

**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, 2006 through June 30, 2009**

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THE SEGAL COMPANY  
100 Montgomery Street, Suite 500 San Francisco, CA 94104-4308  
T 415.263.8200 F 415.263.8290 www.segalco.com

March 31, 2010

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 2006 through 2009**

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, 2006 through June 30, 2009. This study utilizes the census data from the last three actuarial valuations and includes the proposed actuarial assumptions, both economic and demographic, for use in future actuarial valuations, beginning with the July 1, 2010 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,

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

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John Monroe, ASA, EA, MAAA  
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 paying promised benefit amounts 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 solely 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.

Shown below are the experience gains (losses) for the last three years, with the investment experience separated from the experience attributable to all other sources.

<b>Year ended June 30:</b>	<b>Gains/(Losses) – in millions</b>		
	<b>Investments</b>	<b>Other Sources</b>	<b>Total</b>
2007	\$ 69.1	\$ (116.3)	\$ (47.2)
2008	10.3	4.5	14.8
<u>2009</u>	<u>(410.2)</u>	<u>(64.4)</u>	<u>(474.6)</u>
Total	\$(330.8)	\$(176.2)	\$(507.0)
Average	\$(110.3)	\$(58.7)	\$(169.0)

Overall, the experience of the Fund over the last three years was less favorable than assumed, resulting in an average loss of \$169 million per year. After separating out the investment experience, the experience loss attributable to other sources (primarily demographic) was, on average, about \$59 million per year. The experience for the year ended June 30, 2008 excludes any liability measurement changes that were a result of the change in actuary.

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, 2006 through June 30, 2009. 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, turnover (vested and ordinary) and percent of members with an eligible spouse or domestic partner.

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

*Ref: Pg. 7*    **Inflation** – Future increases in the cost-of-living index which drives investment returns and active member salary increases, as well as COLA increases to retired employees.

***Recommendation: Reduce the rate from 3.75% per annum to 3.50% per annum as discussed in Section III(A).***

*Ref: Pg. 8*    **Investment Return** – The estimated average future rate of return net of expenses 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 8.00% per annum to 7.75% per annum as shown in Section III(B).***

*Ref: Pg. 13*    **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 3.75% to 3.50%. Increase the current real “across the board” salary increase assumption from 0.50% to 0.75%. In addition to the combined inflationary and real “across the board” salary increases of 4.25%, increase the promotional and merit increase rates to those developed in Section III(C).***

*Ref: Pg. 17*    **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. 22*    **Mortality Rates** – The probability of dying at each age. Mortality rates are used to project life expectancies.

***Recommendation: Update the current mortality table by decreasing mortality rates as developed in Section IV(B).***

*Ref: Pg. 26* **Termination Rates** – The probability of leaving employment at each age and receiving either a refund of contributions or a deferred vested benefit.

***Recommendation: Adjust the current male and female total termination rates to those developed in Section IV(C) and assume that 45% of future terminations are ordinary withdrawals (i.e., refund of member contributions), while the remaining 55% are deferred vested terminations.***

*Ref: Pg. 32* **Disability Incidence Rates** – The probability of becoming disabled at each age.

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

*Ref: Pg. 35* **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.***

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. The cost impact of the proposed changes is shown in Section V.

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 2009**  
(U.S. City Average – All Urban Consumers)

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	<u>25<sup>th</sup> Percentile</u>	<u>Median</u>	<u>75<sup>th</sup> Percentile</u>
15-year moving averages	2.7%	3.5%	4.8%
30-year moving averages	3.3%	4.3%	5.0%

The average inflation rates have continued to decline gradually over the last several years due to the relatively low inflationary period in the 1990s and early 2000s. However, the inflation rates for the past few years have started to show some increase. 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.

LADWP’s investment consultant, Pension Consulting Alliance (PCA), anticipates an annual inflation rate of 3.0%. Note that, in general, the investment consultants’ time horizon for this assumption is shorter than the time horizon we use for the actuarial valuation.

In the 2009 public fund survey published by the National Association of State Retirement Administrators, the median inflation assumption used by 113 large public retirement funds in the 2008 valuations has remained unchanged from the 3.50% used in the 2007 valuations.

**Based on all of the above information, we recommend that the current annual inflation assumption of 3.75% be reduced to 3.50% for the July 1, 2010 valuation.**

## **B. INVESTMENT RETURN**

The investment return assumption is comprised of two components: (i) Inflation; and (ii) Real Rate of Return.

### ***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 Private Equity and Real Return) 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 long term future market returns.

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

<u>Asset Class</u>	<u>Percentage of Portfolio</u>	<u>Average Real Rate of Return from a Sample of Consultants to Public Sector Clients<sup>(1)</sup></u>
Domestic Equity	34.0%	6.50%
Developed International Equity	24.0%	7.37%
Fixed Income	24.0%	1.94%
Real Estate	5.0%	4.83%
Real Return	7.0%	4.00% <sup>(2)</sup>
Private Equity	5.0%	9.50% <sup>(2)</sup>
Cash and Cash Equivalents	<u>1.0%</u>	<u>0.38%</u>
Total	100.0%	5.44% <sup>(3)</sup>

<sup>(1)</sup> These are based on the projected arithmetic returns provided by the investment advisory firms serving the LADWP Retirement Plan, the county retirement systems of Alameda, Contra Costa, Fresno, Orange, Sacramento, San Bernardino, San Diego and the City of Fresno Retirement System.

<sup>(2)</sup> PCA’s assumption is used for this class to more closely reflect the underlying investments made specifically for the LADWP Retirement Plan.

<sup>(3)</sup> The real rate of return assumptions utilized by PCA produce a 5.01% 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 5.44% portfolio real rate of return be used to determine the Plan's investment return assumption. This is 0.05% higher than the return calculated three years ago. The difference is due to changes in the real rate of return assumptions provided to us by the investment advisory firms (-0.40%) offset by a change in the Plan's target asset allocation (+0.45%).

***Plan Expenses***

The real rate of return assumption for the portfolio needs to be adjusted for administrative and 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, 2009.

**Administrative and 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 Administrative and Investment Expenses	Total %
2009	\$6,842,993	\$17,842	0.26%
2008	7,333,400	22,749	0.31%
2007	6,432,179	20,124	0.31%
2006	6,090,464	16,616	0.27%
2005	5,862,076	12,268	<u>0.21%</u>
Average			0.27%

The experience shows that the average expense during the past five years was 0.27%. Based on this experience, we believe a future expense assumption of 0.30% is reasonable. The recommended 0.30% expense assumption is consistent with the expense experience of Segal's other California public retirement systems.

### ***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 also are expected to vary by asset class. This portfolio risk is incorporated into the real rate of return assumption through a risk adjustment.

The purpose of the risk adjustment is to increase the likelihood of achieving the actuarial investment return assumption in the long term. The 5.44% expected real rate of return developed earlier in this report was based on mean or average returns. This means there is a 50% chance of the actual return in each year being at least as great as the average. The risk adjustment is intended to increase that probability.

Three years ago, the Board adopted an investment return assumption of 8.00%. 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 62% (based on a portfolio standard deviation of 11.2% provided by PCA in 2007) and assuming that the distribution of returns over that period follows the Normal statistical distribution<sup>1</sup>.

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.

When combined with the inflation, real return, and expense components recommended earlier in this report, that same risk adjustment of 0.89% now results in a 7.75% investment return assumption.

Note that because of a slight increase in the volatility of the portfolio that risk adjustment leads to a slightly lower confidence level of 61%. This new confidence level is determined using the Plan's annual portfolio standard deviation (which is 12.2% as provided by PCA in 2010).

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<sup>1</sup> The theory that long-term investment returns follow a Normal distribution is debatable; however, we believe the Normal distribution assumption is reasonable for purposes of setting the risk adjustment.

***Recommended Investment Return Assumption***

The following table provides the calculated net investment return assumption that results from the previous discussion:

<b><u>Calculation of Investment Return Assumption</u></b>	
<b><u>Assumption Component</u></b>	<b><u>Recommended Value</u></b>
Inflation	3.50%
Plus Portfolio Real Rate of Return	5.44%
Minus Expense Adjustment	(0.30%)
Minus Risk Adjustment	<u>(0.89%)</u>
Total	7.75%

**Based on this calculation, we recommend that the investment return assumption be decreased from 8.00% to 7.75%.**

## 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 an inflation rate of 3.50%. This inflation component will be 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 0.7% - 1.0% annually during the last 10 – 20 years.

We also referred to the annual report on the financial status of the Social Security program published in May 2009. 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 4.2%. This is 0.7% greater than our recommended price inflation assumption.



**Considering these two factors, we recommend increasing the real “across the board” salary increase assumption from 0.50% to 0.75% so that the combined inflation and “across the board” salary increase assumption remains unchanged at 4.25%.**

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 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 member’s actual salary increase over each year of the experience period;
- Categorizing these increases according to member demographics;
- Removing the wage inflation component from these increases (equal to the increase in the member’s average salary during the year);
- Modifying current assumptions to reflect some portion of these measured increases reflective of their “credibility”.

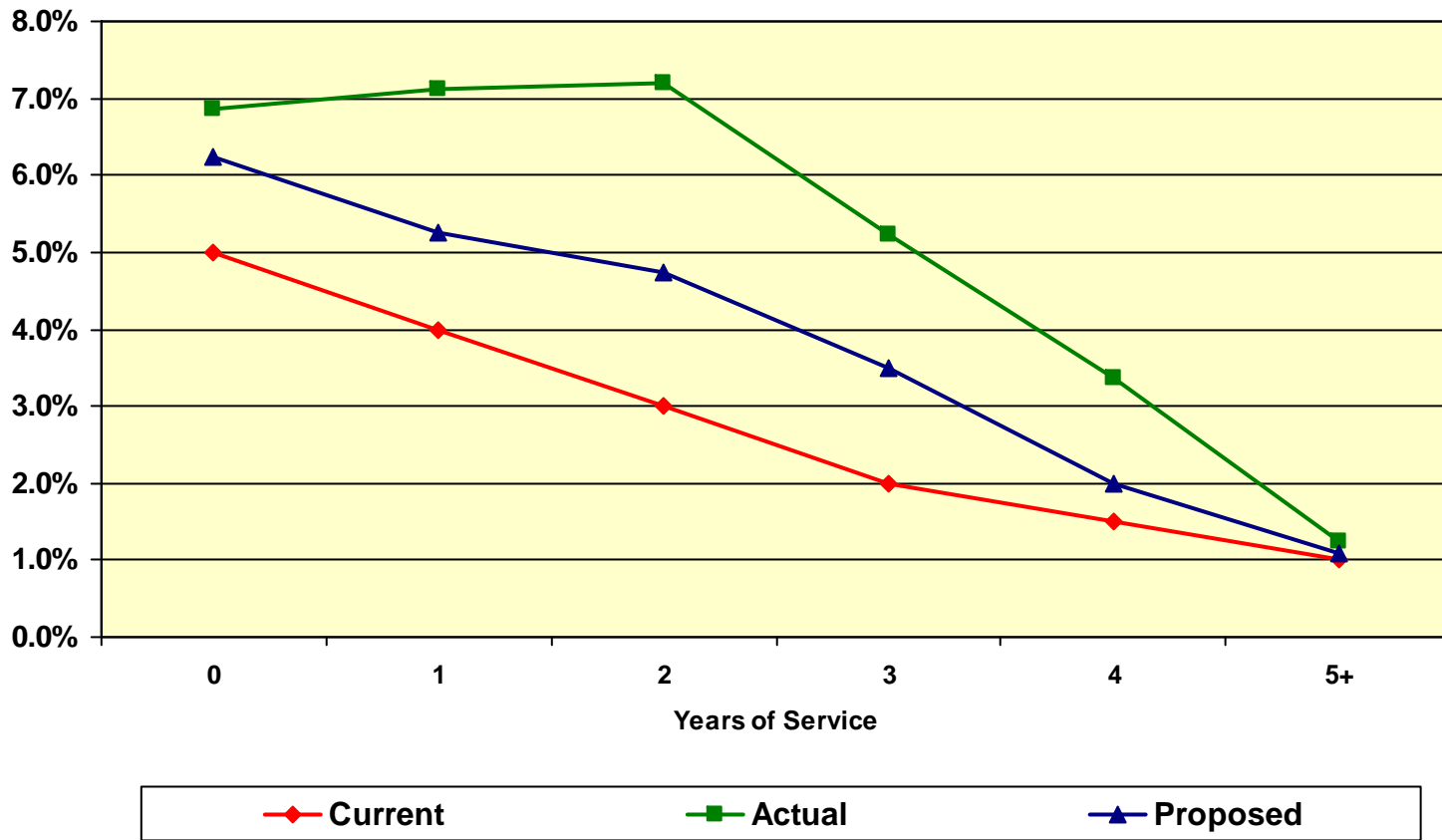
The following table compares the actual average promotional and merit increases by years of service with the current assumptions and our proposed assumptions. The table is based on the three-year experience period from July 1, 2006 through June 30, 2009. The actual average promotional and merit increases were determined by netting the actual average total salary increases by 4.2%, which was the average inflation plus real “across the board” increases (i.e., wage inflation) over the three-year period.

<b>Promotional and Merit Increases</b>			
<b><u>Years of Service</u></b>	<b><u>Current Assumptions</u></b>	<b><u>Actual Average Increase</u></b>	<b><u>Proposed Assumptions</u></b>
Less than 1	5.00%	6.87%	6.25%
1	4.00%	7.13%	5.25%
2	3.00%	7.20%	4.75%
3	2.00%	5.22%	3.50%
4	1.50%	3.37%	2.00%
5+	1.00%	1.25%	1.10%

The proposed promotional and merit assumptions are higher than the current assumptions for all members.

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**



#### 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 over 30 years of service at retirement, we continue to recommend separate retirement rates for these members. The table below shows the observed service (non-disability) retirement rates for members with under 30 years of service at retirement over the last three 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	5.00%	3.89%	4.00%
56	3.00	2.97	3.00
57	3.00	3.53	3.00
58	3.00	2.79	3.00
59	4.00	2.95	4.00
60	4.00	5.20	5.00
61	4.00	5.73	5.00
62	4.00	7.39	5.00
63	5.00	5.23	5.00
64	5.00	5.71	5.00
65	100.00	10.94	15.00
66	100.00	10.84	15.00
67	100.00	11.76	15.00
68	100.00	10.53	15.00
69	100.00	16.07	15.00
70 & over	100.00	4.55	100.00

As shown above, we recommend increasing the age at which 100% retirement is assumed from age 65 to 70. 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.

**Members with 30 or more years of service at retirement:**

<b>Age</b>	<b>Current Assumed Rate of Retirement</b>	<b>Actual Rate of Retirement</b>	<b>Proposed Assumed Rate of Retirement</b>
50	30.00%	0.00%	0.00%
51	12.50	0.00	0.00
52	12.50	1.03	0.00
53	5.00	0.00	0.00
54	5.00	0.00	0.00
55	25.00	24.44	25.00
56	12.50	17.72	15.00
57	12.50	12.96	12.50
58	12.50	13.37	12.50
59	12.50	13.33	12.50
60	15.00	22.96	20.00
61	10.00	12.50	10.00
62	10.00	11.96	10.00
63	20.00	29.49	25.00
64	20.00	21.54	20.00
65	100.00	26.92	25.00
66	100.00	26.32	25.00
67	100.00	0.00	25.00
68	100.00	21.05	25.00
69	100.00	18.75	25.00
70 & Over	100.00	9.09	100.00

Based on the above experience, we propose eliminating the retirement rates below age 55 for those members with 30 or more years of service at retirement. This is consistent with the cessation of the early retirement window (effective September 2005) that provided unreduced benefits for early retirement for members retiring with 30 or more years of service in that age group. Please note that the retirement rates at ages 55 and over are unaffected by the window since members retiring with 30 years of service still receive unreduced benefits at these ages. We are recommending slight increases in some of those rates for members between the ages of 55 and 64. We also recommend increasing the age at which 100% retirement is assumed from age 65 to 70. Overall, these recommendations result in a decrease in assumed retirements.

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 whose value was equal to the employee contribution account plus the Department matching contribution account or, if greater, a deferred annuity at age 60 based on the Formula pension. Since very few inactive vested members will be eligible for the Formula pension we recommend changing to assume 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.

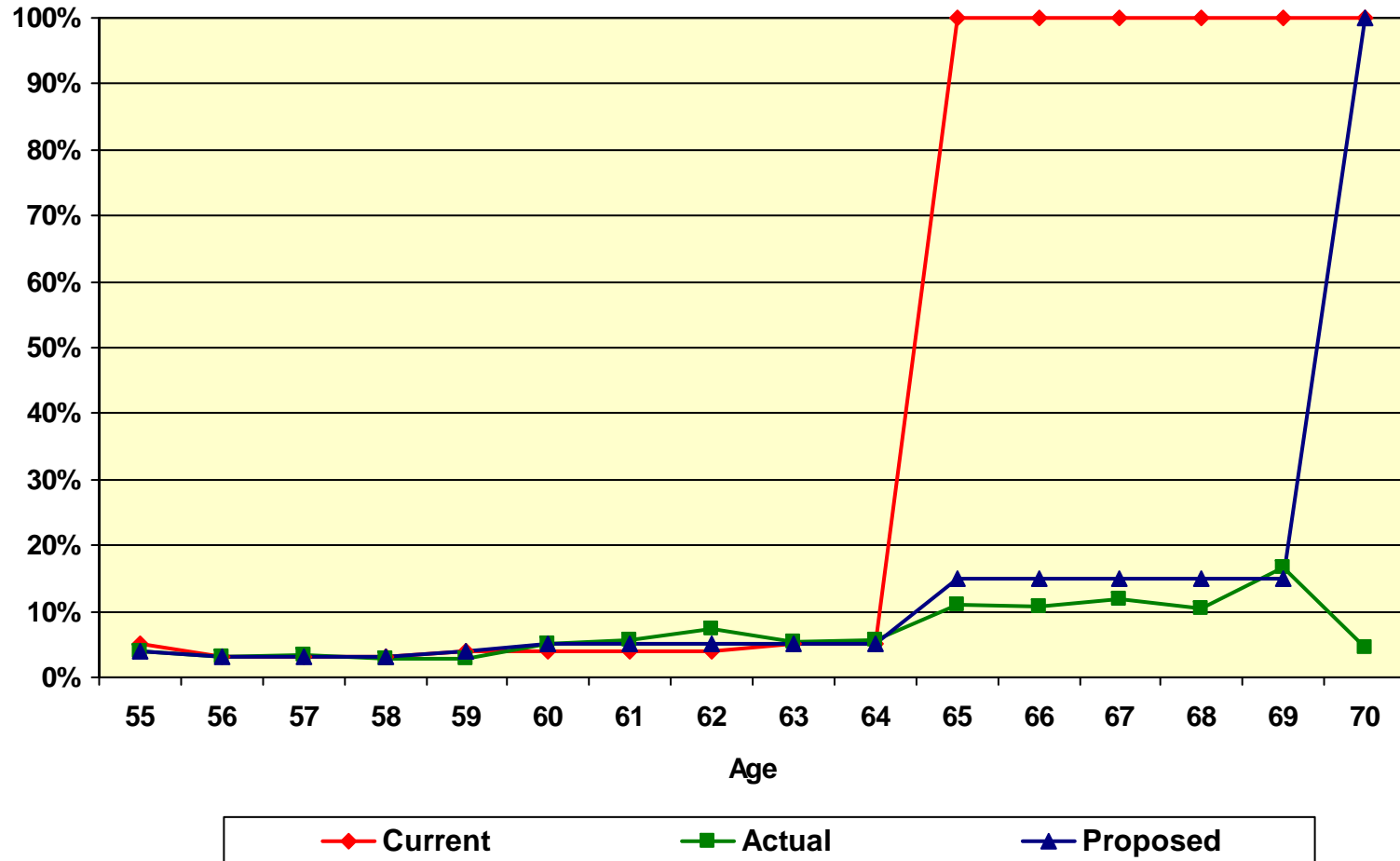
In prior valuations, it was assumed that 90% of active male members and 75% of active female members would have an eligible spouse or domestic partner when they retired. Based on the experience for members who retired during the last three years, about 79% of male members and 49% of female members had an eligible spouse or domestic partner at retirement. We recommend decreasing the assumptions to 85% for males and 60% for females.

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.

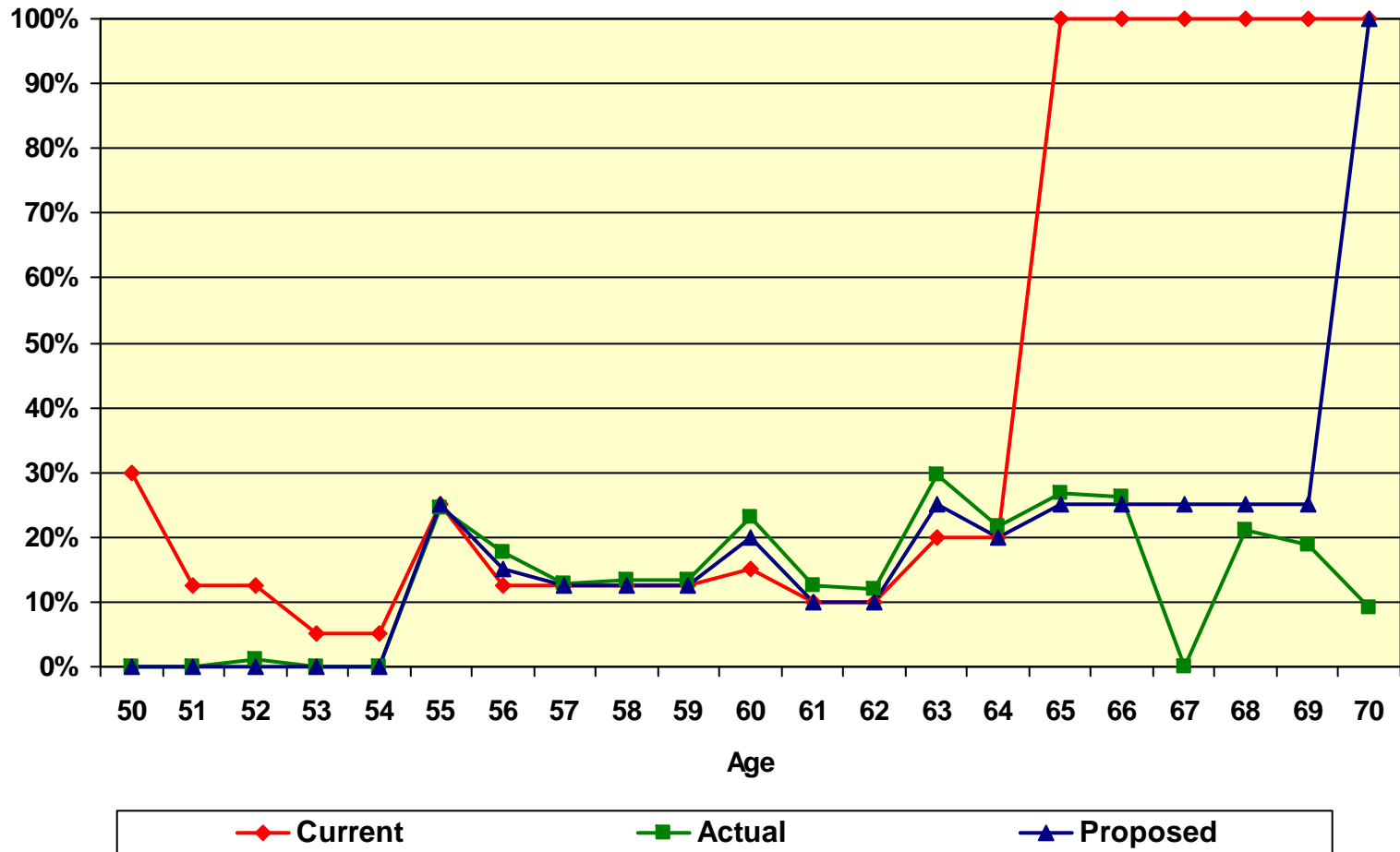
<b>Survivor's Age as Compared to Member's Age</b>	
<b>Beneficiary Sex</b>	<b>Recommended Assumption</b>
Male	3 years older
Female	3 years younger

Since the majority of survivors are expected to be 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





**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 did not receive a Permanent Total Disability Benefit). The table currently being used for post-service retirement mortality rates is the 1994 Group Annuity Mortality Table (separate tables for males and females).

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

Among all retired members, the actual deaths compared to the expected deaths under the current and proposed assumptions for the last three years are as follows:

Year Ending June 30,	Healthy Pensioners		
	Expected Deaths - Current Assumptions	Actual Deaths	Expected Deaths - Proposed Assumptions
2007	287	274	258
2008	287	297	258
2009	286	290	258
Total	860	861	774
Actual / Expected	100%		111%

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 100%. We recommend updating the current table to 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. This will bring the actual to expected ratio to 111%. This is consistent with standard actuarial practice to include some margin in the rates to anticipate expected future improvement in life expectancy. Generally, preferable practice is to have a

margin of around 10%; that is, the actual deaths among current retirees are around 10% greater than the expected deaths during the current period.

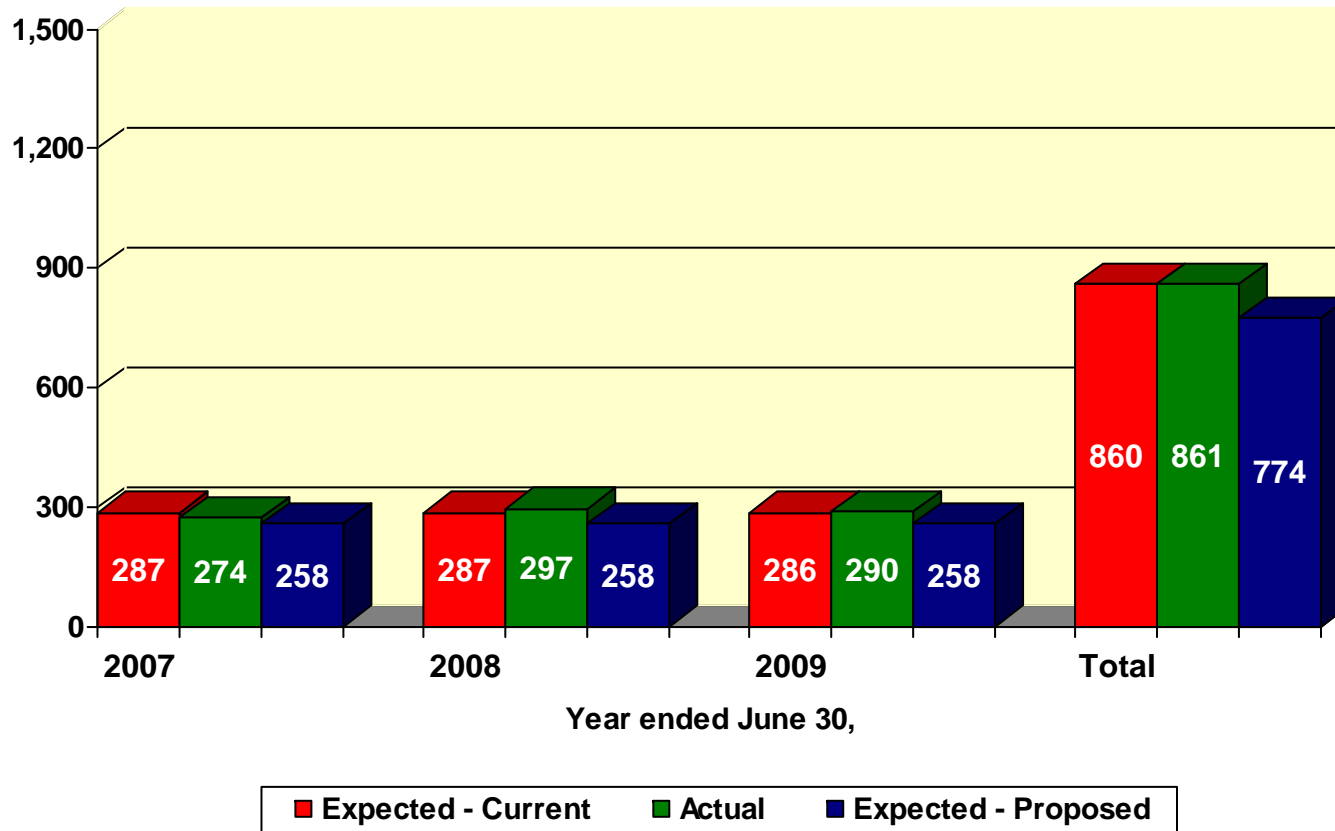
We will continue to monitor this assumption in future experience studies.

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

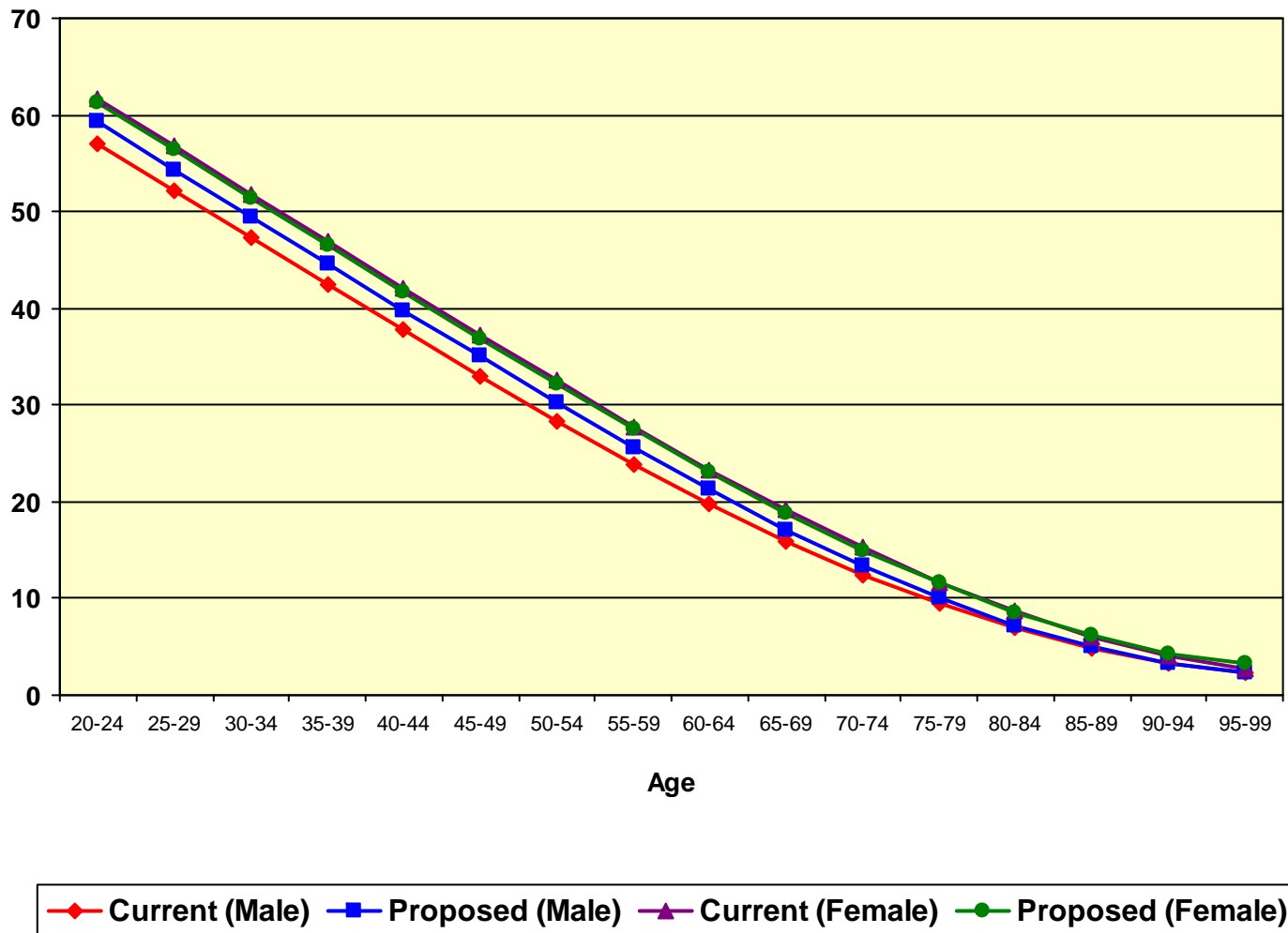
#### Disabled Mortality

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



### Chart 5 Life Expectancies



### C. TERMINATION RATES

Termination rates include all terminations for reasons other than death, disability or retirement. Under the current assumptions there is an overall incidence of termination assumed combined with an assumption that 35% of all male terminated members will choose a deferred benefit (vested termination) and 65% will choose a refund of member contributions (ordinary withdrawal). For females, it is currently assumed that 40% will elect a deferred benefit and 60% will choose a refund of member contributions. 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. The termination experience over the last three years for active male and female members is shown in the following table. Please note that we have excluded any members that were eligible for retirement.

<b>Termination Rates (Male)</b>			
<b>Age</b>	<b>Current Rate</b>	<b>Actual Rate</b>	<b>Proposed Rate</b>
20 – 24	7.75%	15.22%	8.50%
25 – 29	5.75	4.62	5.25
30 – 34	4.00	3.59	3.75
35 – 39	2.75	2.45	2.60
40 – 44	2.00	1.86	1.90
45 – 49	1.50	1.54	1.50
50 – 54	1.20	1.01	1.10
55 – 59	0.90	4.21	0.90
60 – 64	0.60	4.88	0.60

<b>Termination Rates (Female)</b>			
<b>Age</b>	<b>Current Rate</b>	<b>Actual Rate</b>	<b>Proposed Rate</b>
20 – 24	10.00%	50.00%	11.00%
25 – 29	8.75	7.32	8.00
30 – 34	6.75	7.03	6.75
35 – 39	5.25	4.07	4.75
40 – 44	4.25	3.24	3.75
45 – 49	2.85	2.63	2.75
50 – 54	2.50	1.60	2.25
55 – 59	2.00	4.94	2.00
60 – 64	0.50	0.00	0.50

We recommend changing the termination rates for males and females to better match the last three year's experience. For both males and females, the proposed rates are higher than the current rates at the very youngest ages and lower at most other ages. The net impact of the proposed rates is a decrease to the expected terminations for both males and females. We did look at whether or not termination rates varied significantly from the current age based rates for those members with less than five years of service. The data from the three-year experience period showed that the termination rates did not vary significantly with the exception of members with less than one year of service. Therefore, we recommend continuation of the current age based assumption structure.

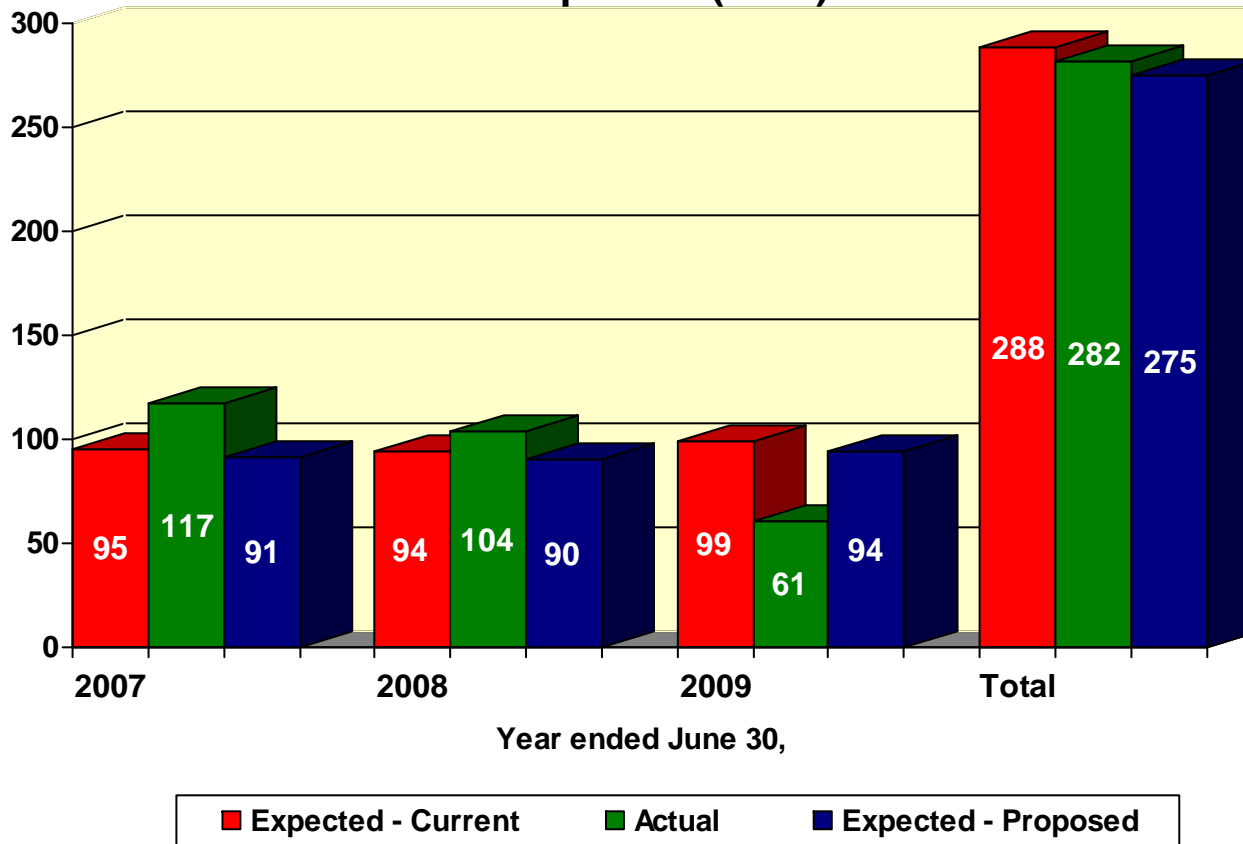
Chart 6 compares actual to expected terminations over the past three years for both the current and proposed assumptions for male members. Chart 7 shows this information for female members.

Chart 8 shows the current and proposed termination rates for male members. Chart 9 shows this information for female members.

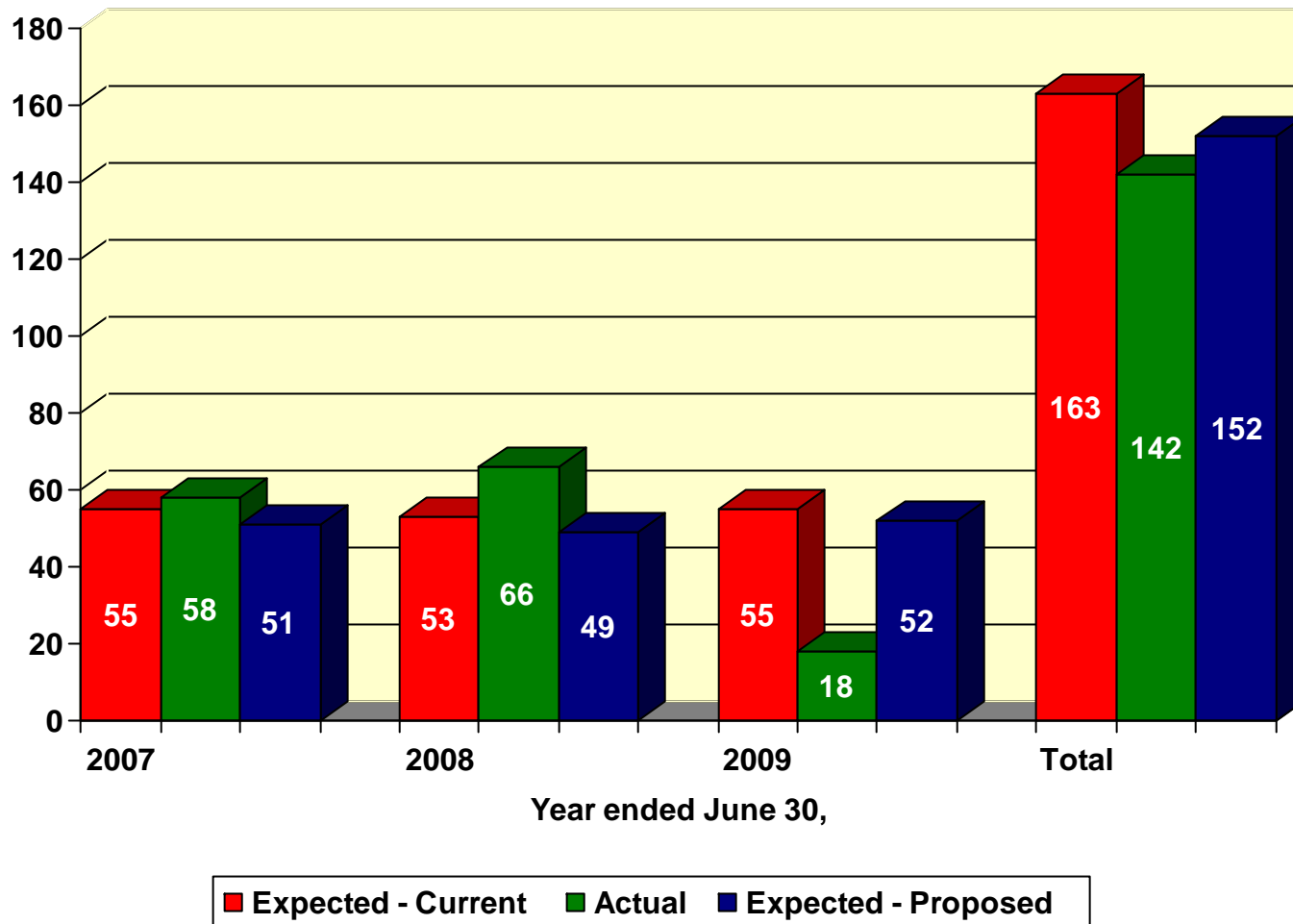
We are recommending a change in the assumption regarding the proportion of total termination rates allocated between ordinary withdrawals (those who terminate and take a refund of employee contributions) and vested terminations (those who leave contributions in Plan and retire later). Currently it is assumed that 65% of male terminations and 60% of female terminations will be ordinary withdrawals. During our review of the last three year's data, we observe that these percentages do not significantly vary between males and females. Also, the percent of ordinary withdrawals appears to have decreased and so our recommended assumption is that 45% of terminations will be ordinary withdrawals. The remaining 55% will be vested terminations.

We currently assume that termination rates are zero at any age where members are assumed to retire. We are recommending a slight change to assuming that termination rates are zero 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 (Male)**

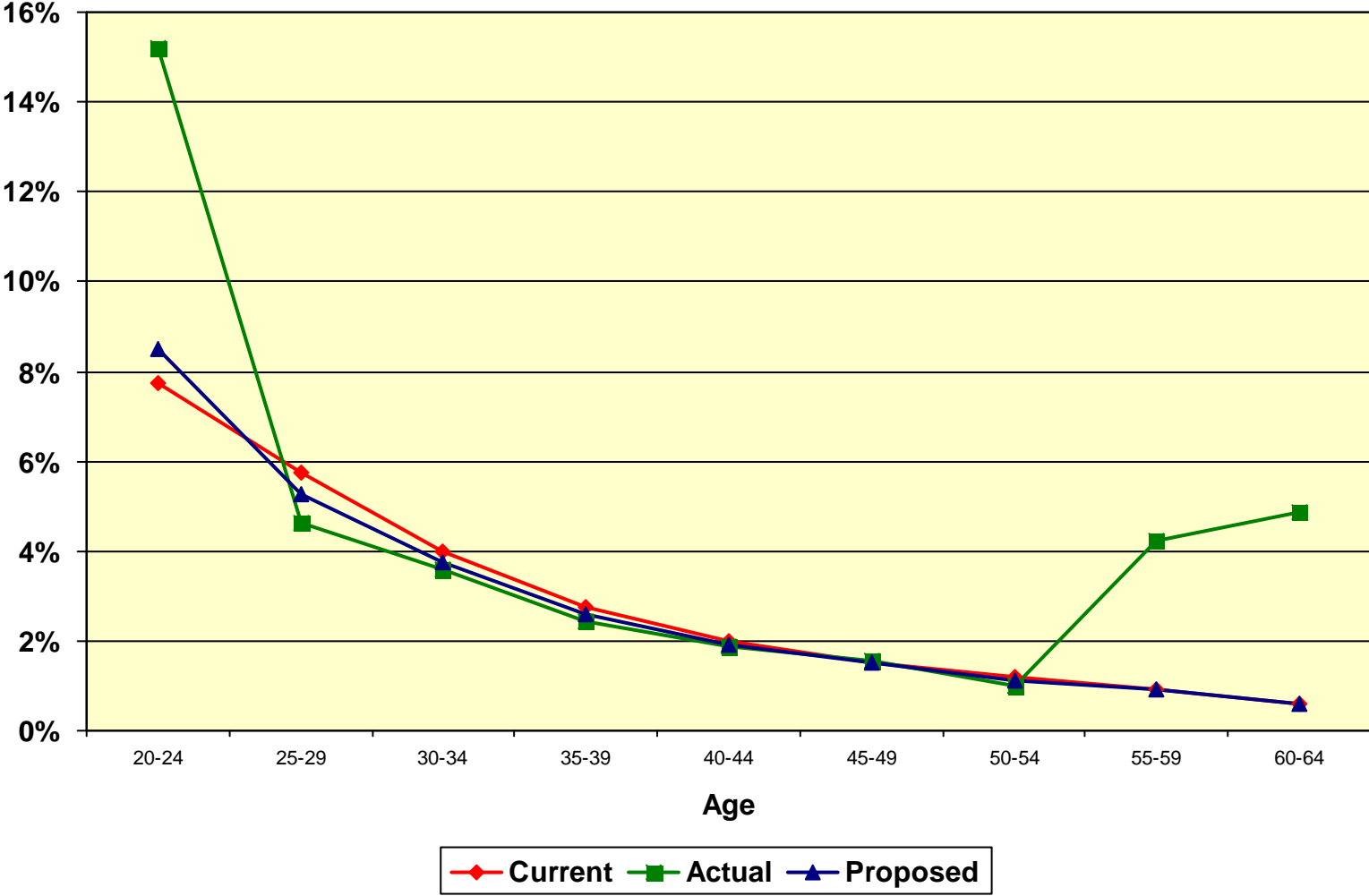


**Chart 7**  
**Actual Number of Terminations Compared**  
**to Expected (Female)**

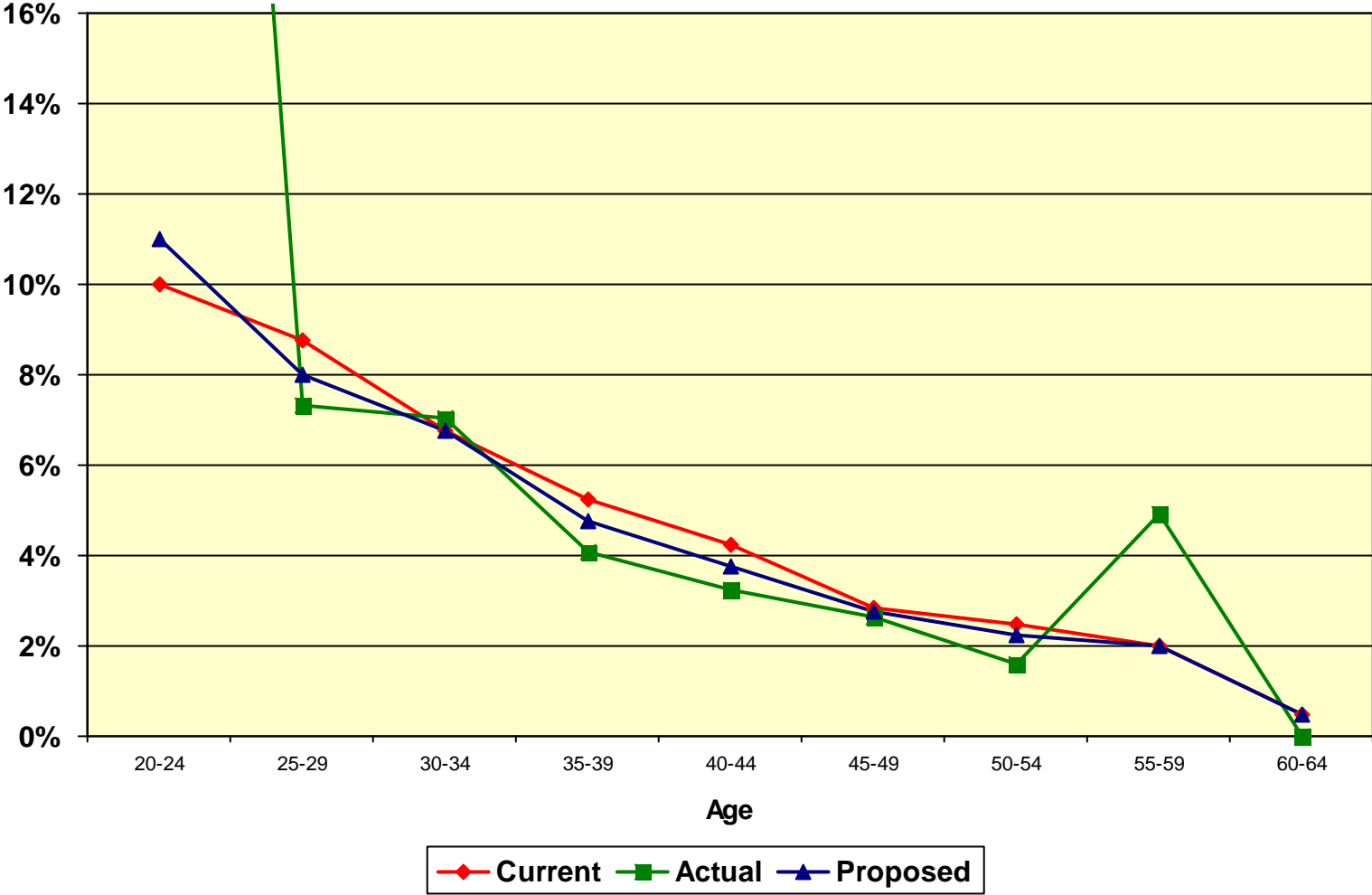




**Chart 8**  
**Termination Rates - Male Active Members**



### Chart 9 Turnover Rates - Female Active Members



**D. DISABILITY INCIDENCE RATES**

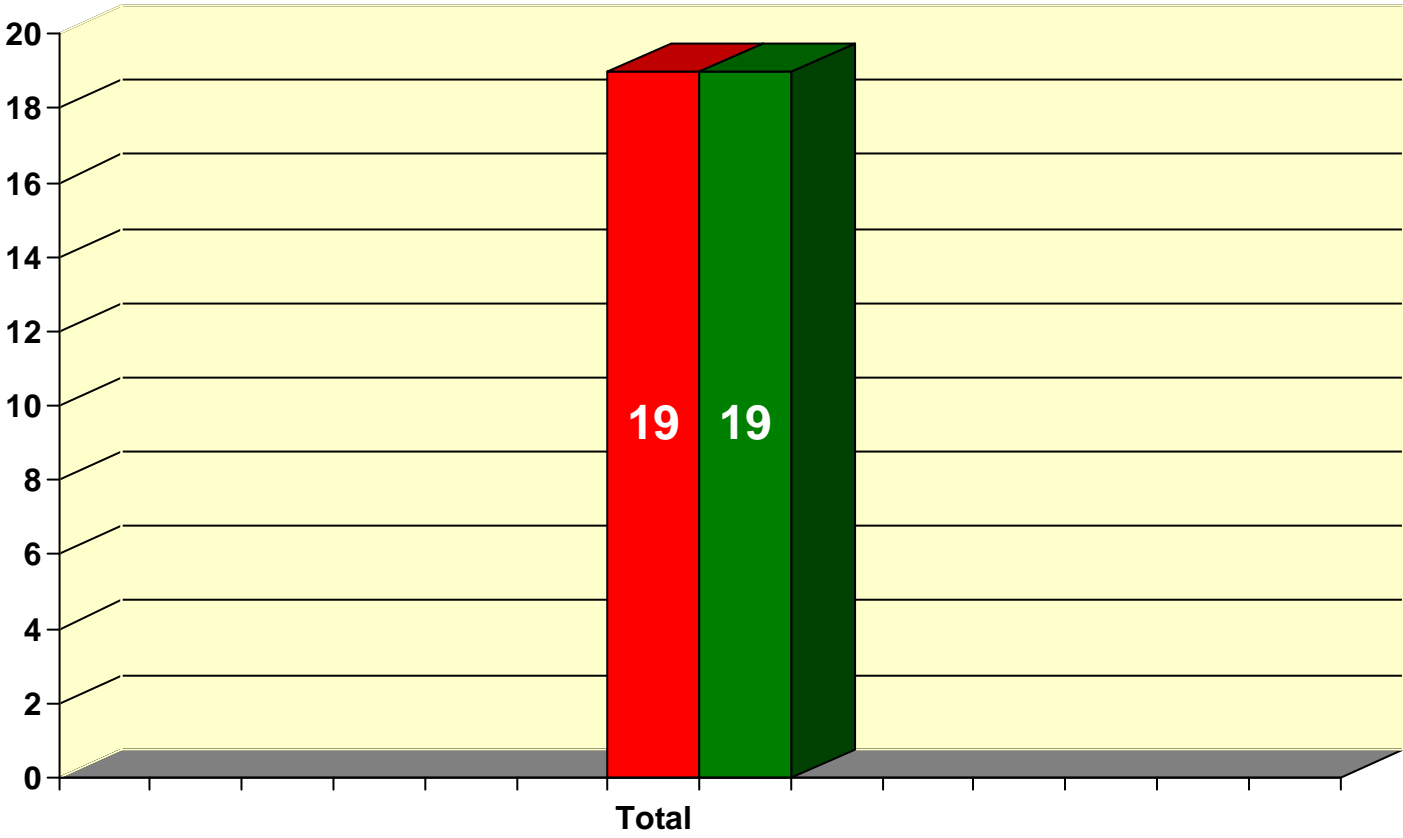
When a participant becomes disabled, he or she may be entitled to a Permanent Total Disability benefit from the Disability Fund. The following summarizes the actual incidence of permanent total disabilities over the past three years compared to the current and proposed assumptions:

<b><u>Rates of Disability Incidence</u></b>		
<b><u>Age</u></b>	<b>Males <u>Current / Proposed Rate</u></b>	<b>Females <u>Current / Proposed Rate</u></b>
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
	<b><u>Total Expected Disabilities</u></b>	<b><u>Actual Disabilities</u></b>
	19	19
Ratio to Actual	100%	

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 10 compares the actual to expected disabilities under the current/proposed assumptions over the last three years. Chart 11 shows current (proposed) rates.

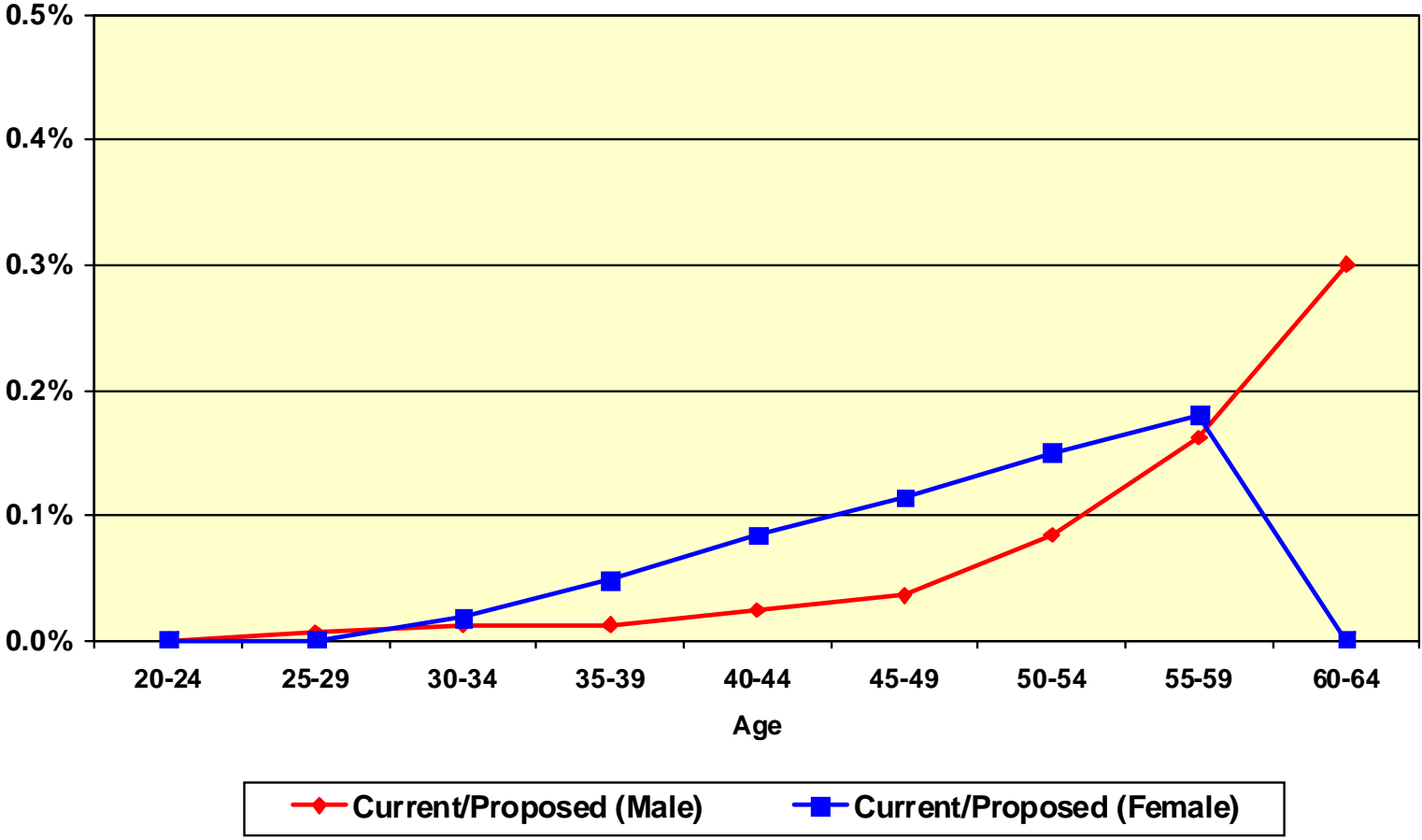
**Chart 10**  
**Actual Number of Disabilities**  
**Compared to Expected**



**July 1, 2006 through June 30, 2009**



**Chart 11**  
**Disability Incidence Rates**



## **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 1.18 years during the three-year experience period from July 1, 2006 through June 30, 2009. Based on this experience, we recommend no change to the current assumption.

## V. COST IMPACT

As developed in the July 1, 2009 actuarial valuation, the Plan's annual cost is 26.12% of compensation under the current set of assumptions. If all of the recommended assumption changes from this experience study were implemented in the 2009 valuation, the annual cost in the July 1, 2009 actuarial valuation would have increased to 30.72% of compensation. Both of these contribution rates are higher than the required match of 110% of the employee contributions.

The recommended assumption changes would have increased the overall plan cost by 4.6% of compensation. The change to the investment return assumption would increase costs by about 4.3% of compensation. The change to the mortality table would increase costs by about 2.2% of compensation. The change to the retirement rates assumption would decrease costs by about 1.6% of compensation. All the other recommended changes would decrease costs by about 0.3% of compensation.

Chart 12 shows the details of the cost increase due to the recommended assumption changes.

**Chart 12**

**Recommended Department Contributions**

	<b>Current Assumptions</b>		<b>Recommended Assumptions</b>	
1. Actuarial accrued liability				
Active members	\$3,802,368,505		\$3,904,098,930	
Terminated vested members	161,317,313		155,702,242	
Retired members	4,093,375,132		4,216,813,509	
Total	\$8,057,060,950		\$8,276,614,681	
2. Net actuarial value of assets	\$7,248,721,252		\$7,248,721,252	
3. Unfunded actuarial accrued liability (UAAL) (1) – (2)	\$808,339,698		\$1,027,893,429	
	<b>Dollar Amount</b>	<b>% of pay</b>	<b>Dollar Amount</b>	<b>% of pay</b>
4. Total normal cost	\$154,425,889	19.18%	\$168,376,952	20.87%
5. Expected member contributions	50,209,794	6.24	50,223,267	6.23
6. Net normal cost: (4) – (5)	104,216,095	12.94	118,153,685	14.64
7. Amortization of UAAL	98,035,202	12.18	120,409,040	14.93
8. Required employer contribution, at beginning of the year	202,251,297	25.12	238,562,725	29.57
9. Required employer contribution, with mid-year interest adjustment	210,341,349	26.12	247,807,031	30.72
10. Employer match (mid-year)	57,440,004	7.13	57,386,360	7.11
11. Greater of required employer contribution or employer match	210,341,349	26.12	247,807,031	30.72
12. Projected compensation	805,137,795		806,787,311	



## APPENDIX A

### CURRENT ACTUARIAL ASSUMPTIONS

#### Mortality Rates

*After Service Retirement  
and Pre-retirement:*

1994 Group Annuity Mortality Table

*After Disability Retirement:*

1994 Group Annuity Mortality Table

#### Termination Rates Before Retirement:

Rate (%)			
Male			
Age	Mortality*	Disability	Total Withdrawal**
25	0.066	0.006	6.550
30	0.080	0.012	4.700
35	0.085	0.012	3.250
40	0.107	0.018	2.300
45	0.158	0.030	1.700
50	0.258	0.054	1.320
55	0.443	0.126	1.020
60	0.798	0.240	0.720
65	1.454	0.000	0.000
Female			
Age	Mortality*	Disability	Total Withdrawal**
25	0.029	0.000	9.250
30	0.035	0.006	7.550
35	0.048	0.036	5.850
40	0.071	0.072	4.650
45	0.097	0.102	3.410
50	0.143	0.138	2.640
55	0.229	0.168	2.200
60	0.444	0.000	1.100
65	0.864	0.000	0.000

\* 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 assumed to retire. Ordinary withdrawal members are assumed to receive their account balance at termination. Vested withdrawal members are assumed to receive a deferred retirement benefit from the plan. 65% of male terminations and 60% of female terminations are assumed to be ordinary withdrawals, with the remaining being vested withdrawals.

## CURRENT ACTUARIAL ASSUMPTIONS

(Continued)

### Retirement Rates:

Age	Under 30 Years of Service	Over 30 Years of Service
50	0.00%	30.00%
51	0.00	12.50
52	0.00	12.50
53	0.00	5.00
54	0.00	5.00
55	5.00	25.00
56	3.00	12.50
57	3.00	12.50
58	3.00	12.50
59	4.00	12.50
60	4.00	15.00
61	4.00	10.00
62	4.00	10.00
63	5.00	20.00
64	5.00	20.00
65	100.00	100.00

### Retirement Age and Benefit for Inactive Vested Participants:

A liability is determined for (a) a deferred annuity at age 60 whose value is equal to the employee normal contribution account plus Department matching contribution account and (b) a deferred annuity at age 60 based on the Formula pension. The plan liability is the greater of these two calculations.

### Percent Married/Domestic Partner:

90% of male members and 75% of female members are assumed to be married 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.

## CURRENT ACTUARIAL ASSUMPTIONS

(Continued)

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**Consumer Price Index:** Increase of 3.75% per year; benefit increases due to CPI subject to 3.00% maximum.

**Employee Contribution and Matching Account Crediting Rate:** 8.00%, based on Plan provisions

**Net Investment Return:** 8.00%, net of administrative and investment expenses.

**Salary Increases:**

Annual Rate of Compensation Increase

Inflation: 3.75% per year, plus “across the board” salary increases of 0.50% per year, plus the following merit and promotional increases.

<u>Years of Service</u>	<u>Increase</u>
0	5.00%
1	4.00%
2	3.00%
3	2.00%
4	1.50%
5 & Over	1.00%

The merit and promotional increases are compounded with the sum of the inflationary and “across the board” salary increases.

**APPENDIX B**  
**PROPOSED ACTUARIAL 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:**

Rate (%)			
Male			
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

Female			
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.

**PROPOSED ACTUARIAL ASSUMPTIONS**

(Continued)

**Retirement Rates:**

<b>Age</b>	<b>Under 30 Years of Service</b>	<b>Over 30 Years of Service</b>
50	0.00%	0.00%
51	0.00	0.00
52	0.00	0.00
53	0.00	0.00
54	0.00	0.00
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 Current Inactive Vested Participants:**

Liability for deferred annuity at age 60 is assumed to be equivalent to the employee contributions plus Department matching contribution account.

**Percent Married/Domestic Partner:**

85% of male members and 60% of female members are assumed to be married 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.

## PROPOSED ACTUARIAL ASSUMPTIONS

(Continued)

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**Other Government Service:** Members are assumed to purchase an additional 0.15 years of service per year.

**Consumer Price Index:** Increase of 3.50% per year; benefit increases due to CPI subject to 3.00% maximum.

**Employee Contribution and Matching Account Crediting Rate:** 8.00%, based on Plan provisions

**Net Investment Return:** 7.75%, net of administrative and investment expenses.

**Salary Increases:**

Annual Rate of Compensation Increase

Inflation: 3.5% per year, plus “across the board” salary increases of 0.75% per year, plus the following merit and promotional increases.

<u>Years of Service</u>	<u>Increase</u>
0	6.25%
1	5.25%
2	4.75%
3	3.50%
4	2.00%
5+	1.10%

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