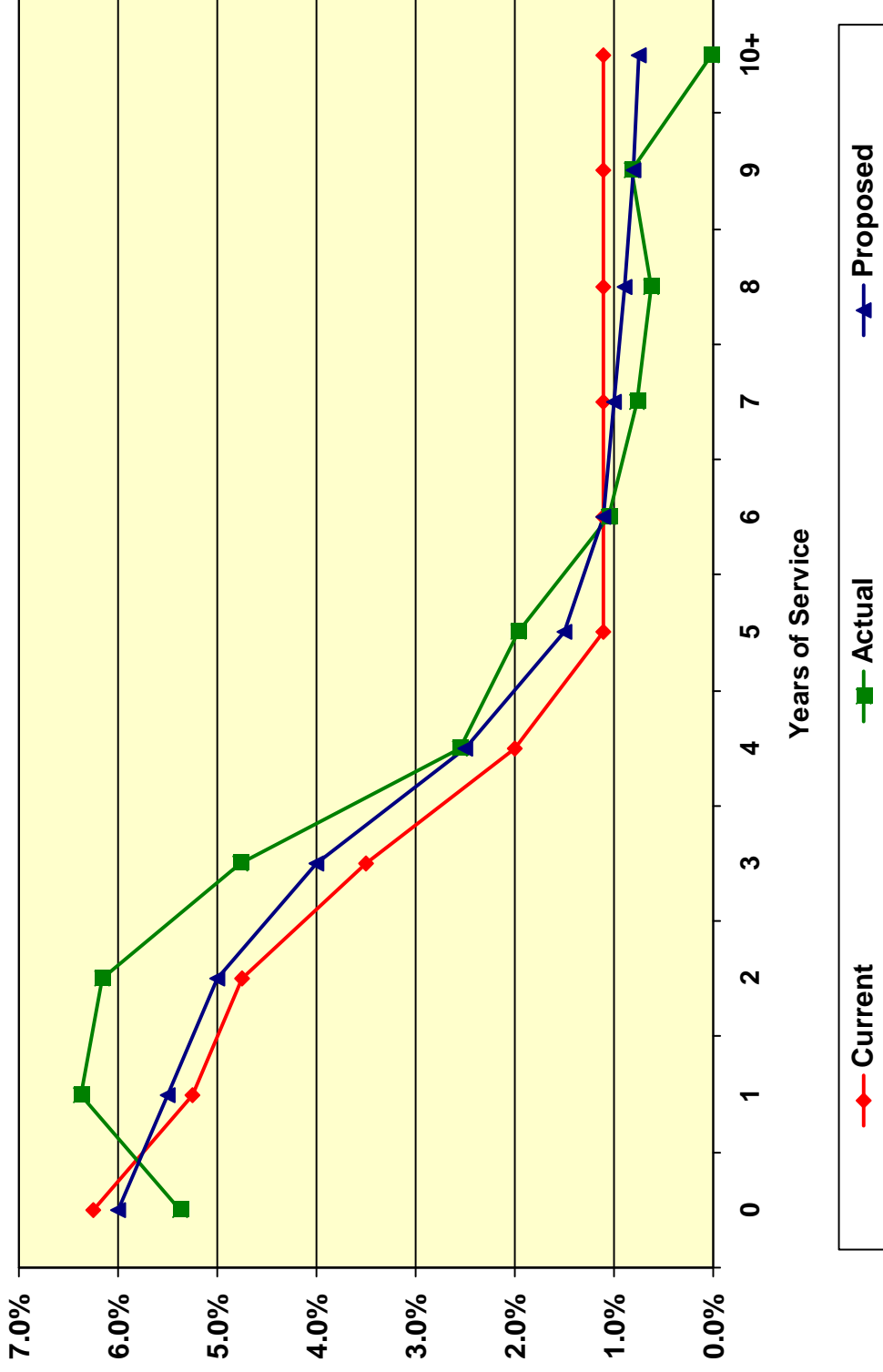
IV. DEMOGRAPHIC ASSUMPTIONS

A. RETIREMENT RATES

The age at which a member retires will affect both the amount of the benefits that will be paid to that member as well as the period over which funding must take place.

Based on the distinct retirement patterns for members with 30 or more years of service at retirement compared to those with under 30 years, we continue to recommend separate retirement rates for these groups of members. The tables below show the observed service (non-disability) retirement rates for members with under 30 years of service at retirement over the last three years, followed by rates for members with 30 or more years. The observed service retirement rates were determined by comparing those members who actually retired from service to those eligible to retire from service. This same methodology is followed throughout this report and was described in Section II. Also shown are the current rates assumed and the rates we propose:

Members with under 30 years of service at retirement:

Age	Current Rate of Retirement	Actual Rate of Retirement	Proposed Rate of Retirement
55	4.00%	5.51%	5.00%
56	3.00	3.29	3.00
57	3.00	3.21	3.00
58	3.00	3.39	3.00
59	4.00	2.85	3.00
60	5.00	5.23	5.00
61	5.00	6.06	6.00
62	5.00	6.77	6.00
63	5.00	7.21	6.00
64	5.00	9.60	7.00
65	15.00	11.28	12.00
66	15.00	12.15	12.00
67	15.00	10.87	12.00
68	15.00	12.99	12.00
69	15.00	15.38	15.00
70	100.00	11.76	30.00
71	100.00	9.09	30.00
72	100.00	8.33	30.00
73	100.00	15.79	30.00
74	100.00	5.26	30.00
75 & over	100.00	22.22	100.00

As shown above, we recommend increasing the age at which 100% retirement is assumed from age 70 to 75. Overall, we are recommending decreases in the retirement rates for members with under 30 years of service at retirement.

Chart 2 that follows later in this Section provides a graphical comparison of the actual experience with current and proposed rates of retirement for members with under 30 years of service at retirement.

The table below shows the observed service retirement rates for members with 30 or more years at retirement over the last three years. Also shown are the current rates assumed and the rates we propose:

Members with 30 or more years of service at retirement:

Age	Current Assumed Rate of Retirement	Actual Rate of Retirement	Proposed Assumed Rate of Retirement
50	0.00%	0.00%	0.00%
51	0.00	1.94	0.00
52	0.00	2.21	0.00
53	0.00	0.54	0.00
54	0.00	0.00	0.00
55	25.00	27.68	25.00
56	15.00	19.85	18.00
57	12.50	16.81	15.00
58	12.50	17.67	15.00
59	12.50	18.92	15.00
60	20.00	21.15	20.00
61	10.00	16.27	15.00
62	10.00	24.03	15.00
63	25.00	23.20	25.00
64	20.00	21.28	20.00
65	25.00	26.32	25.00
66	25.00	18.87	25.00
67	25.00	18.37	25.00
68	25.00	28.57	25.00
69	25.00	7.14	25.00
70	100.00	29.41	30.00
71	100.00	5.88	30.00
72	100.00	18.75	30.00
73	100.00	20.00	30.00
74	100.00	14.29	30.00
75 & Over	100.00	20.00	100.00

Based on the above experience, we are recommending slight increases in some of those rates for members between the ages of 55 and 62. We also recommend increasing the age at which 100% retirement is assumed from age 70 to 75. Overall, these recommendations result in a slight decrease in assumed retirements for members with 30 or more years of service at retirement.

Chart 3 provides a graphical comparison of the actual experience with current and proposed rates of retirements for members with 30 or more years of service at retirement.

In prior valuations, current inactive vested members were assumed to receive a deferred annuity at age 60. The average age at retirement over the prior three years was 60.5. We recommend maintaining the assumed retirement age for inactive vested members. We also recommend maintaining the assumption that current inactive vested members will only receive a deferred annuity at age 60 whose value is equal to the employee contribution account plus the Department matching contribution account, since very few inactive vested members will be eligible for the Formula pension. In addition, we will continue to assume that members receiving Permanent Total Disability will retire at the earlier of age 60 or age 55 with 30 years of service and receive the Formula pension.

In prior valuations, it was assumed that 85% of active male members and 60% of active female members would have an eligible spouse or domestic partner when they retired. Due to limited data being available regarding eligible spouses or domestic partners at retirement, we recommend maintaining the assumptions for this study. However, we understand the necessary information is being tracked in the new pension system used by the Retirement Office and we will review this assumption again in three years using that data. Also, we recommend applying this assumption to current service retirees with Options A, B, C, F to estimate whether there is a 50% continuance to the eligible spouse or domestic partner.

Since the value of the survivor's benefit is dependent on the survivor's age and sex, we must also have assumptions for the age and sex of the survivor. Based on the experience during the three-year period and studies done for other retirement systems, we believe that it is reasonable to continue to assume a three year age difference for the survivor's age as compared to the member's age. The recommended assumption for the age of the survivor is shown below.

| | Survivor's Age as Compared to Member's Age |
Beneficiary Sex	Recommended Assumption
Male	3 years older
Female	3 years younger

Since the majority of survivors are of the opposite sex, we will continue to assume that the survivor's sex is the opposite of the member. These assumptions will continue to be monitored in future experience studies.

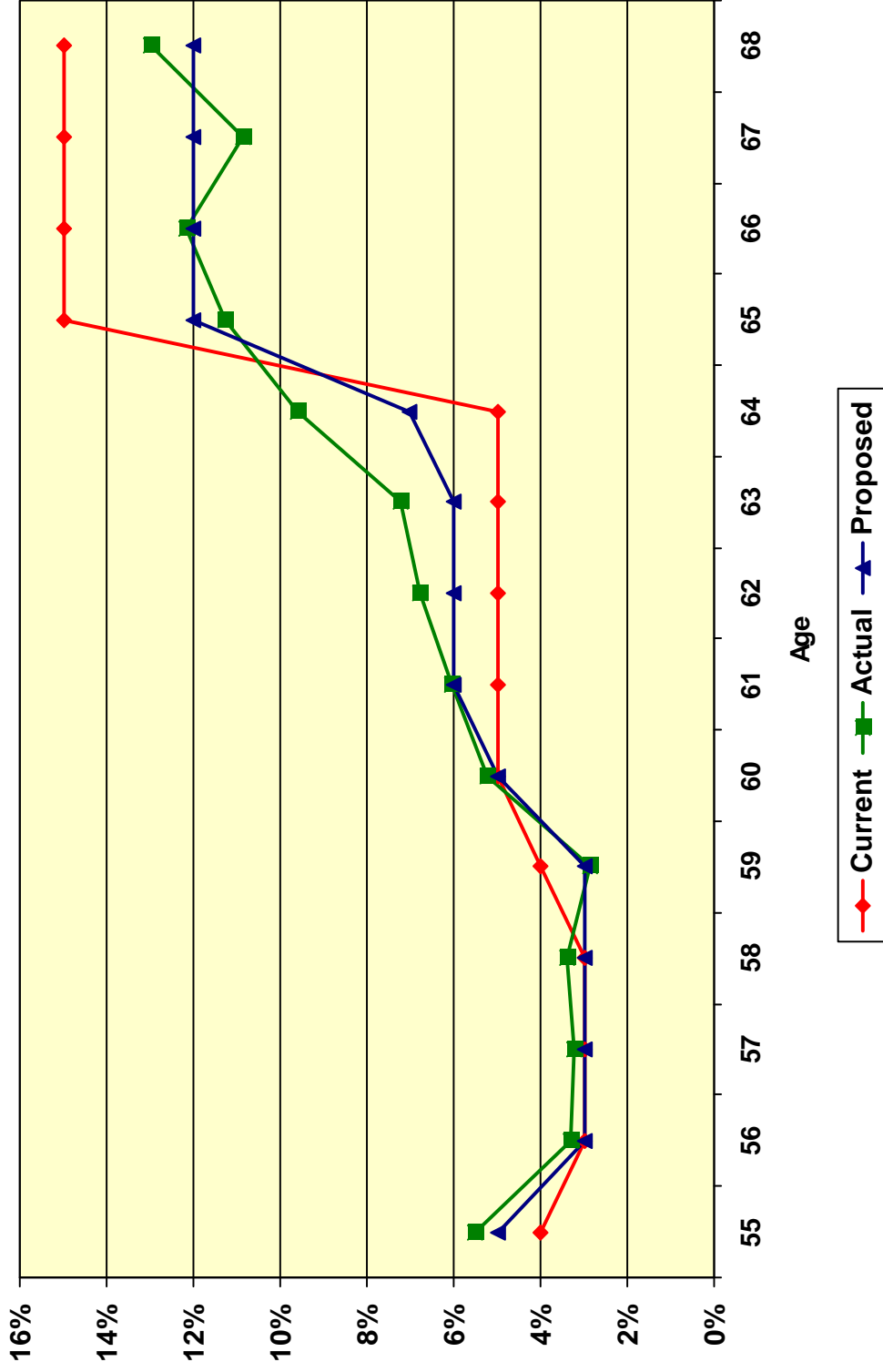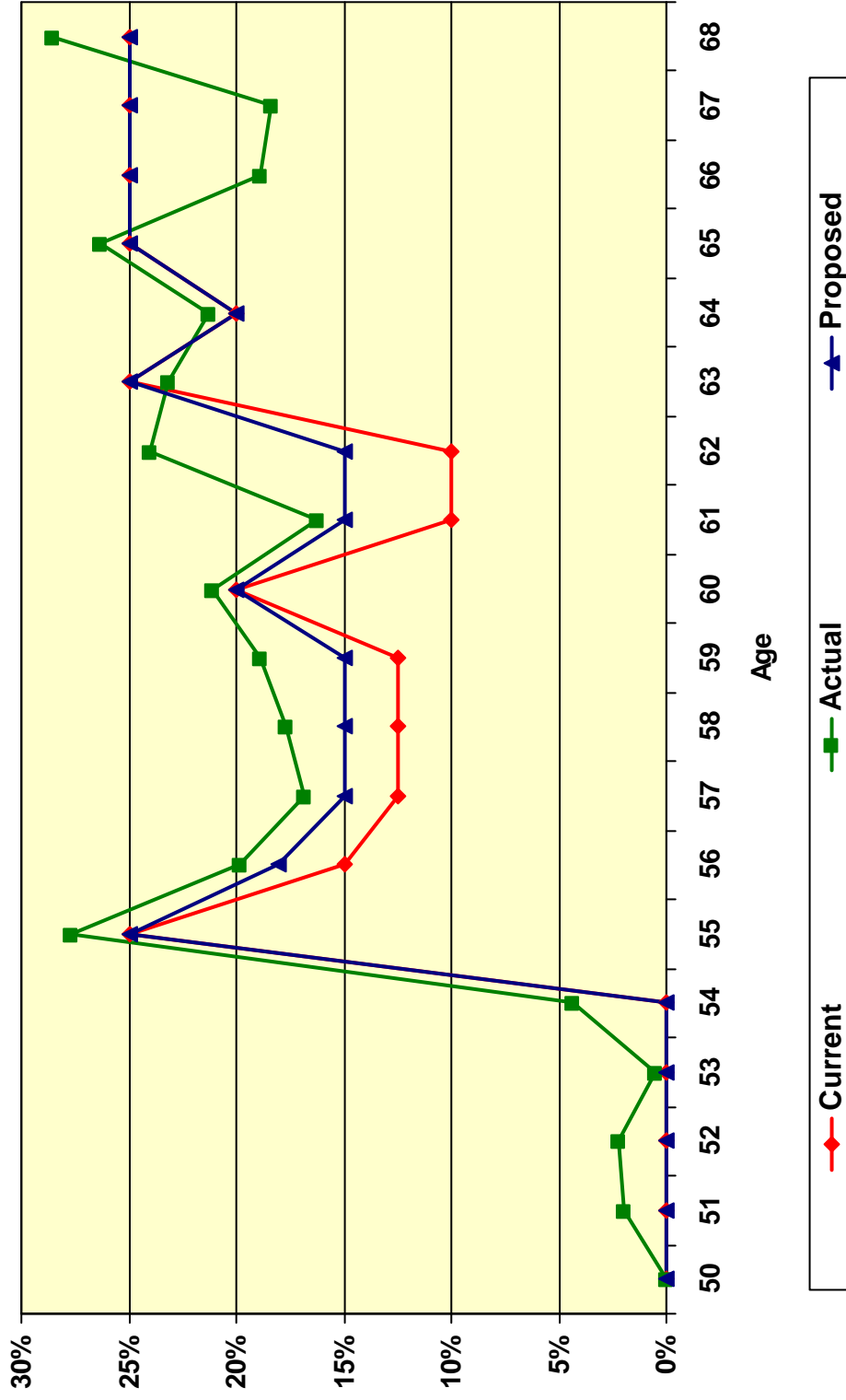# Chart 2
Retirement Rates - Under 30 Years of Service

Chart 3
Retirement Rates - 30 or More Years of Service

Legend: ♦ Current ■ Actual ▲ Proposed

B.   MORTALITY RATES

The "healthy" mortality rates project what proportion of members will die before retirement as well as the life expectancy of a member who retires from service (i.e., who does not receive a Permanent Total Disability Benefit). The table currently being used for post-service retirement mortality rates is the RP-2000 Combined Healthy Mortality Table (separate tables for males and females) with ages set back two years for males and one year for females.

Recent changes to ASOP 35 have increased the actuary's responsibility to reflect and to disclose an allowance for future mortality improvement in this assumption. Ways to reflect anticipated future mortality improvement include:

> Mortality of a longer-lived group - The table in use, without projection, forecasts fewer deaths than the current experience level, thus implicitly allowing for future mortality improvement.

> Projection to a future year - The same mortality table is used for everyone, but that table is intended to be reflective of mortality at a future date, not as of today.

> Generational mortality - Each year of birth has its own mortality table that reflects the forecasted improvements. Thus, younger participants have more future mortality improvement built in than older participants do.

Historically, we have used the approach described in the first bullet when setting mortality assumptions for WPERP. Generally, we have set the mortality assumption so that actual deaths will be at least 10% greater than those assumed.

Pre-Retirement Mortality

The number of deaths among active and deferred vested members is not large enough to provide a statistically credible basis for a specific pre-retirement mortality analysis. Therefore, we continue to recommend that pre-retirement mortality follow the same tables used for post-retirement mortality. Note that we will continue to assume that 5% of pre-retirement deaths are duty related.

Post-Retirement Mortality

Our analysis starts with a table that shows, among all retired members, the actual deaths compared to the expected deaths under the current assumptions for the last three years. We also show the deaths under proposed assumptions based on using a methodology consistent with prior years. As noted above, in prior years we have generally set the mortality assumption so that actual deaths will be at least 10% greater than those assumed. We are recommending continuation of that methodology in this experience study. However, as discussed later in this section, the Board should be aware that a future recommendation may include the use of a generational mortality table.

Year Ending June 30,	Healthy Pensioners - Male			Healthy Pensioners - Female		
	Expected Deaths	Actual Deaths	Proposed Expected Deaths	Expected Deaths	Actual Deaths	Proposed Expected Deaths
2010	215	190	185	43	36	37
2011	220	215	190	45	45	39
2012	222	217	192	46	49	40
Total	657	622	567	134	130	116
Actual / Expected	95%		110%	97%		112%

Chart 4 compares actual to expected deaths under the current and proposed assumptions over the past three years.

The ratio of actual to expected deaths was 95%. We recommend updating the current table to the RP-2000 Combined Healthy Mortality Table (separate tables for males and females) with ages set back one year, projected to 2030 with Scale AA. This will bring the actual to expected ratio to 110%. This is consistent with ASOP 35 as we are including some margin in the mortality rates to anticipate expected future improvement in life expectancy.

Chart 5 shows the life expectancies (i.e., expected future lifetime) under both the current and proposed tables.

As mentioned earlier, we want to make the Board aware that a future recommendation might be for the use of a generational mortality table. While the use of generational mortality tables is under considerable discussion as an emerging practice within the actuarial profession, to date it is still uncommon for public sector retirement plans to actually use a generational mortality table. However,

we anticipate that actuarial practice will continue to move in this direction, for reasons we will now discuss.

A generational mortality table provides dynamic projections of mortality experience for each cohort of retirees. For example, the mortality rate for someone who is 65 next year will be slightly less than for someone who is 65 this year. In general, using generational mortality anticipates increases in the cost of the Plan over time as participants' life expectancies are projected to increase. This is in contrast to updating a static mortality assumption with each experience study as we have proposed in this and prior experience studies.

Using generational mortality rather than static mortality incorporates a more explicit assumption for future mortality improvement. Accordingly, the goal is to start with a mortality table that closely matches the current experience (without a margin for future mortality improvement), and then reflecting mortality improvement by projecting lower mortality rates in future years. That is why, for an illustrative generational mortality table that we developed for the Plan, the current actual to expected ratio shown in the table below for both males and females is 99%. In future years these ratios would remain around 100%, as long as actual mortality improved at the same rates as anticipated in the generational mortality tables.

	Healthy Pensioners - Male			Healthy Pensioners - Female		
Year Ending June 30,	Expected Deaths	Actual Deaths	Proposed Expected Deaths*	Expected Deaths	Actual Deaths	Proposed Expected Deaths
2010	215	190	206	43	36	42
2011	220	215	211	45	45	44
2012	222	217	213	46	49	45
Total	657	622	630	134	130	131
Actual / Expected	95%		99%	97%		99%

*   *For illustration purposes only and shown for the RP-2000 Combined Healthy Mortality Table with ages set back one year for males, projected to 2011 (middle year of the experience study period) with Scale BB.*

Note that using generational mortality increases current liabilities and costs more than using static mortality but should result in fewer changes (and cost increases) in later years. For example, the generational mortality table developed above would increase the current employer contribution rate by about 3% of compensation more than the updated static table that we are recommending.

<u>Disabled Mortality</u>

Disabled mortality was included in the development of assumed healthy mortality rates. This was done because the number of disabled pensioners who were receiving benefits from both the Permanent Total Disability Fund and the Retirement Plan is minimal compared to the total number of pensioners receiving only Retirement Plan benefits. We continue to recommend using the same mortality table for disabled members who received a Permanent Total Disability Benefit as is used for healthy service retired members.

Chart 4
Post-Retirement Deaths

Year ended June 30,

	Expected - Current	Actual	Expected - Proposed
2010	258	226	222
2011	265	260	229
2012	268	266	232
Total	791	752	683

Chart 5
Life Expectancies

Legend: Current (Male) · Proposed (Male) · Current (Female) · Proposed (Female)
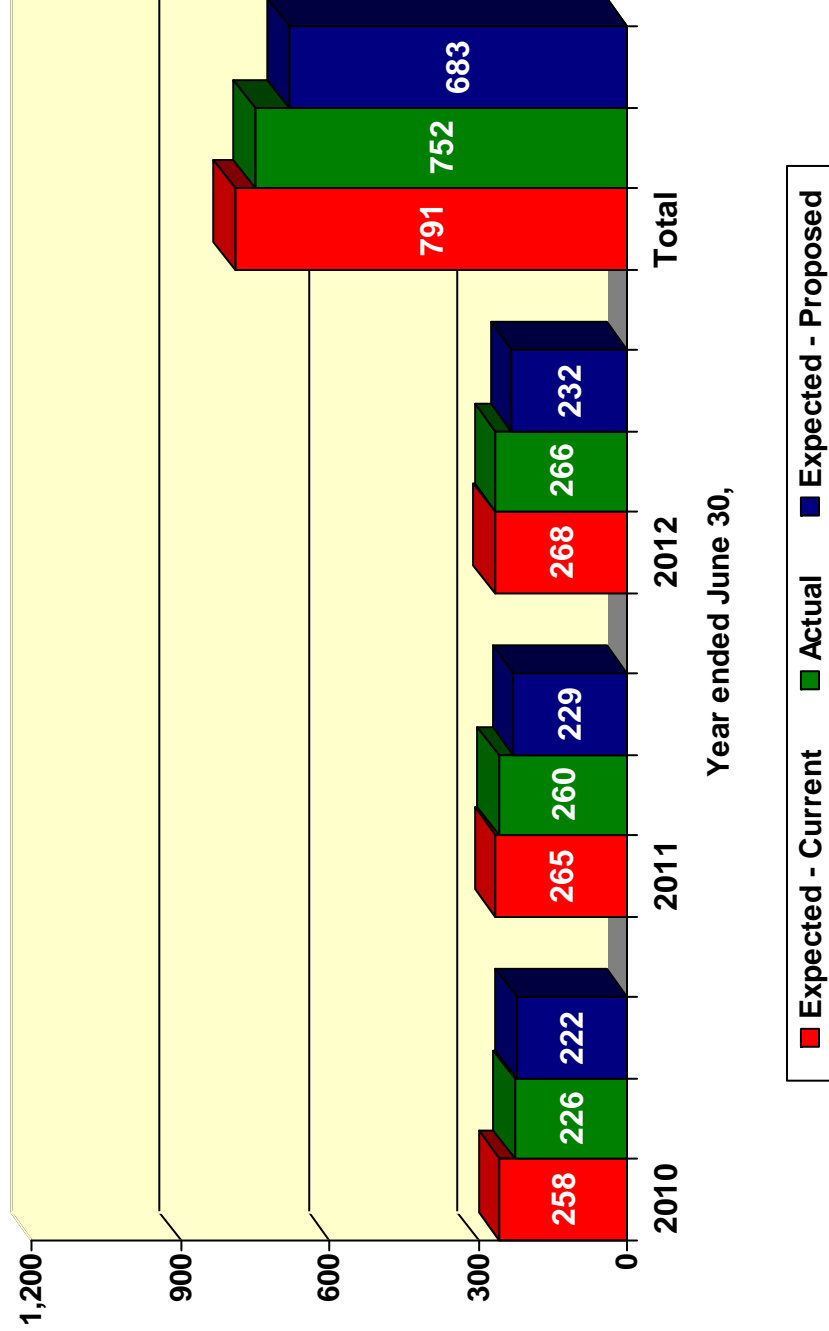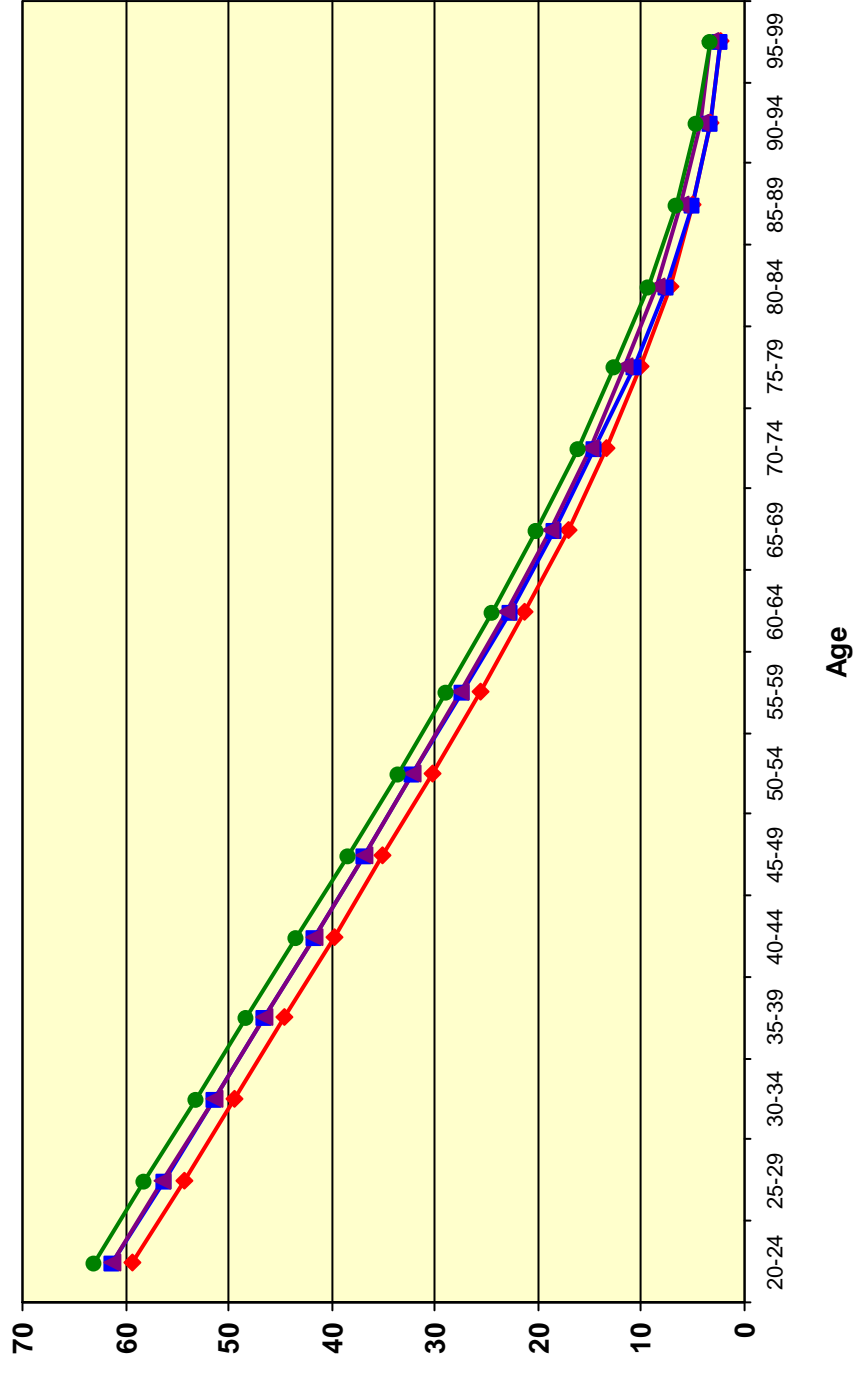
Age

C.   TERMINATION RATES

Termination rates include all terminations for reasons other than death, disability or retirement. Under the current assumptions there is an assumed overall incidence of termination combined with an assumption that 55% of all terminated members will choose a deferred benefit (vested termination) and 45% will choose a refund of member contributions (ordinary withdrawal). With this experience study we are continuing to recommend that a combined set of withdrawal and termination assumptions be used with an assumption regarding the proportion of members who choose a deferred benefit or a refund of member contributions.

Currently, the assumed termination rates are a function of a member's age. Our experience review analyzed withdrawals and terminations, both as a function of age and as a function of years of service for male and female groups separately. Our review found the following:

➤   While withdrawal and termination rates correlate with both years of service and age, we believe there is a stronger correlation with years of service. This is consistent with our experience from other systems.

➤   Actual withdrawal and termination rates do not vary significantly for males and females.

As a result of these observations, we recommend that the termination rate assumptions be:

1.   Combined for both males and females, instead of separate rates for each group;

2.   Structured as a function of years of service, instead of as a function of age.

The termination experience over the last three years for active male and female members is shown by age in the following table. Please note that we have excluded any members that were eligible for retirement.

Termination Rates (Male)		
Age	Current Rate	Actual Rate
20 – 24	8.50%	8.02%
25 – 29	5.25	1.86
30 – 34	3.75	1.39
35 – 39	2.60	1.28
40 – 44	1.90	1.07
45 – 49	1.50	0.72
50 – 54	1.10	0.46
55 – 59	0.90	0.96
60 – 64	0.60	3.92

Termination Rates (Female)

Age	Current Rate	Actual Rate
20 – 24	11.00%	3.33%
25 – 29	8.00	3.41
30 – 34	6.75	3.88
35 – 39	4.75	0.37
40 – 44	3.75	1.16
45 – 49	2.75	0.87
50 – 54	2.25	0.96
55 – 59	2.00	4.35
60 – 64	0.50	4.35

The following table shows the termination experience by years of service over the last three years:

Termination Rates

Years of Service	Current Rate	Actual Rate	Proposed Rate
Less than 1	3.63%	9.74%	9.00%
1	3.87	4.28	4.00
2	3.74	3.58	3.50
3	3.39	1.25	3.00
4	3.14	0.36	2.75
5	3.09	0.92	2.50
6	2.92	0.44	2.25
7	2.76	0.64	2.00
8	2.64	0.22	1.75
9	2.44	0.69	1.50
10	2.52	0.96	1.25
11 & Over	1.89	0.28	1.00

Chart 6 compares actual to expected terminations over the past three years for both the current and proposed assumptions.

Chart 7 shows the actual, current, and proposed termination rates by years of service.

The experience during the period was significantly lower than expected. This may be due to the economic circumstances that occurred during the period of this study. For that reason, while we are proposing reductions in the termination rates, we have not fully reflected the actual experience that occurred during this period.

We are recommending a change in the assumption regarding the proportion of total termination rates allocated between ordinary withdrawals (those who terminate and take a refund of employee contributions) and vested terminations (those who leave contributions in Plan and retire later).

Currently it is assumed that 45% of terminations will be ordinary withdrawals. During our review of the last three year's data, we observe that, consistent with plan provisions, all 100% of terminations are ordinary withdrawals for members with less than one year of service. Also, the percent of ordinary withdrawals for members with more than one year of service appears to have decreased. Therefore, our recommended assumptions are shown in the table below:

Ordinary Withdrawals

Years of Service	Current Assumption	Actual	Proposed Assumption
Less than one	45%	100%	100%
More than one	45%	16%	15%

Vested Terminations

Years of Service	Current Assumption	Actual	Proposed Assumption
Less than one	55%	0%	0%
More than one	55%	84%	85%

We continue to assume that termination rates are zero at any age for members eligible to retire. In other words, members eligible to retire are assumed either to retire (and commence receiving a benefit) or to continue working.

Chart 6

Actual Number of Terminations Compared to Expected

Year ended June 30,

- Expected - Current
- Actual
- Expected - Proposed

2010: 163, 93, 145
2011: 166, 64, 127
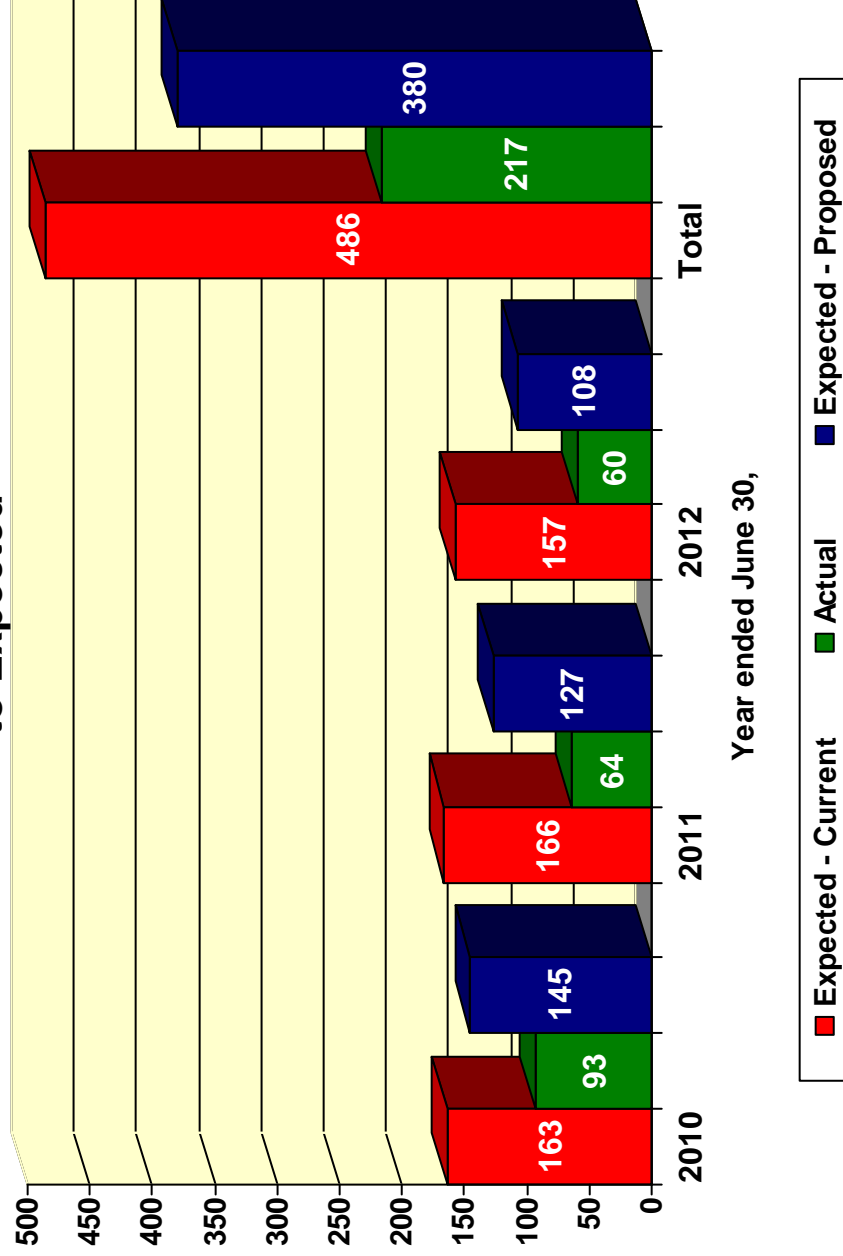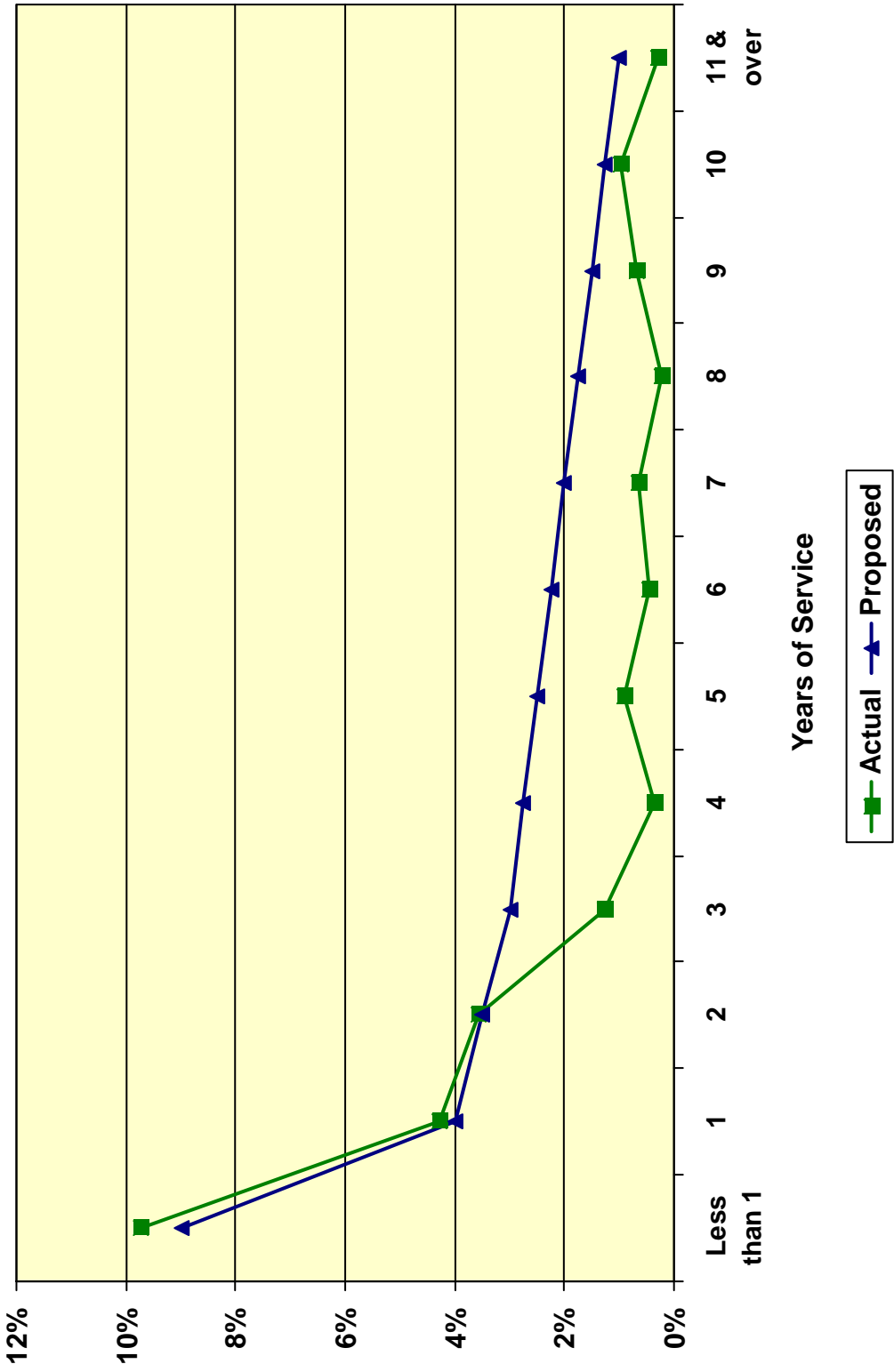2012: 157, 60, 108
Total: 486, 217, 380

Chart 7
Termination Rates - All Active Members
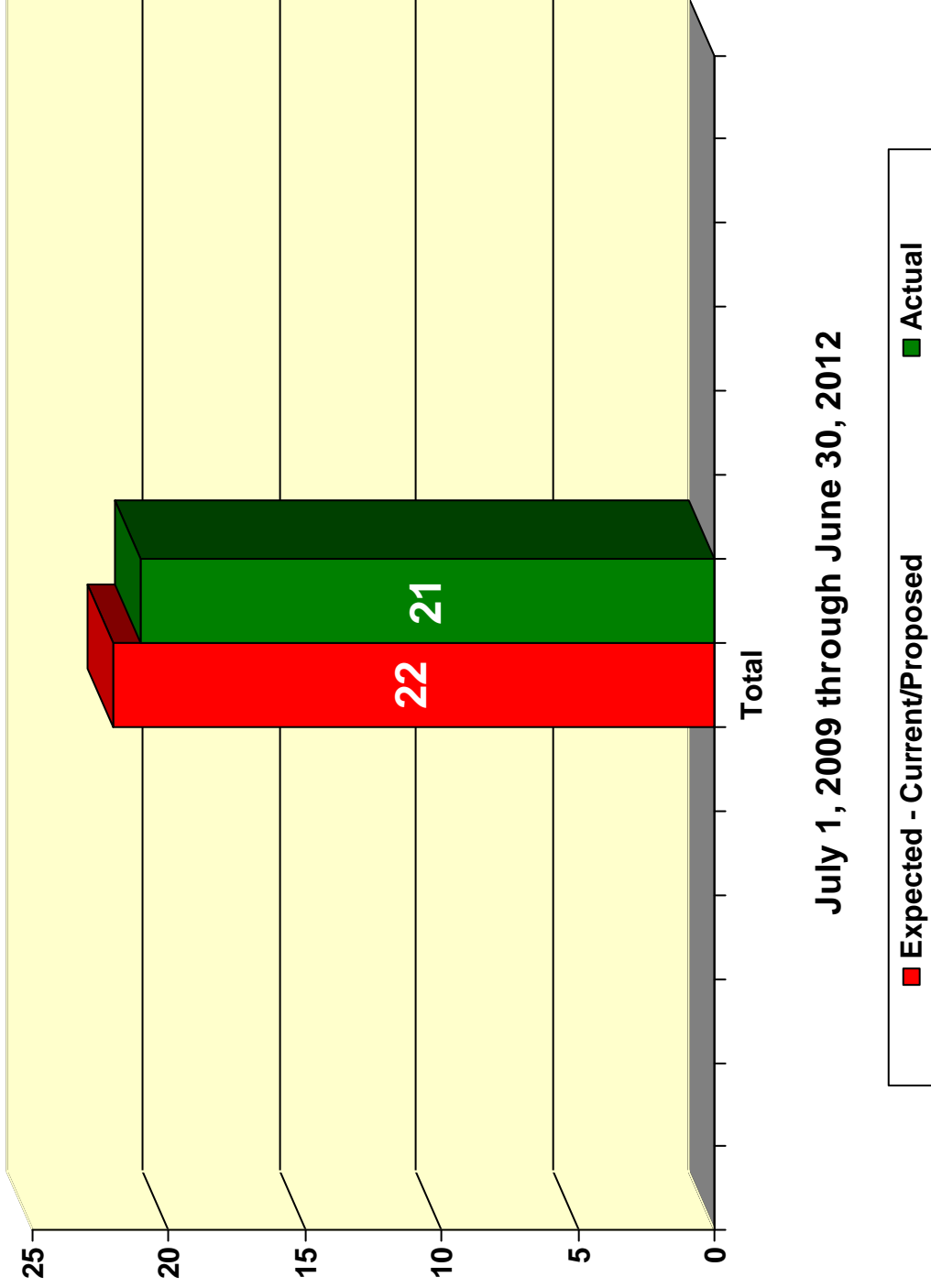
D. DISABILITY INCIDENCE RATES

When a participant becomes disabled, he or she may be entitled to a Permanent Total Disability benefit from the Disability Fund. The following summarizes the actual incidence of permanent total disabilities over the past three years compared to the current and proposed assumptions:

Rates of Disability Incidence

Age	Males Current / Proposed Rate	Females Current / Proposed Rate
20 – 24	0.000%	0.000%
25 – 29	0.006	0.000
30 – 34	0.012	0.018
35 – 39	0.012	0.048
40 – 44	0.024	0.084
45 – 49	0.036	0.114
50 – 54	0.084	0.150
55 – 59	0.162	0.180
60 – 64	0.300	0.000

	Total Expected Disabilities	Actual Disabilities
	22	21
Ratio to Actual	105%	

Since the actual number of permanent total disabilities was in line with those expected under the current assumptions over the past three years as shown above, we do not recommend changing the current rates. Furthermore, a refinement to this assumption would not materially impact the plan liabilities due to the low number of disabilities.

Chart 8 compares the actual to expected disabilities under the current/proposed assumptions over the last three years. Chart 9 shows current (proposed) rates.

Chart 8
Actual Number of Disabilities Compared to Expected

July 1, 2009 through June 30, 2012

Expected - Current/Proposed   Actual

-40-

Chart 9
Disability Incidence Rates

Legend: Current/Proposed (Male), Current/Proposed (Female)

X-axis: Age (20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64)

Y-axis: 0.0%, 0.1%, 0.2%, 0.3%, 0.4%, 0.5%
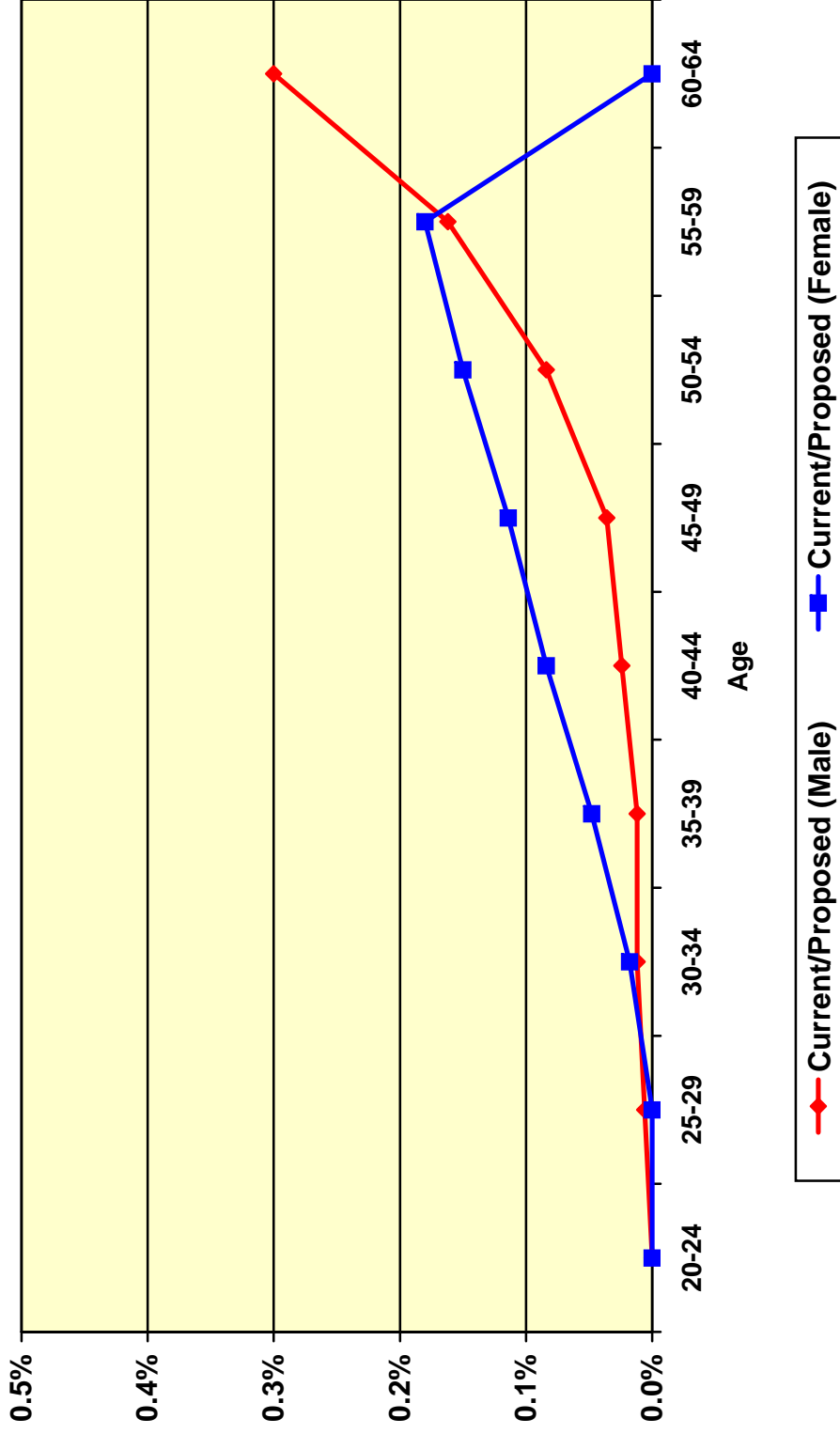
E.   FUTURE SERVICE ACCRUALS

Plan retirement benefits are based on a member's total service, including the purchase of other government service. In order to project benefits and determine the liabilities, an assumption about the amount of service earned and purchased by members each year is necessary. The current assumption is that each active member will earn 1.00 year of service and purchase an additional 0.15 years of other government service for each future year of employment.

The actual average annual service increase for continuing active members was 1.08 years during the valuation year ending June 30, 2012. Please note that because of various data issues regarding the service credit field we have excluded the experience for the first two-years of the experience period (July 1, 2009 through June 30, 2011). Based on this experience, we recommend no change to the current assumption and we will continue to monitor this assumption next study when more reliable data is available.

V. EXPECTED MEMBER CONTRIBUTIONS

The total employer contribution requirement has two components - an annual Normal Cost, and a payment with respect to the Unfunded Actuarial Accrued Liability (UAAL). The total Normal Cost (before an offset for expected member contributions) is determined by summing up the next year's <u>individual</u> Normal Costs for each active member. The employer Normal Cost would then be determined by subtracting expected member contributions.

Historically, in the annual actuarial valuation for WPERP, expected member contributions have been determined on an <u>aggregate</u> basis by taking the present value of future member contributions for all active members divided by their present value of future salaries to obtain a single member contribution rate for all active members. The expected member contributions are then that aggregate member contribution rate applied to the compensation for all active members. In essence, this method produces an average member contribution rate that takes into account expected member contributions during all future expected years of employment for active members.

While we believe this method is consistent with the Actuarial Standards of Practice, use of this approach does result in actuarial gains and losses even if all actuarial assumptions are met each year. Therefore, we are proposing a change to the method for determining expected member contributions in the annual actuarial valuation. The proposed method determines expected member contributions on an <u>individual</u> basis in a manner consistent with the determination of the total Normal Cost. In other words, the expected member contributions under the proposed method are just the member contributions expected to be received by the WPERP during the year following the valuation date. Under this method, there are no actuarial gains or losses during years where all actuarial assumptions are met.

VI. COST IMPACT

As developed in the July 1, 2012 actuarial valuation, the employers' annual cost is 46.08% of compensation under the current set of assumptions. If all of the recommended assumption changes from this experience study (including the 7.50% investment return assumption) were implemented in the 2012 valuation, the annual cost in the July 1, 2012 actuarial valuation would have increased to 54.56% of compensation. If the alternative recommendation for a 7.25% investment return assumption were to be adopted, then the employer's annual cost would have increased to 59.62% of compensation. All of these contribution rates are higher than the required match of 110% of the employee contributions.

The recommended assumption changes (including the 7.50% investment return assumption) would have increased the overall plan cost by 8.5% of compensation. The change to the 7.50% investment return assumption alone would increase costs by about 4.7% of compensation. The recommended change to the updated static mortality table would increase costs by about 6.0% of compensation.[5] The change to the salary increase assumption alone would decrease costs by about 3.4% of compensation. All the other recommended changes would increase costs by about 1.2% of compensation.

Chart 10 shows the details of the cost increase due to the recommended assumption changes (including the 7.50% investment return assumption).

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[5] As noted earlier, a generational mortality table would increase current employer contributions by an <u>additional</u> 3% of compensation

Chart 10

Recommended Department Contributions

	Current Assumptions		Recommended Assumptions[1]	
1. Actuarial accrued liability				
Active members	$4,707,096,331		$4,916,124,994	
Terminated vested members	177,116,212		190,897,510	
Retired members and beneficiaries	4,808,390,309		5,067,406,312	
Total	$9,692,602,852		$10,174,428,816	
2. Net actuarial value of assets	$7,573,885,754		$7,573,885,754	
3. Unfunded actuarial accrued liability (UAAL) (1) – (2)	$2,118,717,098		$2,600,543,062	

	Dollar Amount	% of pay	Dollar Amount	% of pay
4. Total normal cost	$189,950,104	21.43%	$210,729,276	23.86%
5. Expected member contributions	56,478,914	6.37	53,997,454	6.11
6. Net normal cost: (4) – (5)	133,471,190	15.06	156,731,822	17.75
7. Amortization of UAAL	259,765,921	29.30	307,764,371	34.84
8. Required employer contribution, at beginning of the year	393,237,111	44.36	464,496,193	52.59
9. Required employer contribution, with mid-year interest adjustment	408,475,049	46.08	481,914,800	54.56
10. Employer match (mid-year)	64,534,219	7.28	61,624,594	6.97
11. Greater of required employer contribution or employer match	408,475,049	46.08	481,914,800	54.56
12. Projected compensation	886,539,366		883,315,367	

[1] Uses 7.50% investment return

APPENDIX A

CURRENT ACTUARIAL ASSUMPTIONS

Demographic Assumptions:

Mortality Rates:

After Service Retirement and Pre-retirement:	RP-2000 Combined Healthy Mortality Table with ages set back two years for males and one year for females
After Disability Retirement:	RP-2000 Combined Healthy Mortality Table with ages set back two years for males and one year for females

**Termination Rates
Before Retirement:**

<center>Rate (%)</center>

<center>Male</center>

Age	Mortality*	Disability	Total Withdrawal**
25	0.037	0.006	6.550
30	0.039	0.012	4.350
35	0.063	0.012	3.060
40	0.096	0.018	2.180
45	0.130	0.030	1.660
50	0.186	0.054	1.260
55	0.292	0.126	0.980
60	0.527	0.240	0.720
65	1.001	0.000	0.420

<center>Female</center>

Age	Mortality*	Disability	Total Withdrawal**
25	0.020	0.000	9.200
30	0.025	0.006	7.250
35	0.044	0.036	5.550
40	0.065	0.072	4.150
45	0.103	0.102	3.150
50	0.155	0.138	2.450
55	0.242	0.168	2.100
60	0.444	0.000	1.100
65	0.862	0.000	0.350

*   *5% of pre-retirement deaths are assumed to be duty related, with the remaining being non-duty related.*

**   *No withdrawal is assumed after a member is first eligible to retire. Ordinary withdrawal members are assumed to receive their account balance at termination. Vested termination members are assumed to receive a deferred retirement benefit. 45% of terminations are assumed to be ordinary withdrawals, with the remaining being vested terminations.*

CURRENT ACTUARIAL ASSUMPTIONS

(Continued)

Retirement Rates:

Age	Under 30 Years of Service	Over 30 Years of Service
55	4.00%	25.00%
56	3.00	15.00
57	3.00	12.50
58	3.00	12.50
59	4.00	12.50
60	5.00	20.00
61	5.00	10.00
62	5.00	10.00
63	5.00	25.00
64	5.00	20.00
65	15.00	25.00
66	15.00	25.00
67	15.00	25.00
68	15.00	25.00
69	15.00	25.00
70	100.00	100.00

Benefit for Inactive Vested Members: Inactive vested members are assumed to retire at age 60 with a Money Purchase Annuity. Members receiving Permanent Total Disability benefits are assumed to retire at the earlier of age 60 or age 55 with 30 years of service.

Definition of Active Members: First day of biweekly payroll following employment for new department employees or immediately following transfer from other city department.

Unknown Data for Members: Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.

Data Adjustments:	Data as of March 31 has been adjusted to June 30 by adding three months of age and, for active employees, three months of service. Contribution account balances were also increased by three months of interest. For members in pay status, we have increased their benefits by the assumed July 1 COLA.
Percent Married/Domestic Partner:	85% of male members and 60% of female members are assumed to have an eligible spouse or domestic partner at pre-retirement death or retirement. Spousal gender is assumed to be opposite that of the member.
Age of Spouse:	Females are 3 years younger than their spouses.
Future Benefit Accruals:	1.0 year of service per year.
Other Government Service:	Members are assumed to purchase an additional 0.15 years of service per year.

Economic Assumptions:

Consumer Price Index:	Increase of 3.50% per year; benefit increases due to CPI subject to 3.00% maximum.
Employee Contribution, Additional Annuity and Matching Account Crediting Rate:	7.75%, based on Plan provisions
Net Investment Return:	7.75%, net of administrative and investment expenses.

Salary Increases:

Annual Rate of Compensation Increase

Inflation: 3.50% per year, plus "across the board" salary increases of 0.75% per year, plus the following merit and promotional increases.

Years of Service	Increase
Less than 1	6.25%
1	5.25%
2	4.75%
3	3.50%
4	2.00%
5 & Over	1.10%

The merit and promotional increases are added with the sum of the inflationary and "across the board" salary increases.

APPENDIX B

PROPOSED ACTUARIAL ASSUMPTIONS

Demographic Assumptions:

Mortality Rates:

After Service Retirement and Pre-retirement: RP-2000 Combined Healthy Mortality Table with ages set back one year, projected to 2030 with Scale AA.

After Disability Retirement: RP-2000 Combined Healthy Mortality Table with ages set back one year, projected to 2030 with Scale AA.

Termination Rates Before Retirement:

	Rate (%)	
	Male	
Age	**Mortality***	**Disability**
25	0.028	0.006
30	0.036	0.012
35	0.060	0.012
40	0.080	0.018
45	0.094	0.030
50	0.116	0.054
55	0.180	0.126
60	0.367	0.240
65	0.739	0.000

	Female	
Age	**Mortality***	**Disability**
25	0.013	0.000
30	0.018	0.006
35	0.031	0.036
40	0.041	0.072
45	0.063	0.102
50	0.093	0.138
55	0.191	0.168
60	0.382	0.000
65	0.742	0.000

* *5% of pre-retirement deaths are assumed to be duty related, with the remaining being non-duty related.*

PROPOSED ACTUARIAL ASSUMPTIONS

(Continued)

Withdrawal Rates:

Years of Service	Total Withdrawal*
Less than 1	9.00%
1	4.00%
2	3.50%
3	3.00%
4	2.75%
5	2.50%
6	2.25%
7	2.00%
8	1.75%
9	1.50%
10	1.25%
11 & over	1.00%

* *No withdrawal is assumed after a member is first eligible to retire. Ordinary withdrawal members are assumed to receive their account balance at termination. Vested termination members are assumed to receive a deferred retirement benefit. For members terminating with less than one year of service, 100% are assumed to be ordinary withdrawals. For members terminating with more than one year of service, 15% are assumed to be ordinary withdrawals, with the remaining 85% being vested terminations.*

PROPOSED ACTUARIAL ASSUMPTIONS

(Continued)

Retirement Rates:

Age	Under 30 Years of Service	Over 30 Years of Service
55	5.00%	25.00%
56	3.00	18.00
57	3.00	15.00
58	3.00	15.00
59	3.00	15.00
60	5.00	20.00
61	6.00	15.00
62	6.00	15.00
63	6.00	25.00
64	7.00	20.00
65	12.00	25.00
66	12.00	25.00
67	12.00	25.00
68	12.00	25.00
69	15.00	25.00
70	30.00	30.00
71	30.00	30.00
72	30.00	30.00
73	30.00	30.00
74	30.00	30.00
75	100.00	100.00

PROPOSED ACTUARIAL ASSUMPTIONS

(Continued)

Benefit for Inactive Vested Members:	Inactive vested members are assumed to retire at age 60 with a Money Purchase Annuity. Members receiving Permanent Total Disability benefits are assumed to retire at the earlier of age 60 or age 55 with 30 years of service.
Definition of Active Members:	First day of biweekly payroll following employment for new department employees or immediately following transfer from other city department.
Unknown Data for Members:	Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Data Adjustments:	Data as of March 31 has been adjusted to June 30 by adding three months of age and, for active employees, three months of service. Contribution account balances were also increased by three months of interest. For members in pay status, we have increased their benefits by the assumed July 1 COLA.
Percent Married/Domestic Partner:	85% of male members and 60% of female members are assumed to have an eligible spouse or domestic partner at pre-retirement death or retirement. The assumption is applied also for current retirees that are missing this data to estimate whether there is a 50% continuance with Option A, B, C, F. Spousal gender is assumed to be opposite that of the member.
Age of Spouse:	Females are 3 years younger than their spouses.
Future Benefit Accruals:	1.0 year of service per year.
Other Government Service:	Members are assumed to purchase an additional 0.15 years of service per year.

Economic Assumptions:

Consumer Price Index:	Increase of 3.25% per year; benefit increases due to CPI subject to 3.00% maximum.
Employee Contribution, Additional Annuity and Matching Account Crediting Rate:	7.75%, based on Plan provisions
Net Investment Return:	7.50%, net of investment expenses. Alternative recommendation is 7.25%, net of investment expenses.

PROPOSED ACTUARIAL ASSUMPTIONS

(Continued)

Salary Increases:

<u>Annual Rate of Compensation Increase</u>

Inflation: 3.25% per year, plus "across the board" salary increases of 0.75% per year, plus the following merit and promotional increases.

Years of Service	Increase
Less than 1	6.00%
1	5.50%
2	5.00%
3	4.00%
4	2.50%
5	1.50%
6	1.10%
7	1.00%
8	0.90%
9	0.80%
10 & over	0.75%

The merit and promotional increases are added to the sum of the inflationary and "across the board" salary increases.