

CalPERS Experience Study
1997 to 2007

CalPERS Actuarial Office

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Executive Summary

The purpose of this experience study is to compare the actual experience of the system against the current assumptions and to recommend new actuarial assumptions for rates of decrement and salary increase.

The report presents the results of the experience study of the California Public Employees Retirement System. The report is derived from data collected during fiscal years 1997 to 2007. It has been almost six years since the last study. The last study was completed in May 2004 and reflected the experience between 1997 and 2002. We feel using ten years of data provides a better mix of years where the economy was in a recession and years where the economy was growing.

The study reviewed retirement rates (service, work related disability and non-work related disability retirement), termination rates (vested terminations and refunds), mortality rates (pre- and post-retirement) and rates of salary increase (increases of salary in excess of inflation) and recommends new assumptions for use in actuarial valuations of plans that participate in the California Public Employees Retirement Fund (State, schools and public agencies).

The recommended assumptions predict:

- Longer post-retirement life expectancy. The life expectancy of males is increasing by a full year on average while it is increasing on average by about 0.3 years for female.
- Slightly earlier retirement ages overall for all State plans, the Schools pool and local agency miscellaneous members and slightly higher retirement ages on average for local agency safety members.
- Higher salary increases for members with high service.
- Mixed results for other assumptions (these are described in detail in this report).

Introduction

The purpose of this experience study is to compare the actual experience of the system against the current recommendations and to recommend new actuarial assumptions for rates of decrement and salary increase. The report presents the results of the experience study of plans that participate in the California Public Employees Retirement Fund (State, schools and public agencies). The report is derived from data collected during fiscal years 1997 to 2007. It was prepared in accordance with current board policy which provides that an actuarial experience study is to be performed every four years. This document presents the results of the review by CalPERS staff into that experience.

Background

An experience study is a summarization of actual experience over a defined period of time. A study can be on past economic experience (such as past inflation, real rates of return on various asset classes, real salary growth relative to inflation, and payroll growth of the active population) and/or on past demographic experience (with an analysis of recent patterns of termination, death, disability, and retirement).

This study is limited exclusively to demographic experience. We consider the advancement of salaries due to seniority, merit, and promotion, independent of inflation as demographic experience for the purposes of this study.

Actuaries use the term “decrement” to describe the circumstances under which individuals leave a population under study. For example, an individual may decrement from the group of active members of the plan due to termination (vested or non-vested), death (work related or not), disability (work related or not), or service retirement.

Exposure is the term used by actuaries to represent the length of time that an individual was exposed to the possibility of leaving the population due to the decrement being studied.

We first compute the raw rates of decrement and salary increases. The raw rate of decrement (for a given decrement and studied population) is defined as the total number of individuals that left the population due to that decrement divided by the total exposure to that decrement for the group. The raw rate of salary increase for a given group is the observed percentage change in salaries for the group from one year to the next. The rates are functions calculated by a series of factors such as age and/or length of service. They do not necessarily become new actuarial assumptions about patterns of behavior for the future for two major reasons. First, the raw rates may represent only a sample of what might be a smooth underlying formula that really predicts behavior; an actuary frequently will “smooth” or “graduate” the raw rates to approximate the smoother underlying formula. Second, and more importantly, the future does not necessarily repeat the past; the experience study must be combined with a considerable amount of actuarial judgment to produce the actuarial assumptions used to anticipate future behavior.

Purpose of the Report

The purpose of this experience study is to review the actual experience of the system against the current assumptions and to recommend new actuarial assumptions for rates of decrement and salary increase (in excess of inflation) based on that experience.

Scope of the Study

This study focused on demographic experience; thus, economic assumptions were not considered as part of this study. The study reviewed retirement rates (service, work related disability and non-work related disability retirement), termination rates (vested terminations and refunds), mortality rates (pre- and post-retirement) and rates of salary increase (increases of salary in excess of inflation). The study did not investigate other demographic assumptions such as the proportion of members who are married, the age difference between a member and his/her spouse, the amount of unused sick leave or the load to account for the use of “best factors”.

In general, salary increases are awarded to employees due to economic factors (price inflation and real wage growth) and factors specific to particular employees (increases due to seniority, merit and promotion). This study only examined the factors specific to particular employees. The increases recommended in this report are to be combined with the economic assumptions about price inflation and real wage growth to determine the final salary increase assumption used in actuarial valuations.

Methodology

The methodology used in this study was the same as the methodology used in the last study except for the salary scale assumption. For the last study, a methodology report was developed and followed when performing the experience study. The methodology report was also reviewed by the actuarial consulting firm of EFI Actuaries Inc. in 2003.

Note that this is the first experience study in which the retirement pattern of separated members was studied in detail. A general discussion of the methodology used follows. Additional details about the methods used are included in the description of the findings for each decrement.

Data Source

The source of the data used in this study was the data stored in the actuarial valuation system. This data consists of a series of snapshots of the member data taken as of the end of each fiscal year.

Accordingly, we obtained data for the experience study from the actuarial database, in the form of eleven annual snapshots as of June 30th of the years 1997 to 2007 with the data covering the participants in all of the retirement plans included in the California Public Employees Retirement System.

These consecutive snapshots were used to generate three main files, one for active members, one for retired members and beneficiaries and one for inactive members entitled to vested benefits. Each file follows individuals through the ten fiscal years of the study providing information regarding when they first entered the study, when they exited and if so for what reason.

Calculation of Exposures and Assignment of Decrements

In general, an individual's exposure to a particular decrement begins only after that individual is eligible to receive benefits should that decrement occur. To reflect this, the exposure of each individual in the study commenced at either the study start date or the eligibility date, whichever was later. Similarly, exposure ended at the study end date or the date at which the eligibility ceased, whichever was earlier. We excluded individuals who decremented before the study start date or were not eligible to receive a benefit by the study end date. The Balducci hypothesis was applied, so if the decrement under study occurred during the observation period, exposure continued to the end of the age and/or service interval in which the decrement occurred.

The method used to calculate exposure and assign decrements by age and service is the exact age method. In the following discussion, E_x represents the sum of all exposure allocated to age x and $?_x$ represents the total number of decrements allocated to age x . To describe the

exact age method, consider a member aged $29 \frac{2}{12}$ at the start of the exposure period and $31 \frac{2}{12}$ at the end of the exposure period, and eligible to decrement throughout the period. Such a member would contribute $\frac{10}{12}$ of a year of exposure to E_{29} , one year of exposure to E_{30} and $\frac{2}{12}$ of a year of exposure to E_{31} . If this same individual were to decrement at age $30 \frac{6}{12}$ instead of continuing to the end of the study period, the exposures would be $\frac{10}{12}$ for E_{29} , 1 for E_{30} and 0 for E_{31} . In addition, the individual would have added 1 to q_{30} . In all cases q_{30} , the rate of decrement for age x , is calculated as q_{30} / E_{30} (before graduation).

In cases where accurate decrement dates were unavailable (primarily termination), we assumed a mid-year decrement for the purpose of determining the cessation of exposure to other decrements. This should be a satisfactory approximation as that the terminations should be evenly distributed throughout the year. In the study of the termination decrement itself, the terminating individual would be allocated a full year of exposure under the Balducci hypothesis, so the lack of an accurate termination date is not a problem.

Rates Studied

As was specified in the methodology report, the following demographic assumptions were studied.

Retirement Rates

- Service Retirement
- Work Related (Industrial) Disability Retirement
- Non-work Related Disability Retirement

Mortality Rates

- Pre-retirement Mortality – Ordinary
- Pre-retirement Mortality – Industrial
- Post-retirement Mortality – Service Retiree
- Post-retirement Mortality – Beneficiary
- Post-retirement Mortality – Non-work Related Disability Retiree
- Post-retirement Mortality – Work Related (Industrial) Disability Retiree

Termination Rates

- Termination (with and without refund)

Non-Decrement Rates

- Salary Increases (due to factors other than wage inflation)

Grouping Factors

Actuarial assumptions are based on a number of factors, including, but not limited to age, gender, and service. Based on CalPERS actuaries' professional judgment about the significance of the possible factors, a number of factors (which varied by decrement) to

examine for possible use in setting the actuarial assumption were selected for each decrement. The factors that were to be examined were documented in the methodology report. Possible factors included:

- Age (Attained Age; age rounded down to the nearest year)
- Service (The difference between the current date and the earliest available hire date, rounded down to the nearest year. This differs from the service used by the current rates, which is the actual total service accumulated by the individual.)
- Entry Age (Computed as Attained Age - Service)
- Age at Retirement
- Gender
- Salary
- Retirement Formula
- Disability Formula
- Organization Category (State, Schools, or Public Agency)
- Membership Category (e.g., Miscellaneous, Industrial, Firefighter, Police)
- Employer Type (City, County, or Other)

Note that with the passage of Senate Bill 400 in 1999, State Miscellaneous and State Industrial Tier 2 members were given the right to convert their service to Tier 1 anytime prior to retirement. As a result, the number of members being covered under these two plans continues to decrease year after year. Therefore, only Tier 1 assumptions were derived as part of this experience study and Tier 2 assumptions will remain unchanged.

Graduation

Various methodologies were used to graduate the results depending on the decrement and the amount of data available ranging from the modified Whittaker-Henderson graduation formula to a simple linear fit. Details are discussed in the sections dealing with the individual decrements and in the section dealing with the salary scale.

Margins

A margin is the difference between the assumption used for a calculation and the corresponding best estimate assumption. The actuarial assumptions recommended in this report represent our best estimate of future experience with no margins for adverse deviation except for post-retirement mortality. For this decrement, a margin has been subtracted from the mortality rates for service retirees and beneficiaries to account for on-going improvements in mortality. More details can be found under the findings for the post-retirement mortality.

Findings

Service Retirement for Active Members

Summary

The experience over the study period shows that, in general, more members are retiring than would be predicted by the current retirement assumptions for all the State plans, the Schools pool and local miscellaneous plans.

We are recommending revising the age and service based retirement assumptions that will produce higher expected numbers of retirements for all the State plans, the Schools pool and local miscellaneous plans. No changes in assumptions are being proposed for California Highway Patrol, local safety members under the 2% at age 55 safety formula and local safety members under the 2% at age 50 formula. For local safety members under the 3% at age 55 and 3% at age 50 formulas, the proposed assumptions predict lower number of retirements.

The proposed assumptions are all based on age and service. Previously, the assumptions applied to public agencies subject to the 2.5% at age 55, 2.7% at age 55 and 3% at age 60 formula were based on age only. The change to age and service based retirement assumptions allows better recognition of the costs for those Public Agency plans and generally cause an increase in employer contribution rates even if the same number of retirements are assumed.

Method

The retirement rates were based on data collected between 6/30/1997 to 6/30/2007. For the State plans and the Schools pool, only the data between 6/30/2000 and 6/30/2007 was included in the study since the retirement formula for all these groups was changes effective January 1, 2000 as a result of SB 400. For the 2.5% at age 55, 2.7% at age 55 and 3% at age 60 formula for local agency miscellaneous members, only the data between 6/30/2002 and 6/30/2007 was included since these benefits became effective on January 1, 2002.

We studied active members and terminated members separately. We excluded transferred members to prevent potential double counting of exposures and decrements for transferred members. The proportion of transferred members who do not have an active record elsewhere in the system is so small that excluding such members will not compromise the results of the study. Since most transferred members are also active members with another CalPERS employer, the same retirement rates will be applied to active and transferred members.

We also tried to exclude the impact of any improvement to benefit formula to ensure we excluded from our data the anticipated decline in retirements prior to an improvement and the anticipated rush to retire after an improvement to the benefit formula. For this experience study, we excluded any experience in the fiscal year prior to and after an improvement in benefit formula.

Factors used for grouping data:

- Age: The retirement rates display a strong pattern by age, due to influences such as the variance in benefit by age, traditional retirement ages, and eligibility for Social Security.
- Service: Retirement rates increase with service.
- Retirement Formula
- Organization Category
- Membership Category: Separate retirement rates were developed for miscellaneous members, police and firefighters. County peace officers were studied separately but the results were close to the results for police so the two categories were combined.
- Employment status: active and terminated were studied separately

Factors studied but not used for grouping data:

- Gender: The retirement rates do differ by gender but generally by less than one percent. The difference in rates by gender seems most pronounced at the earliest ages when females retire at slightly higher rates than males. However, even there, the difference is very small. In a large population the difference will cancel out, and it was decided that spreading out the data by splitting by gender would yield less reliable results.

The data was first grouped by membership category and benefit formula. In order to assess whether or not the current assumptions had to be revised, we did a comparison of the actual number of retirement to the expected number of retirements anticipated by our current assumption. The expected number of retirements was compared to the actual number of retirement for all ages and for all services. Based on this comparison changes to the current assumptions were made where appropriate.

Other Notes:

- Of the formulas studied in this report, only the retirement experience under the 2.5% at age 55, 2.7% at age 55 and the 3% at age 60 Public Agency miscellaneous formula were not studied in the prior experience study. Not enough data was available for these three formulas during the prior study.
- Some public agencies have mandatory retirement policies at certain ages for safety members. No data was available about these policies and it was not possible to identify or exclude the impact of these policies in this study. However, such policies would have affected the results.

Results

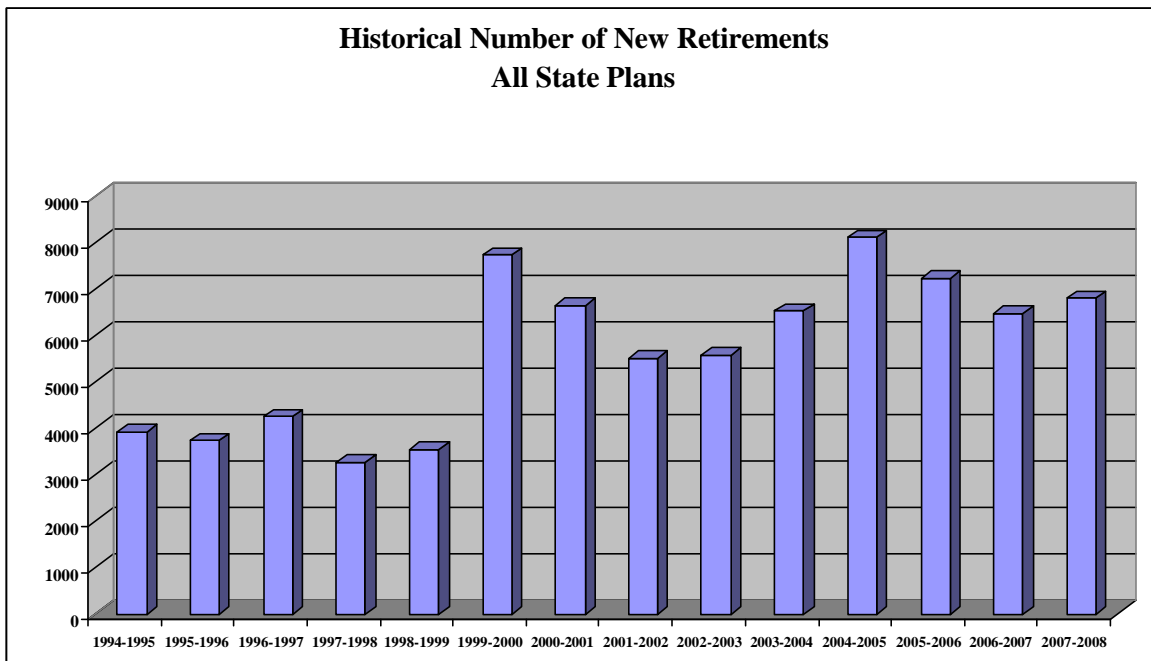
The service retirement rates display a strong and fairly consistent pattern by age. This can be attributed to a combination of the psychology of the membership and the structure of the benefits. It has long been observed that members tend to display a preference for retiring at ages divisible by 5, thus, retirement rates tend to be higher at ages 50, 55, 60 and 65. In addition, retirement rates are also higher at age 62 (when social security becomes available)

and at the age when the retirement benefit formula no longer increases (for members in the 2% @ 55 miscellaneous benefit formulas spikes occur at age 63).

The retirement rates were also studied by fiscal year to try to isolate the impact certain events might have had on the retirement behavior. For all the State plans and the Schools pool, the actual number of retirements was higher than expected each year over the study period.

The last experience study covered the time period where an important benefit improvement took place for all State and Schools employees. In 1999, Senate Bill 400 was enacted and provided enhanced retirement benefits to all State and School employees. In the last study, only data after year 2000 was considered since the benefit enhancements became effective on January 1, 2000.

As can be seen in the chart below for the State plans, the years before the passage of SB 400 saw smaller numbers of retirement. In 2000 with the passage of SB 400, the number of retirements increased. This was expected when the SB 400 analysis was prepared, as the analysis was based on this expected increased number of retirements. In the following three years, the number of retirements decreased. CALPERS actuaries conducted an experience study which was based on the three years of experience that followed the implementation of SB 400. The study showed that the number of retirements after SB 400 was lower than anticipated in the SB 400 cost analysis which led the actuarial office to lower the assumption about the anticipated number of retirements. Since the completion of that study, we saw numbers of retirements higher than expected by the actuarial assumptions. In 2007-2008, the number of retirements was about the same as expected. Since then though, the number of retirement has increased once again for reasons we believe are related to the current state of the economy and the mandatory furloughs that were imposed on State workers.



When looking at the fiscal year by fiscal year chart, it becomes apparent that fiscal year 2004-2005 is particularly high considering it is five years after the passage of SB 400. That year was following a change in the law allowing members to purchase Additional Retirement Service Credit (ARSC). As a result, we decided to investigate further. The retirement pattern of those purchasing service was studied and it showed that members that purchased service retired twice as fast as those who did not purchase service.

In selecting the proposed retirement assumptions, the believed impact of ARSC on retirement pattern was taken into account by not giving full weight to the 2003-2004 and 2004-2005 fiscal years. We felt that the introduction of ARSC had a lot to do with the increase in retirements in 2004-2005 and probably also for the higher than expected retirements in 2003-2004 and 2005-2006 years. We believe that including such one time event in the experience study would have resulted in the prediction of too many retirements going forward.

As a result, the proposed assumptions predict fewer retirements than the actual number of retirements over the study period but more than expected from the current assumptions. As mentioned above, we are aware that in the two fiscal year following our study period that the service retirements are much higher once again. We believe this increase is related to the current state of the economy and the mandatory furloughs that were imposed on State workers. Even with these new assumptions, we anticipate to see actuarial losses due to service retirement for fiscal year 2009-2010. We expect the trend to revert itself back toward our assumptions as the economy improves.

A separate study of members who purchased ARSC is currently under way. That study is looking at both the retirement pattern of members purchasing service as well as the salary increases of members purchasing service. A separate report will be produced for that study.

No changes are being proposed to the retirement assumptions for CHP. Back in 2004, a temporary benefit increase was adopted for CHP members in the form of an 8% increase in final compensation at the time of retirement. This benefit was phased out over time. As expected, the number of service retirement increased dramatically right after the adoption of this temporary benefit increase. Prior to the benefit increase, the actual number of retirements was about 8% higher than expected, after the temporary benefit increase, the actual number of retirements was 233% higher. In our professional judgment, the best course of action is to recommend that the current assumptions remain in place.

As mentioned above, the current assumptions applied to public agencies subject to the 2.5% at age 55, 2.7% at age 55 and 3% at age 60 formulas are based on age only. That means the same probability of retirement is assigned to a member age 55 whether that member has 10 years of service or 30 years of service. The proposed new assumptions for these three formulas are now based on age and service to allow for better recognition of the costs. These new rates predict fewer retirements among low-service members and more retirements among high-service members. Overall, more retirements are being predicted for plans covered by one of these three formulas.

The table below compares the actual number of retirements due to service retirement with the expected number of such retirements under both the current and proposed assumptions for active members.

Service Retirement Rates for Active Members					
	Actual*	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio
State Miscellaneous Tier 1	33,057	24,033	138%	30,004	110%
State Industrial Tier 1	1,434	1,076	133%	1,307	110%
State Safety	3,466	2,470	140%	3,211	108%
POFF	6,363	4,661	137%	5,425	117%
CHP	955	614	156%	No Changes	N/A
Schools	45,496	34,635	131%	39,689	115%
Public Agency					
2% at age 60 Miscellaneous	2,964	2,649	112%	2,982	99%
2% at age 55 Miscellaneous	23,871	21,570	111%	24,016	99%
2.5% at age 55 Miscellaneous	1,691	1,424	119%	1,533	110%
2.7% at age 55 Miscellaneous	2,749	2,337	118%	2,654	104%
3.0% at age 60 Miscellaneous	1,723	1,705	101%	1,663	104%
2% at age 50 Firefighters	723	728	99%	No Changes	
3% at age 55 Firefighters	340	413	82%	340	100%
3% at age 50 Firefighters	995	1,429	70%	1,193	83.4%
2% at age 50 Police	1,585	1,610	98%	No Changes	
3% at age 55 Police	211	587	74%	219	96%
3% at age 50 Police	2,651	3,086	86%	2,774	96%

* The number of actual and expected retirements has been adjusted to exclude all retirements on and above the age at which 100% of members are assumed to retire.

Service Retirement for Terminated Members

Summary

In the CalPERS valuation system, terminated members are currently assumed to retire as soon as they are eligible. We reviewed this assumption and are proposing the adoption of retirements rates that vary by age and service for terminated members.

Method

The retirement rates were based on data collected between 6/30/1997 to 6/30/2007. For the State plans and the Schools pool, only the data between 6/30/2000 and 6/30/2007 was included in the study since the retirement formulas for all these groups were changed effective January 1, 2000 as a result of SB 400.

Factors used for grouping data:

- Age: The retirement rates display a strong pattern by age, due to influences such as the variance in benefit by age, traditional retirement ages, and eligibility for Social Security.
- Service: Retirement rates increase with service.
- Organization Category
- Membership Category
- Employment status: active and terminated were studied separately

Factors studied but not used for grouping data:

- Gender

Results

This is the first time ever that the retirement pattern of terminated members has been studied. For terminated members we observed that the service retirement rates display a strong and fairly consistent pattern by age. It is also apparent that most members do not retire when they are first eligible contrary to the previous assumption. As expected, the results showed that terminated members retired much faster than active members.

By comparing the retirement pattern for terminated members to the retirement pattern of active members, it became clear that they were similar. As a result, the recommendation is to use the same retirement pattern that was approved for active members and apply a load factor to them to reflect the higher rates of retirement, especially at the lower ages.

Below is a table showing the proposed load factors that are recommended.

Age	Load Factor
50	450%
51	250%
52 through 56	200%
57 through 60	150%
61 through 64	125%
65 and above	100% (no change)

The table below compares the actual number of retirements due to service retirement for terminated members with the expected number of such retirements under both the current and proposed assumptions for terminated members.

Service Retirement Rates for Terminated Members					
	Actual	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio
State					
State Miscellaneous Tier 1	2,156	56,977	4%	2,145	101%
State Industrial Tier 1	108	4,535	2%	126	86%
State Safety	201	3,575	6%	170	118%
POFF	157	2,057	8%	140	112%
CHP	49	314	16%	25	199%
Schools	3,812	186,627	2%	3,143	121%
Public Agency					
Miscellaneous	4,984	106,464	5%	5,122	97%
Safety	618	2,546	24%	786	79%

Non-Work Related Disability

Summary

Overall, the new rates produce slightly lower rates of disability. No changes in assumptions are being proposed for State Miscellaneous male members and for Public Agency firefighters and police officers. New rates are being proposed for all other State and Public Agency members. The rates are lower for all groups except for CHP and Public Agency County Peace Officers. Note that the rates are generally being reduced above the age of 50.

Method

Transferred members were excluded from the study of this decrement for the same reasons as in the study of the service retirement decrement.

Factors used for grouping data:

- Age: Rates displayed a strong and fairly consistent pattern by age with substantial differences at different ages.
- Gender: For some groups, male and female disability rates differed significantly and separate tables were produced. For other groups, the male and female rates did not differ materially and the results were combined.
- Organization Category: The disability rates for Public Agency, State, and Schools miscellaneous members differed significantly and separate tables were produced.
- Membership Category: There are substantial differences in the disability rates by membership category. For example, the male Public Agency Safety rates are less than half those for male Public Agency Miscellaneous. Generally, State Industrial had the highest rates of disability followed by State Miscellaneous; State Safety had the lowest rates.
- Disability Formula: For most groups there was insufficient data to group by disability formula.

Raw non-work related disability retirement rates were graduated using the Whittaker-Henderson method.

Results

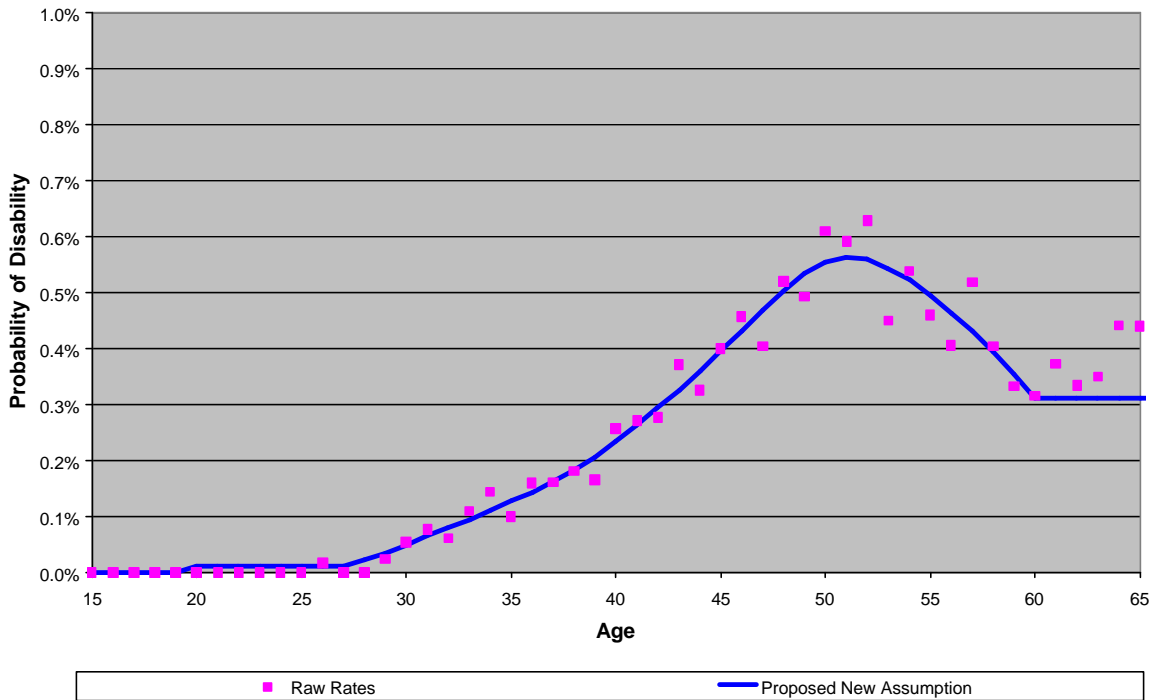
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In Schools, males had higher disability rates; in State Miscellaneous, females had higher disability rates; in Public Agency Miscellaneous, the disability rates were slightly higher for males. These results are consistent with the results from the previous experience study.

In the last study, the disability rates for CHP were reduced significantly since the experience showed that the actual number of decrements for CHP members was only 10% of the expected number. This time, the 10 year period showed that the number of disability incidence was higher than assumed and as a result the proposed disability rates for CHP are higher but still much lower than the rates in used prior to the last study.

For the Miscellaneous groups the disability rates at high ages (60 and above) are lower than the rates at the initial retirement ages (age 50 to 55). This pattern was observed in multiple groups where a substantial portion of the active population work beyond age 60 (e.g. State Miscellaneous, Public Agency Miscellaneous, and Schools pool). This suggests that this pattern is genuine. We believe that an explanation for this effect could be that, beyond age 55, the service retirement benefit is greater than the disability benefit, which encourages people to choose service retirement. The following chart shows this effect for State Miscellaneous Females:

**State Miscellaneous - Female
Non - Work Related Disability Retirement Rates**



The table below compares the actual number of (non-work related) disability retirements with the expected number of such retirements under both the current and proposed assumptions.

Non-Work Related Disability Retirements					
	Actual	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio
State					
Miscellaneous Tier 1 Male	1,391	1,453	96%	No Changes	
Miscellaneous Tier 1 Female	2,585	2,921	88%	2,590	100%
Industrial	413	472	88%	401	103%
Safety	298	324	92%	291	102%
POFF	214	274	78%	215	100%
CHP	13	9	144%	13	100%
Schools					
Schools Male	1,865	2,418	77%	1,874	100%
Schools Female	2,973	3,659	81%	2,973	100%
Public Agency					
Miscellaneous Male	1,987	2,389	83%	1,997	99%
Miscellaneous Female	1,801	2,134	84%	1,813	99%
Firefighters	105	95	111%	No Changes	
Police	42	38	111%	No Changes	
CPO	73	38	192%	69	106%

Work-Related (Industrial) Disability

Summary

Overall, the new work related (industrial) disability retirement rates produce higher decrements for all members except for State Police Officers and Firefighters where the rates are not changing.

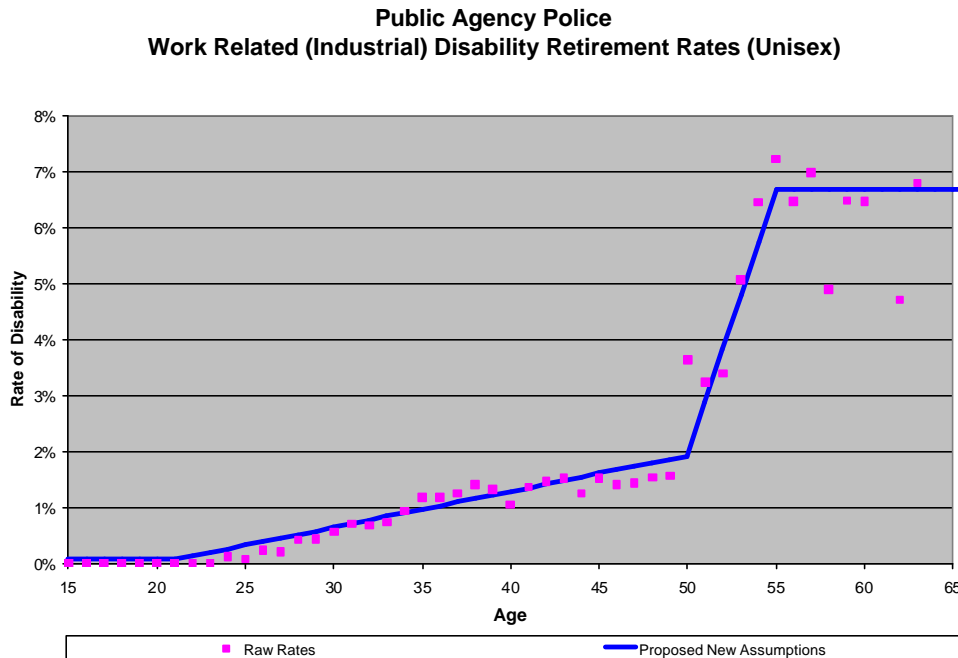
Method

Transferred and terminated members were excluded from the study of this decrement for the same reasons as in the study of the service retirement decrement.

Factors used for grouping data:

- Age: Rates increase with age. There were very few decrements below age 30 while some groups had very high work-related disability rates at retirement ages.
- Membership category: The effect was particularly apparent at retirement age, where some groups, CHP in particular, had much higher work related disability rates than others.

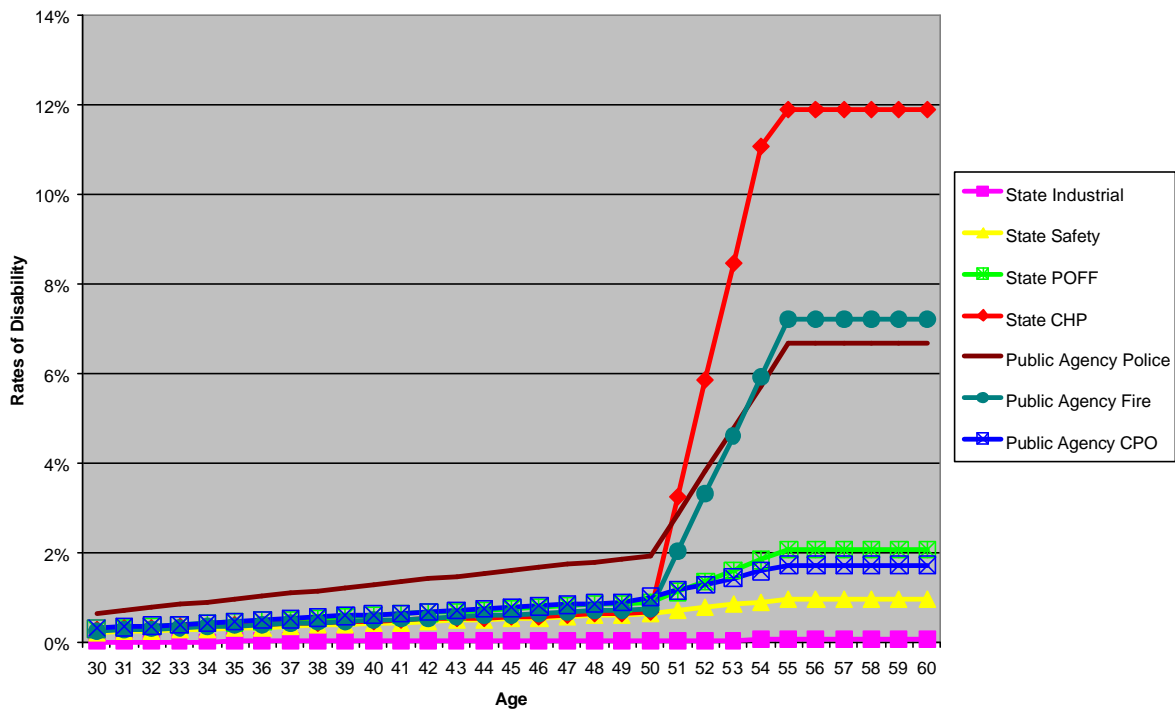
As was done in the last experience study, three linear segments were fit to the data between the ages of 15 and 50, 50 and 55, and 55 and higher. As an example, data for the Public Agency police category showed a significant increase in the disability rates shortly after age 50 and then a significant leveling off.



Discussion

There are significant variations in the patterns of work related disability between the various membership categories. It is believed that these differences represent real underlying differences in the behavior of members. For example, three of the groups (Public Agency police, Public Agency firefighter and California Highway Patrol) show a very substantial increase in the rates of industrial disability at or shortly after age 50. Three other groups (State safety, State POFF and Public Agency county peace officers) do not display this effect. This difference is believed to be due to how strictly the disability criteria are enforced for the different groups.

Comparison of Proposed Rates of Work Related (Industrial) Disability



One group (State industrial) has much lower rates of disability at all ages than the other groups. This is believed to reflect a difference in the nature of the work performed by this group as compared to the nature of the work performed by the other groups.

Results

The new work related (industrial) disability retirement rates produce higher decrements for all members except for State Police Officers and Firefighters where the rates are not changing. One of the reasons that the number of disability was greater than expected over the last 10 years is in part due to the fact that we modified our data collecting process. In many instances when an employee becomes disabled they first appear in our data as a termination of employment while their case is being reviewed. In the past, these would have been treated as a termination of employment not a disability. In this study we made sure to treat these as disabilities. That would explain in part the increase in the number of actual disability shown by our data.

Also, it is worth noting that for many of the groups, the proposed rates of work related disability show the biggest increases after age 50. From a pension plan cost point of view, these disabilities do not necessarily mean an increase in cost since the member is already eligible for service retirement and in most cases the benefit under service retirement is greater than the disability benefit. However, it is worth noting that higher rates of work related disabilities after age 50 generally result in additional costs to taxpayers because of the tax treatment of this type of disability benefits.

The table below compares the actual number of decrements due to work related disability retirement with the expected number of such decrements under both the current and proposed assumptions.

Work Related Disability Retirements					
	Actual	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio
State					
Industrial	31	21	148%	31	100%
Safety	950	777	122%	932	102%
POFF	2,753	2,842	97%	No Changes	
CHP	954	825	116%	904	106%
Schools	N/A	N/A	N/A	N/A	N/A
Public Agency					
Firefighters	1,551	1,307	119%	1,568	99%
Police	3,277	2,840	115%	3,266	100%
CPO	679	497	137%	640	106%

Terminations with Vested Benefits and Terminations with Refund

Summary

For terminations with vested benefits, the proposed rates produce an increase in the number of members expected to decrement with vested benefits for all State plans, Schools and Public Agency Miscellaneous plans. The rates are not changing for Public Agency firefighters and Public Agency County Peace Officers. For Public Agency Police plans, the proposed rates produce a decrease in the number of members expected to decrement with vested benefits.

For terminations with refunds, the proposed rates produce an increase in the number of members expected to decrement with refund for Schools, Miscellaneous Tier 1, State Industrial, and California Highway Patrol. Conversely, the proposed rates produce a decrease in the number of members expected to decrement with refunds for State Safety, State Peace Officers and Firefighters, and all the Public Agency Plans.

Method

Terminations with vested benefits and terminations with refunds were looked at separately. All terminated members having less than 5 years of service were considered refunds.

The termination data from 6/30/1998 was found to be inconsistent (due to the implementation of new data extract programs in 1999) with the other years of data and was not included in the study.

For simplicity and to avoid double counting, only data from active members was included in the study.

Factors used for grouping data:

- **Age:** Termination rates declined as age increased. Age was used as a grouping factor for State Miscellaneous, Schools, Public Agency miscellaneous and State Industrial categories. However, safety groups generally have less variance in the age at date of hire than do miscellaneous groups. This results in a higher correlation with service and makes this factor less useful in predicting terminations. Given this effect and the lesser amount of data available for safety groups, age was not used as a grouping factor for safety categories.
- **Service:** Termination rates declined as service increased. Service is used as a grouping factor in the proposed rates for all employee categories.
- **Employee Category:** Significant differences were observed in the termination rates applicable to different employee categories. Separate tables of termination rates were generated for miscellaneous members, police, firefighters and county peace officers.

Factors studied but not used for grouping data:

- Gender: While females generally terminated at slightly higher rates than males, the difference was insignificant compared to the effects of other factors.

In the last study, the raw rates were fitted by fitting three line segments through the data. This pattern was deemed to still be appropriate. The proposed rates were obtained by simply multiplying the current rates by a factor, either up or down, to better represent what the underlying raw rates were displaying. For example, for State Miscellaneous, the proposed rates for termination with refunds were obtained by increasing the current rates by 15% for members with less than 5 years of service and decreasing the current rates by 50% for members with more than 5 years of service.

Results

Overall, the new termination rates are higher than the current rates but the relative level of forfeitures is similar to those inherent in the current assumptions.

The table below compares the actual number of terminations with vested benefits under both the current and proposed assumptions.

Termination with Vested Benefits					
	Actual	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio
State					
Miscellaneous Tier 1	11,429	7,199	159%	11,375	100%
Industrial	830	355	234%	831	100%
Safety	1,310	642	204%	1,310	100%
POFF	2,376	1,991	119%	2,369	100%
CHP	254	167	152%	254	100%
Schools	28,054	20,302	138%	28,016	100%
Public Agency					
Miscellaneous	21,129	15,518	136%	21,104	100%
Firefighters	518	530	98%	No Changes	
Police	1,349	1,846	73%	1,348	100%
CPO	690	689	100%	No Changes	

The table below compares the actual number of terminations with refunds under both the current and proposed assumptions.

Termination with Refunds					
	Actual	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio
State					
Miscellaneous Tier 1	28,683	26,262	109%	27,623	104%
Industrial	1,100	1,062	104%	1,128	98%
Safety	3,212	3,409	94%	3,270	98%
POFF	5,592	6,779	82%	5,555	101%
CHP	216	193	112%	215	100%
Schools	101,268	95,522	106%	98,718	103%
Public Agency					
Miscellaneous	68,075	72,627	94%	69,106	99%
Firefighters	1,081	1,582	68%	1,071	101%
Police	2,447	3,690	66%	2,308	106%
CPO	1,837	1,979	93%	1,840	100%

Pre-retirement Mortality – Non-work Related

Summary

The new rates for non-work related pre-retirement mortality are higher than the current rates and continue to vary by age and gender only.

Method

Once again only the data from active members was used to study this decrement.

Factors used for grouping data:

- Age: Rates increase with age. Due to the small number of decrements the raw data was grouped into five year age bands.
- Gender: Male mortality rates are roughly 1.5 times the female rates.

Factors studied but not used for grouping data:

- Membership category: Rates for Miscellaneous members are similar to those for Safety members.

We fit an exponential curve to the raw rates.

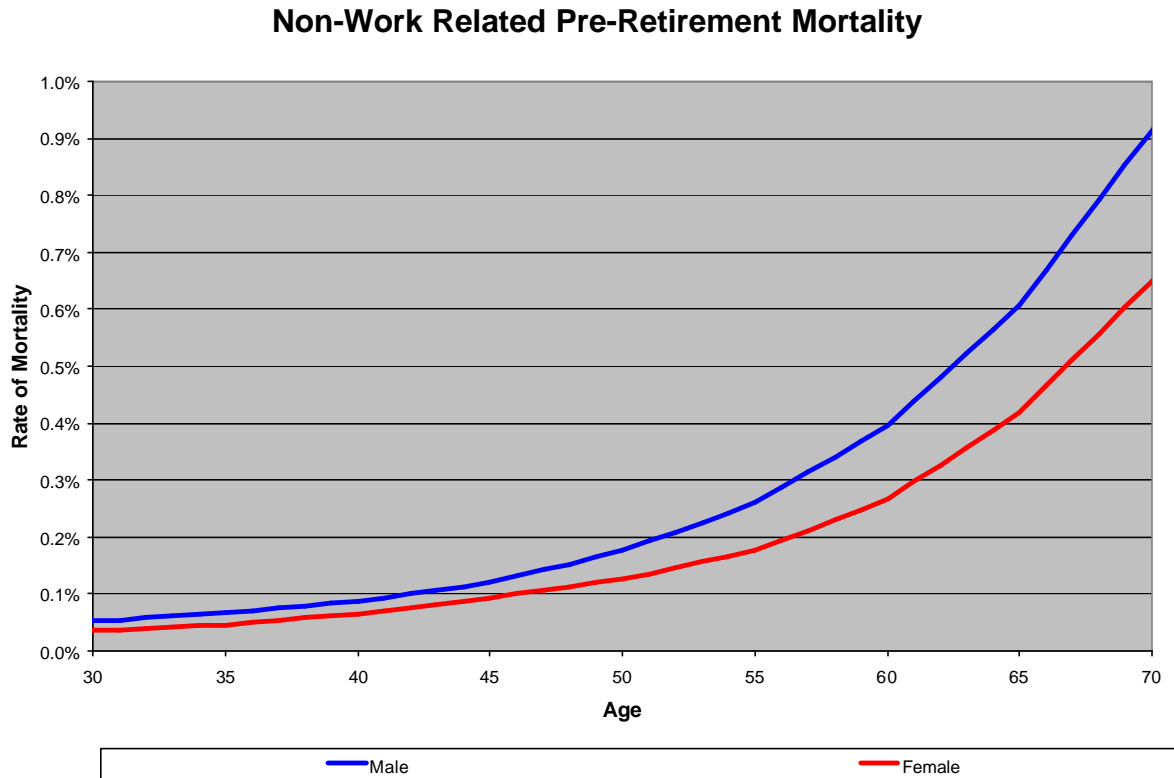
Discussion

In the prior study, the rates of pre-retirement non-work related mortality were lowered and at the time it was felt that further investigation was required. After further analysis, it was determined that the mortality rates were somewhat lower than would have been expected but not so low as to indicate a serious flaw.

This time around, the ten year time period for the study showed that the rates of pre-retirement non-work related mortality were higher than currently assumed and more in line with what would have been expected in the last study. Therefore, the rates are being increased for both male and female.

Results

The proposed rates of pre-retirement, non-work related mortality are shown in the graph below.



The table below compares the actual number of non-work related deaths with the expected number of such deaths under both the current and proposed assumptions.

Non-Work Related Deaths					
	Actual	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio
Female	5,255	4,279	123%	5,220	101%
Male	4,453	3,462	129%	4,423	101%

Pre-retirement Mortality – Work Related

Summary

Observed rates of work related mortality during the ten year study period were lower than predicted by the current rates; thus, the new rates are lower than the current rates.

Method

Only active members are eligible for this benefit, so we studied only active member data. The number of decrements is very low and this severely limited the amount of data grouping that was possible.

The only factor used for grouping data was age:

- Age: Rates increase with age.

Factors studied but not used for grouping data:

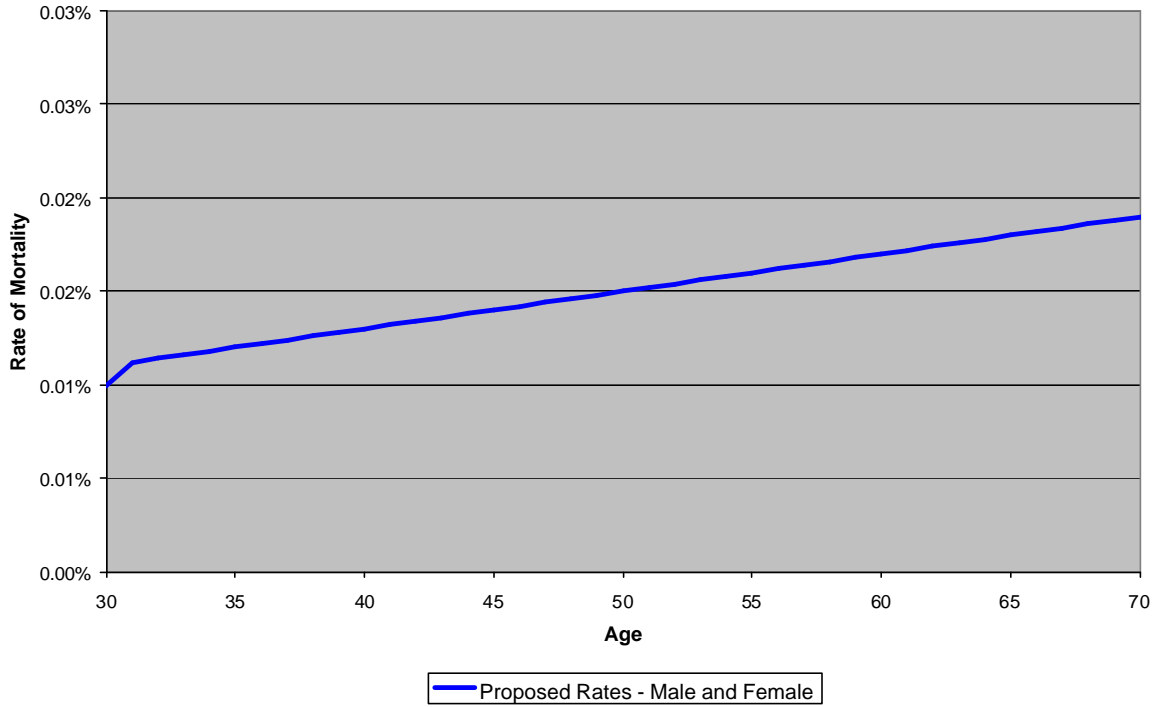
- Gender: There were insufficient female decrements to group by gender.
- Employee Category: There were insufficient decrements.
- Employer Type: There were insufficient decrements.

Male data from Industrial, Safety, POFF, CHP, and Public Agency Safety plans was combined and grouped into 10-year bands by age. As there was insufficient data to justify a more exact treatment, a straight line was fitted to the raw data. There were only three female decrements so this data was not used.

Results

The observed rates of work related mortality during the ten year study period were lower than predicted by the current rates for ages greater than 30. The proposed rates of pre-retirement, work related mortality are shown in the following graph.

Work Related Pre-Retirement Mortality



The table below compares the actual number of work related deaths with the expected number of such deaths under both the current and proposed assumptions.

Work Related Deaths					
	Actual	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio
All groups (non-Miscellaneous)	54	187	29%	60	90%

Post-Retirement Mortality – Service Retiree and Beneficiary

Summary

A new set of post-retirement mortality rates is being proposed for both male and female. The new rates are lower for both males and females which translate in an increase in the life expectancy of members. The life expectancy of males is increasing on average by 1 year while it is increasing on average by about 0.3 year for females.

No material differences in the post-retirement mortality rates were observed for retirees from safety groups as compared to retirees from miscellaneous groups. A more detailed discussion on this topic is included later in the report.

Method

Factors used for grouping data:

- Age: Rates increase with age.
- Gender: Male mortality rates are significantly higher than female rates but the difference is getting smaller.

Factors studied but not used for grouping data:

- Membership category: The mortality rates for the various Safety groups are all close to the Miscellaneous rates.

Raw rates were developed by age and gender and then graduated (by age) using the Whittaker-Henderson method.

The mortality rates were studied by looking at the 1997-2002 and the 2002-2007 time periods separately. In doing so, it became clear that mortality improvements had occurred over the last 5 years. In the last study, a 5% reduction factor had been applied to all the rates to reflect future mortality improvement. In comparing the mortality rates in 2002-2007 to the current assumption it showed that on average the male rates were about 10% lower and about 5% lower for female. That showed that the improvement that was applied in the last study was about right for females and to low for males.

In this study, we propose including 5 years of projected on-going mortality improvement using the Scale AA published by the Society of Actuaries to bring the mortality rates from the mid point of the study to today. This scale consists of an expected annual improvement in mortality that varies by age and also differs for males and females. The expected improvement is greater for males than females.

It is worth noting that the actuarial profession is currently in the process of modifying an existing Actuarial Standard of Practice (ASOP No. 35) to include more disclosure about potential future mortality improvements. The current draft version of ASOP No. 35 states the following:

“As mortality rates have continued to decline over time, concern has increased about the impact of potential future mortality improvements on the magnitude of pension commitments. Section 3.5.3 of current ASOP No. 35 lists “the likelihood and extent of mortality improvement in future” as a factor for the actuary to consider in selecting a mortality assumption. In the view of many actuaries, the guidance regarding mortality assumptions should more explicitly recognize estimated future mortality improvement as a fundamental and necessary assumption, and the actuary’s provision for such improvement should be explicitly and transparently disclosed. The exposure draft reflects this intent.”

As mentioned above, we are proposing to include 5 years of projected on-going mortality improvement using the Scale AA published by the Society of Actuaries to bring the mortality rates from the mid point of the study to today. 5 years of mortality improvement is the least amount of recommend at this time. We intend to continue monitoring the post-retirement mortality to see if additional improvement might be necessary in the future.

There was insufficient data to develop low-age mortality rates from our data for ages below age 50. Prior to age 50, we are proposing to use the current assumptions and apply 5 years of mortality improvement using scale AA. For males, we are also proposing to reduce all the rates by 5% since the overall mortality rates in the 2002-2007 period for males were about 5% lower than our current assumption. This 5% reduction is in addition to the improvements expected from Scale AA.

In order to smooth the transition at age 50, we blended the derived service retiree mortality rates with the rates prior to age 50 for ages between 50 and 63. Finally, between the ages of 100 and 110 the smoothed mortality rates were merged into an exponential curve which predicts 100% mortality at age 110.

Results

The new rates are lower for both males and females which translate in an increase in the life expectancy of members. The table below provides a comparison of the life expectancy for males and females under the current assumptions and the proposed new assumptions.

LIFE EXPECTANCY (In Years) *				
ATTAINED AGE	CURRENT ASSUMPTIONS		PROPOSED ASSUMPTIONS	
	Male	Female	Male	Female
50	80.9	84.8	81.8	85.0
55	81.4	85.0	82.3	85.3
60	82.0	85.5	83.0	85.7
65	82.9	86.1	83.9	86.4
70	84.2	87.1	85.0	87.3

The tables below compare the actual number of deaths with the expected number of deaths under both the current and proposed assumptions for members who retired under a service retirement.

Post-Retirement Mortality – Service Retiree Deaths					
	Actual	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio (Proposed)
Female	22,465	22,965	99%	22,105	102%
Male	22,938	24,193	95%	21,705	106%

As can be seen in the table above, the 5 years of mortality improvement that is being projected using Scale AA correspond to about a 6% reduction for males and 2% for females.

* Technically this is the expected age at death rather than the life expectancy.

Post-Retirement Mortality – Non-Work Related Disability Retiree

Summary

The new mortality assumptions for non-work related disability retirees produce generally higher rates of mortality for males before the age of 50 and lower after age 50. For females, the new mortality assumptions produce slightly lower mortality rates at all ages than the current assumptions.

Method

The mortality rates were studied by looking at the 1997-2002 and the 2002-2007 time periods separately.

Factors used for grouping data:

- Age: Mortality rates increase with age.
- Gender: Male mortality rates are higher than female rates.

Factors studied but not used for grouping data:

- Employee category: Between the ages of 30 and 80 the average mortality rates for Miscellaneous members were very similar to the rates for non-Miscellaneous members. There was insufficient data outside of this age range to make a comparison.

Based on these findings, raw rates were developed by age and gender and then graduated using the Whittaker-Henderson method. An exponential curve was used above age 80.

Results

The new mortality assumptions for non-work related disability retirees produce generally higher rates of mortality for males before the age of 50 and lower after age 50. For females, the new mortality assumptions produce slightly lower mortality rates at all ages than the current assumptions. Overall, the life expectancy of males younger than age 50 is generally lower while for males over the age of 50 and all females the life expectancy is higher by less than one year.

The mortality rates for non-work related disability retiree were studied by looking at the 1997-2002 and the 2002-2007 time periods separately. This showed that the mortality rates had improved over the last 5 years. As a result, we propose to include 5 years of projected on-going mortality improvement using the Scale AA published by the Society of Actuaries.

The table below provides a comparison of the life expectancy for males and females under the current assumptions and the proposed new assumptions.

LIFE EXPECTANCY (In Years) *				
ATTAINED AGE	CURRENT ASSUMPTIONS		PROPOSED ASSUMPTIONS	
	Male	Female	Male	Female
30	66.8	71.6	65.7	72.1
40	69.5	73.9	69.0	74.2
50	72.2	76.4	73.4	77.0
60	76.1	79.7	77.2	80.7
70	80.9	83.5	81.6	84.2

The table below compares the actual number of deaths of retirees who retired due to non-work related disability with the expected number of deaths under both the current and proposed assumptions.

Post-Retirement Mortality – Non-Work Related Disability Retiree Deaths					
	Actual	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio
Female	2,546	2,675	95%	2,477	103%
Male	2,874	2,968	97%	2,717	106%

* Technically this is the expected age at death rather than the life expectancy.

Post-Retirement Mortality – Work-Related Disability Retiree

Summary

The new mortality rates for male, work related disability retirees are lower than the current rates by close to 20% in some ages while the new female rates are slightly lower to reflect 5 years of mortality improvement.

Method

Factors used for grouping data:

- Age: Mortality rates increase with age.
- Gender: Gender is a factor, particularly above age 50.

Factors studied but not used for grouping data:

- Membership category: Mortality rates differ somewhat at later ages. Above age 50, CHP, Public Agency fire, and POFF groups had somewhat lower rates than other groups.
- Age at retirement: Mortality rates differ somewhat based on age at retirement. Retirees who retired before age 50 had slightly higher mortality rates than post-50 retirees.

Mortality rates of disabled members were studied by category but there were insufficient decrements to create accurate mortality curves using all the various grouping categories. Age and gender were determined to be the most important factors and the proposed rates are grouped accordingly.

As was done for the mortality rates for members who retired under service retirements, the mortality rates for non-work related disability retiree were studied by looking at the 1997-2002 and the 2002-2007 time periods separately. This showed that the mortality rates had improved over the last 5 years. As a result, we propose to include 5 years of projected on-going mortality improvement using the Scale AA published by the Society of Actuaries.

The male raw rates were graduated using the Whitaker-Henderson method and then modified to reflect 5 years of mortality improvement using Scale AA published by the Society of Actuaries. The female rates are the current rates modified to reflect 5 years of mortality improvement using Scale AA published by the Society of Actuaries.

Results

The new rates are lower for both males and females which translate in an increase in the life expectancy of members. The table below provides a comparison of the life expectancy for males and females under the current assumptions and the proposed new assumptions.

LIFE EXPECTANCY (In Years) *				
ATTAINED AGE	CURRENT ASSUMPTIONS		PROPOSED ASSUMPTIONS	
	Male	Female	Male	Female
30	75.6	80.2	78.4	80.6
40	76.5	81.0	79.2	81.4
50	77.6	82.0	80.1	82.3
60	79.1	83.5	81.6	83.8
70	81.9	85.8	83.9	86.0

The table below compares the actual number of deaths of retirees who retired due to work related disability with the expected number of deaths under both the current and proposed assumptions.

Post-Retirement Mortality – Work Related Disability Retiree Deaths					
	Actual	Expected (Current)	A/E Ratio	Expected (Proposed)	A/E Ratio
Female	119	124	96%	118	101%
Male	1,695	2,123	80%	1,589	107%

* Technically this is the expected age at death rather than the life expectancy.

Post-Retirement Mortality – Miscellaneous Versus Safety

As part of this experience study, the post-retirement mortality experience of the various safety categories and miscellaneous members were compared. As mentioned earlier, no material differences in the post-retirement mortality rates were observed for retirees from safety groups as compared to retirees from miscellaneous groups.

Below is a table comparing the life expectancy of members at CalPERS during the 1997-2007 study period. Only males that were in receipt of a service retirement benefits were included for this table. Note that the post-retirement mortality assumptions being proposed were based on the last 5 years of the study and also include mortality improvement. For this reason, the actual life expectancy of members used for valuation purposes is slightly higher than shown in the tables below.

Life Expectancy Table (In Years) *
For Service Retirements Only
Male Only

Age	Miscellaneous Members Only	All Safety Members	Firefighters	Police Officers	County Peace Officers
50	80.1	81.4	81.7	82.0	81.1
55	81.1	81.8	82.1	82.3	81.5
60	81.9	82.4	82.7	82.7	82.0
65	83.0	83.2	83.5	83.4	82.9

As can be seen, the life expectancy of safety members is slightly higher than the life expectancy of miscellaneous members. Since many safety members retire as a result work related injuries, we also compared life expectancies by combining both those that retired under a service retirement and those that retired under work related injuries. As expected, the life expectancy of safety workers came down but only slightly as can be seen in the table below.

* Technically this is the expected age at death rather than the life expectancy.

Life Expectancy Table (In Years) *
For Service Retirements and Retirements Caused by Work Related Injuries
Male Only

Age	Miscellaneous Members Only	All Safety Members	Firefighters	Police Officers	County Peace Officers
50	80.1	80.2	80.5	80.5	79.9
55	81.1	80.9	81.3	81.2	80.7
60	81.9	81.6	82.0	81.8	81.4
65	83.0	82.6	82.9	82.7	82.5

Since the differences in mortality between miscellaneous members and safety members were not material, we are recommending to continue the use of the same post-retirement mortality tables for all members.

* Technically this is the expected age at death rather than the life expectancy.

Salary Increase

Salary Increase

Summary

The new salary assumptions are identical to the current assumptions except for the members with more than 23 years of service. At higher service levels the new assumptions predict higher pay increases.

Method

We studied data from active members only.

Factors used for grouping data:

- Entry Age: Employees with lower entry ages tend to get larger pay increases at the same amount of service.
- Service: Salary increases are generally higher for low-service individuals.
- Membership Category
- Organization Category

Factors studied but not used for grouping data:

- Gender: We observed nearly identical patterns of salary increase for males and females.

Sources of salary increases: Seniority, Merit, and Promotion (SMP) and Inflation.

Salary increases can be thought of as the product of two distinct components: increases due to wage inflation and increases due to seniority, merit and promotion. Salary increases due to wage inflation tend to be driven by global or national trends although they can also be driven by industry specific trends as well. As such, these increases are best treated as an economic assumption and should be considered in conjunction with other economic assumptions such as price inflation and real rates of return. The pattern of increases due to seniority, merit and promotion tend to differ due to member specific or employer specific factors and are best treated as a demographic assumption. In this study, only the seniority, merit and promotion component of salary increases was studied. The salary increase assumptions recommended in this study should be combined with a wage inflation assumption to get total expected salary increases.

Method

As part of this study, the data for developing a new set of salary increase assumptions was studied two separate ways. A transverse study was done as well as a study using a method described in details in a book called “Fundamentals of Private Pension Plans” by McGill.

A transverse study compares the average salary for different age and service cells and estimates the average salary increase based on this difference. Thus, the average salary increase for 42 year old members with 15 years of service would be determined by comparing the average salary of 42 year olds with 15 years of service with the average salary of 43 year olds with 16 years of service. The main advantage of a transverse study is that the same amount of inflation is built into each age/service cell and hence wage inflation will not skew the results; there is no need to “back out” wage inflation from the data before determining the expected salary increases. The main disadvantage of a transverse study is that it will yield faulty results if high paid and low paid members decrement at different rates. For example, if high paid members delay retirement (due to higher job satisfaction, recent promotions, etc.) more than low paid members, the high paid members will represent an increasing proportion of the population at higher ages and a transverse study will generate artificially high salary increases for older members.

In using the transverse method, the data was divided up by organization category, employee category, banded entry age, and service. A fourth order polynomial was fit to the average salary data and pay increases were calculated from the smooth salary curve.

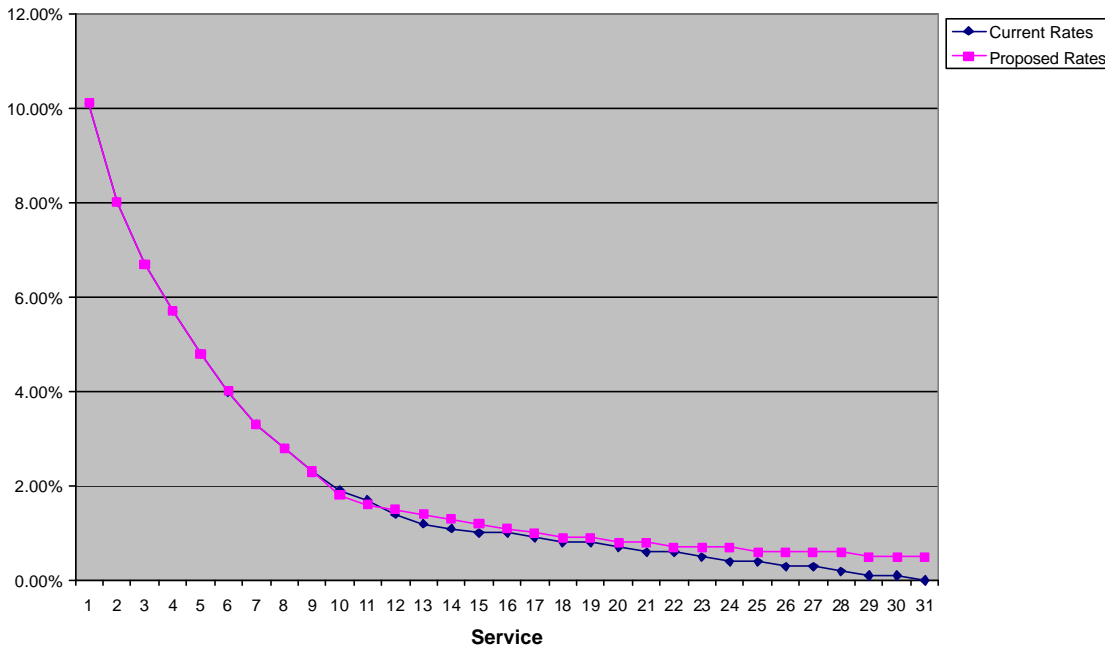
The other method used was the method described in details in a book called “Fundamentals of Private Pension Plans” by McGill. The book indicates that the proper way to construct a merit salary scale is to examine the historical relationship between the average compensation of employees at various ages to the average compensation of the entire population. For example, if in year 1 the average salary of members age 30 with 5 years of service is 50% of the average salary of the total population and that in year 2 the average salary of those same members still working and now age 31 with 6 years of service is 52% of the average salary of the total population then the merit salary increase between year 1 and year 2 for that age and service group was 4% (52 divided by 50). We used this method and calculated a merit salary increase for each age and service cell for each of the fiscal years between June 30, 1997 and June 30, 2007. Finally the merit salary increase for each age and service cell for the 10 year period were averaged over the years based on the number of people present in each cell in each of those years. These average increases were then graphed and fitted using a fourth order polynomial.

Results

As mentioned above, the data was studied using two separate methods. Both results led to the same conclusion that our current assumptions are appropriate at lower service levels but should be increased at later service. In the last study, the merit salary increase assumption was set to 0% for members with 30 or more years of service. In performing this study, it became clear that the data showed that members with high service continued to receive salary increases. We believe that these are legitimate and are probably the result of promotional opportunity late in an individual’s career and the result of more and more employers, especially for safety members, offering longevity salary increases.

Below is a chart comparing the current merit salary assumptions for State Miscellaneous to the proposed merit salary assumptions for a member hired at age 25.

**Current and Proposed Salary Scale Rates
For the State Miscellaneous Plan**



Below is a table showing the proposed ultimate merit salary increase for each of the groups. Note that the assumed wage inflation of 3.25% gets added to these merit increases in the actuarial valuations. For example, if the ultimate rate in the table below is 0.5%, that means in our valuations we assume the ultimate rate is 3.75%. Also, the current assumptions vary based on entry age and the proposed new assumptions continue to do so.

Group	Members with an Entry Age between 15 and 30	Members with an Entry Age between 30 and 40	Members with an Entry Age of more than 40
State Miscellaneous	0.5%	0.5%	0.2%
State Industrial	0.6%	0.3%	0.1%
State Safety	0.6%	0.6%	0.6%
State POFF	0.4%	0.4%	0.4%
Schools	0.4%	0.3%	0.1%
Public Agency			
Miscellaneous	0.6%	0.5%	0.1%
Firefighters	0.5%	0.4%	0.1%
Police	0.5%	0.3%	0.3%
CPO	0.5%	0.3%	0.3%

Because of this change to the ultimate merit salary increase assumption, the current merit salary increase assumption for members with less than 30 years of service had to be modified to ensure the salary increase assumption was lesser or equal as the service increased. As a result, the proposed merit salary increase assumption has higher rates for members with more than 28 years of service for State Miscellaneous and CHP, 25 years for State Industrial and 23 years of service or more for all other groups.

Recommendation

We recommend adopting the actuarial assumptions as discussed above and as summarized in Appendix A.



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Appendix A – Summary of Proposed Rates

Service Retirement Rates

Service Retirement Miscellaneous Tier 1 – 2%@55							
Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.004	0.011	0.016	0.019	0.023	0.027	0.032
51	0.004	0.011	0.015	0.019	0.023	0.027	0.031
52	0.004	0.012	0.016	0.020	0.025	0.029	0.033
53	0.006	0.015	0.021	0.026	0.032	0.037	0.043
54	0.008	0.022	0.030	0.037	0.046	0.054	0.062
55	0.018	0.048	0.067	0.082	0.101	0.118	0.136
56	0.014	0.038	0.054	0.066	0.081	0.095	0.109
57	0.018	0.048	0.068	0.084	0.102	0.120	0.138
58	0.019	0.050	0.071	0.087	0.106	0.124	0.144
59	0.022	0.059	0.082	0.101	0.124	0.145	0.168
60	0.026	0.070	0.098	0.121	0.148	0.173	0.200
61	0.032	0.087	0.122	0.150	0.184	0.215	0.248
62	0.047	0.125	0.176	0.217	0.266	0.311	0.359
63	0.056	0.150	0.211	0.259	0.318	0.371	0.429
64	0.046	0.124	0.174	0.214	0.262	0.307	0.354
65	0.054	0.145	0.204	0.250	0.307	0.359	0.415
66	0.042	0.114	0.161	0.197	0.242	0.283	0.327
67	0.044	0.117	0.165	0.203	0.249	0.290	0.336
68	0.043	0.116	0.163	0.200	0.245	0.286	0.331
69	0.049	0.131	0.185	0.227	0.279	0.326	0.376
70	0.050	0.134	0.188	0.231	0.284	0.331	0.383
71	0.039	0.104	0.147	0.180	0.222	0.259	0.299
72	0.034	0.092	0.130	0.160	0.196	0.229	0.264
73	0.029	0.077	0.108	0.133	0.164	0.191	0.221
74	0.020	0.053	0.074	0.092	0.112	0.131	0.152
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement Industrial Tier 1 – 2%@55							
Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.006	0.011	0.018	0.026	0.031	0.033	0.039
51	0.005	0.010	0.015	0.022	0.026	0.027	0.033
52	0.006	0.011	0.018	0.026	0.031	0.033	0.039
53	0.010	0.018	0.028	0.041	0.048	0.051	0.061
54	0.016	0.029	0.045	0.067	0.079	0.084	0.100
55	0.028	0.052	0.081	0.120	0.141	0.150	0.178
56	0.020	0.037	0.057	0.085	0.100	0.106	0.126
57	0.019	0.035	0.054	0.080	0.094	0.100	0.119
58	0.025	0.046	0.071	0.106	0.125	0.132	0.157
59	0.029	0.053	0.083	0.123	0.146	0.155	0.183
60	0.038	0.070	0.109	0.162	0.191	0.202	0.240
61	0.039	0.071	0.112	0.165	0.195	0.207	0.245
62	0.076	0.139	0.217	0.321	0.378	0.402	0.476
63	0.062	0.114	0.178	0.264	0.312	0.331	0.392
64	0.047	0.087	0.135	0.200	0.237	0.251	0.298
65	0.083	0.153	0.238	0.353	0.416	0.442	0.523
66	0.067	0.122	0.191	0.282	0.333	0.354	0.419
67	0.067	0.122	0.191	0.282	0.333	0.354	0.419
68	0.056	0.102	0.159	0.235	0.278	0.295	0.349
69	0.056	0.102	0.159	0.235	0.278	0.295	0.349
70	0.089	0.163	0.254	0.376	0.444	0.472	0.559
71	0.089	0.163	0.254	0.376	0.444	0.472	0.559
72	0.089	0.163	0.254	0.376	0.444	0.472	0.559
73	0.089	0.163	0.254	0.376	0.444	0.472	0.559
74	0.089	0.163	0.254	0.376	0.444	0.472	0.559
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement State Safety – 2.5%@55							
Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.012	0.021	0.028	0.033	0.037	0.048	0.057
51	0.007	0.012	0.016	0.018	0.020	0.027	0.031
52	0.008	0.014	0.019	0.023	0.025	0.033	0.039
53	0.012	0.021	0.028	0.033	0.037	0.048	0.056
54	0.024	0.041	0.055	0.064	0.072	0.093	0.111
55	0.042	0.070	0.095	0.111	0.124	0.161	0.191
56	0.038	0.064	0.086	0.101	0.113	0.146	0.174
57	0.034	0.058	0.079	0.092	0.103	0.133	0.158
58	0.040	0.068	0.092	0.107	0.120	0.155	0.184
59	0.040	0.067	0.090	0.105	0.118	0.153	0.181
60	0.043	0.072	0.098	0.115	0.128	0.166	0.197
61	0.057	0.096	0.130	0.152	0.170	0.221	0.261
62	0.070	0.117	0.159	0.186	0.208	0.270	0.320
63	0.066	0.111	0.151	0.176	0.197	0.256	0.303
64	0.071	0.120	0.163	0.191	0.213	0.277	0.328
65	0.095	0.160	0.217	0.254	0.284	0.369	0.437
66	0.072	0.121	0.163	0.191	0.213	0.277	0.328
67	0.071	0.119	0.161	0.189	0.210	0.273	0.324
68	0.079	0.132	0.179	0.210	0.234	0.304	0.361
69	0.098	0.166	0.224	0.263	0.293	0.381	0.452
70	0.086	0.144	0.195	0.229	0.255	0.331	0.393
71	0.068	0.115	0.156	0.183	0.204	0.265	0.314
72	0.068	0.115	0.156	0.183	0.204	0.265	0.314
73	0.068	0.115	0.156	0.183	0.204	0.265	0.314
74	0.068	0.115	0.156	0.183	0.204	0.265	0.314
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

**Service Retirement
POFF – 3%@55**

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.006	0.020	0.027	0.031	0.052	0.082	0.095
51	0.005	0.018	0.024	0.028	0.047	0.074	0.086
52	0.008	0.026	0.035	0.041	0.067	0.106	0.123
53	0.014	0.048	0.064	0.074	0.123	0.193	0.224
54	0.016	0.054	0.073	0.084	0.139	0.219	0.254
55	0.023	0.078	0.105	0.122	0.202	0.317	0.368
56	0.021	0.070	0.094	0.109	0.181	0.284	0.330
57	0.017	0.058	0.079	0.091	0.151	0.238	0.276
58	0.020	0.066	0.089	0.103	0.170	0.267	0.310
59	0.019	0.063	0.085	0.098	0.162	0.255	0.296
60	0.020	0.067	0.091	0.105	0.174	0.273	0.317
61	0.021	0.070	0.095	0.110	0.182	0.286	0.332
62	0.035	0.116	0.157	0.181	0.301	0.472	0.549
63	0.032	0.107	0.145	0.167	0.277	0.436	0.506
64	0.041	0.137	0.185	0.214	0.355	0.558	0.648
65	0.039	0.132	0.178	0.206	0.341	0.536	0.623
66	0.033	0.112	0.152	0.175	0.291	0.457	0.530
67	0.041	0.138	0.186	0.215	0.357	0.560	0.651
68	0.034	0.113	0.153	0.177	0.293	0.461	0.535
69	0.028	0.094	0.127	0.146	0.243	0.382	0.444
70	1.000	1.000	1.000	1.000	1.000	1.000	1.000

**Service Retirement
CHP – 3%@50**

NO CHANGES BEING PROPOSED

Service Retirement Schools – 2%@55							
Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.005	0.009	0.013	0.015	0.016	0.018	0.022
51	0.005	0.010	0.014	0.017	0.019	0.021	0.025
52	0.006	0.012	0.017	0.020	0.022	0.025	0.029
53	0.007	0.014	0.019	0.023	0.026	0.029	0.033
54	0.012	0.024	0.033	0.039	0.044	0.049	0.057
55	0.024	0.048	0.067	0.079	0.088	0.099	0.116
56	0.020	0.039	0.055	0.065	0.072	0.081	0.095
57	0.021	0.042	0.059	0.070	0.078	0.087	0.102
58	0.025	0.050	0.070	0.083	0.092	0.103	0.121
59	0.029	0.057	0.080	0.095	0.105	0.118	0.138
60	0.037	0.073	0.102	0.121	0.134	0.150	0.176
61	0.046	0.090	0.126	0.149	0.166	0.186	0.218
62	0.076	0.151	0.212	0.250	0.278	0.311	0.366
63	0.069	0.136	0.191	0.225	0.251	0.281	0.330
64	0.067	0.133	0.185	0.219	0.244	0.273	0.320
65	0.091	0.180	0.251	0.297	0.331	0.370	0.435
66	0.072	0.143	0.200	0.237	0.264	0.295	0.347
67	0.067	0.132	0.185	0.218	0.243	0.272	0.319
68	0.060	0.118	0.165	0.195	0.217	0.243	0.286
69	0.067	0.133	0.187	0.220	0.246	0.275	0.323
70	0.066	0.131	0.183	0.216	0.241	0.270	0.316
71	0.051	0.102	0.143	0.168	0.188	0.210	0.246
72	0.045	0.090	0.126	0.149	0.166	0.185	0.218
73	0.044	0.088	0.122	0.145	0.161	0.180	0.212
74	0.055	0.109	0.153	0.180	0.201	0.225	0.264
75	0.055	0.108	0.151	0.179	0.199	0.223	0.262
76	0.044	0.086	0.121	0.143	0.159	0.178	0.209
77	0.050	0.098	0.137	0.162	0.181	0.202	0.238
78	0.050	0.100	0.140	0.165	0.184	0.206	0.242
79	0.093	0.185	0.258	0.305	0.340	0.380	0.447
80	1.000	1.000	1.000	1.000	1.000	1.000	1.000

**Service Retirement
Public Agency Miscellaneous – 2%@60**

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.011	0.015	0.018	0.021	0.023	0.026	0.028
51	0.009	0.013	0.016	0.018	0.020	0.023	0.025
52	0.013	0.018	0.022	0.025	0.028	0.031	0.034
53	0.011	0.016	0.019	0.022	0.025	0.028	0.030
54	0.015	0.021	0.025	0.028	0.032	0.036	0.039
55	0.023	0.032	0.039	0.044	0.049	0.055	0.060
56	0.019	0.027	0.032	0.037	0.041	0.046	0.050
57	0.025	0.035	0.042	0.048	0.054	0.060	0.066
58	0.030	0.042	0.051	0.058	0.065	0.073	0.080
59	0.035	0.049	0.060	0.068	0.076	0.085	0.093
60	0.062	0.087	0.105	0.119	0.133	0.149	0.163
61	0.079	0.110	0.134	0.152	0.169	0.190	0.208
62	0.132	0.186	0.225	0.255	0.284	0.319	0.350
63	0.126	0.178	0.216	0.244	0.272	0.305	0.335
64	0.122	0.171	0.207	0.234	0.262	0.293	0.322
65	0.173	0.243	0.296	0.334	0.373	0.418	0.458
66	0.114	0.160	0.194	0.219	0.245	0.274	0.301
67	0.159	0.223	0.271	0.307	0.342	0.384	0.421
68	0.113	0.159	0.193	0.218	0.243	0.273	0.299
69	0.114	0.161	0.195	0.220	0.246	0.276	0.302
70	0.127	0.178	0.216	0.244	0.273	0.306	0.335
71	0.082	0.116	0.140	0.159	0.177	0.198	0.218
72	0.097	0.136	0.165	0.187	0.208	0.233	0.256
73	0.055	0.078	0.094	0.107	0.119	0.133	0.146
74	0.088	0.124	0.150	0.170	0.189	0.212	0.233
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

**Service Retirement
Public Agency Miscellaneous 2%@55**

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.015	0.020	0.024	0.029	0.033	0.039	0.044
51	0.013	0.016	0.020	0.024	0.027	0.033	0.037
52	0.014	0.018	0.022	0.027	0.030	0.036	0.040
53	0.017	0.022	0.027	0.032	0.037	0.043	0.049
54	0.027	0.034	0.041	0.049	0.056	0.067	0.076
55	0.050	0.064	0.078	0.094	0.107	0.127	0.143
56	0.045	0.057	0.069	0.083	0.095	0.113	0.127
57	0.048	0.061	0.074	0.090	0.102	0.122	0.137
58	0.052	0.066	0.080	0.097	0.110	0.131	0.148
59	0.060	0.076	0.092	0.111	0.127	0.151	0.169
60	0.072	0.092	0.112	0.134	0.153	0.182	0.205
61	0.089	0.113	0.137	0.165	0.188	0.224	0.252
62	0.128	0.162	0.197	0.237	0.270	0.322	0.362
63	0.129	0.164	0.199	0.239	0.273	0.325	0.366
64	0.116	0.148	0.180	0.216	0.247	0.294	0.330
65	0.174	0.221	0.269	0.323	0.369	0.439	0.494
66	0.135	0.171	0.208	0.250	0.285	0.340	0.382
67	0.133	0.169	0.206	0.247	0.282	0.336	0.378
68	0.118	0.150	0.182	0.219	0.250	0.297	0.334
69	0.116	0.147	0.179	0.215	0.246	0.293	0.329
70	0.138	0.176	0.214	0.257	0.293	0.349	0.393
71	0.094	0.120	0.145	0.175	0.200	0.238	0.267
72	0.104	0.132	0.160	0.192	0.220	0.261	0.294
73	0.083	0.106	0.129	0.155	0.177	0.211	0.237
74	0.064	0.082	0.100	0.120	0.137	0.163	0.183
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

**Service Retirement
Public Agency Miscellaneous 2.5% @55**

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.026	0.033	0.040	0.048	0.055	0.062	0.069
51	0.021	0.026	0.032	0.038	0.043	0.049	0.054
52	0.021	0.026	0.032	0.038	0.043	0.049	0.054
53	0.026	0.033	0.040	0.048	0.055	0.062	0.069
54	0.043	0.054	0.066	0.078	0.089	0.101	0.112
55	0.088	0.112	0.136	0.160	0.184	0.208	0.232
56	0.055	0.070	0.085	0.100	0.115	0.130	0.145
57	0.061	0.077	0.094	0.110	0.127	0.143	0.160
58	0.072	0.091	0.111	0.130	0.150	0.169	0.189
59	0.083	0.105	0.128	0.150	0.173	0.195	0.218
60	0.088	0.112	0.136	0.160	0.184	0.208	0.232
61	0.083	0.105	0.128	0.150	0.173	0.195	0.218
62	0.121	0.154	0.187	0.220	0.253	0.286	0.319
63	0.105	0.133	0.162	0.190	0.219	0.247	0.276
64	0.105	0.133	0.162	0.190	0.219	0.247	0.276
65	0.143	0.182	0.221	0.260	0.299	0.338	0.377
66	0.105	0.133	0.162	0.190	0.219	0.247	0.276
67	0.105	0.133	0.162	0.190	0.219	0.247	0.276
68	0.105	0.133	0.162	0.190	0.219	0.247	0.276
69	0.105	0.133	0.162	0.190	0.219	0.247	0.276
70	0.125	0.160	0.194	0.228	0.262	0.296	0.331
71	0.125	0.160	0.194	0.228	0.262	0.296	0.331
72	0.125	0.160	0.194	0.228	0.262	0.296	0.331
73	0.125	0.160	0.194	0.228	0.262	0.296	0.331
74	0.125	0.160	0.194	0.228	0.262	0.296	0.331
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

**Service Retirement
Public Agency Miscellaneous 2.7% @55**

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.028	0.035	0.043	0.050	0.058	0.065	0.073
51	0.022	0.028	0.034	0.040	0.046	0.052	0.058
52	0.022	0.028	0.034	0.040	0.046	0.052	0.058
53	0.028	0.035	0.043	0.050	0.058	0.065	0.073
54	0.044	0.056	0.068	0.080	0.092	0.104	0.116
55	0.091	0.116	0.140	0.165	0.190	0.215	0.239
56	0.061	0.077	0.094	0.110	0.127	0.143	0.160
57	0.063	0.081	0.098	0.115	0.132	0.150	0.167
58	0.074	0.095	0.115	0.135	0.155	0.176	0.196
59	0.083	0.105	0.128	0.150	0.173	0.195	0.218
60	0.088	0.112	0.136	0.160	0.184	0.208	0.232
61	0.085	0.109	0.132	0.155	0.178	0.202	0.225
62	0.124	0.158	0.191	0.225	0.259	0.293	0.326
63	0.107	0.137	0.166	0.195	0.224	0.254	0.283
64	0.107	0.137	0.166	0.195	0.224	0.254	0.283
65	0.146	0.186	0.225	0.265	0.305	0.345	0.384
66	0.107	0.137	0.166	0.195	0.224	0.254	0.283
67	0.107	0.137	0.166	0.195	0.224	0.254	0.283
68	0.107	0.137	0.166	0.195	0.224	0.254	0.283
69	0.107	0.137	0.166	0.195	0.224	0.254	0.283
70	0.129	0.164	0.199	0.234	0.269	0.304	0.339
71	0.129	0.164	0.199	0.234	0.269	0.304	0.339
72	0.129	0.164	0.199	0.234	0.269	0.304	0.339
73	0.129	0.164	0.199	0.234	0.269	0.304	0.339
74	0.129	0.164	0.199	0.234	0.269	0.304	0.339
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

**Service Retirement
Public Agency Miscellaneous 3%@60**

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.026	0.033	0.040	0.048	0.055	0.062	0.069
51	0.021	0.026	0.032	0.038	0.043	0.049	0.054
52	0.019	0.025	0.030	0.035	0.040	0.046	0.051
53	0.025	0.032	0.038	0.045	0.052	0.059	0.065
54	0.039	0.049	0.060	0.070	0.081	0.091	0.102
55	0.083	0.105	0.128	0.150	0.173	0.195	0.218
56	0.055	0.070	0.085	0.100	0.115	0.130	0.145
57	0.061	0.077	0.094	0.110	0.127	0.143	0.160
58	0.072	0.091	0.111	0.130	0.150	0.169	0.189
59	0.080	0.102	0.123	0.145	0.167	0.189	0.210
60	0.094	0.119	0.145	0.170	0.196	0.221	0.247
61	0.088	0.112	0.136	0.160	0.184	0.208	0.232
62	0.127	0.161	0.196	0.230	0.265	0.299	0.334
63	0.110	0.140	0.170	0.200	0.230	0.260	0.290
64	0.110	0.140	0.170	0.200	0.230	0.260	0.290
65	0.149	0.189	0.230	0.270	0.311	0.351	0.392
66	0.110	0.140	0.170	0.200	0.230	0.260	0.290
67	0.110	0.140	0.170	0.200	0.230	0.260	0.290
68	0.110	0.140	0.170	0.200	0.230	0.260	0.290
69	0.110	0.140	0.170	0.200	0.230	0.260	0.290
70	0.132	0.168	0.204	0.240	0.276	0.312	0.348
71	0.132	0.168	0.204	0.240	0.276	0.312	0.348
72	0.132	0.168	0.204	0.240	0.276	0.312	0.348
73	0.132	0.168	0.204	0.240	0.276	0.312	0.348
74	0.132	0.168	0.204	0.240	0.276	0.312	0.348
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement Public Agency Fire – 2%@55
NO CHANGES BEING PROPOSED

Service Retirement Public Agency Police – 2%@55
NO CHANGES BEING PROPOSED

Service Retirement Public Agency Fire – 2%@50
NO CHANGES BEING PROPOSED

Service Retirement Public Agency Police – 2%@50
NO CHANGES BEING PROPOSED

Service Retirement Public Agency Fire – 3%@55							
Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.012	0.012	0.012	0.018	0.028	0.033	0.033
51	0.008	0.008	0.008	0.012	0.019	0.022	0.022
52	0.018	0.018	0.018	0.027	0.042	0.050	0.050
53	0.043	0.043	0.043	0.062	0.098	0.114	0.114
54	0.057	0.057	0.057	0.083	0.131	0.152	0.152
55	0.092	0.092	0.092	0.134	0.211	0.246	0.246
56	0.081	0.081	0.081	0.118	0.187	0.218	0.218
57	0.100	0.100	0.100	0.146	0.230	0.268	0.268
58	0.081	0.081	0.081	0.119	0.187	0.219	0.219
59	0.078	0.078	0.078	0.113	0.178	0.208	0.208
60	0.117	0.117	0.117	0.170	0.267	0.312	0.312
61	0.078	0.078	0.078	0.113	0.178	0.208	0.208
62	0.098	0.098	0.098	0.141	0.223	0.260	0.260
63	0.078	0.078	0.078	0.113	0.178	0.208	0.208
64	0.078	0.078	0.078	0.113	0.178	0.208	0.208
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement Public Agency Police – 3%@55							
Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.019	0.019	0.019	0.019	0.040	0.060	0.060
51	0.024	0.024	0.024	0.024	0.049	0.074	0.074
52	0.024	0.024	0.024	0.024	0.051	0.077	0.077
53	0.059	0.059	0.059	0.059	0.121	0.183	0.183
54	0.069	0.069	0.069	0.069	0.142	0.215	0.215
55	0.116	0.116	0.116	0.116	0.240	0.363	0.363
56	0.076	0.076	0.076	0.076	0.156	0.236	0.236
57	0.058	0.058	0.058	0.058	0.120	0.181	0.181
58	0.076	0.076	0.076	0.076	0.157	0.237	0.237
59	0.094	0.094	0.094	0.094	0.193	0.292	0.292
60	0.141	0.141	0.141	0.141	0.290	0.438	0.438
61	0.094	0.094	0.094	0.094	0.193	0.292	0.292
62	0.118	0.118	0.118	0.118	0.241	0.365	0.365
63	0.094	0.094	0.094	0.094	0.193	0.292	0.292
64	0.094	0.094	0.094	0.094	0.193	0.292	0.292
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement Public Agency Fire – 3%@50							
Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.034	0.034	0.034	0.048	0.068	0.080	0.086
51	0.046	0.046	0.046	0.065	0.092	0.109	0.117
52	0.069	0.069	0.069	0.097	0.138	0.163	0.175
53	0.084	0.084	0.084	0.117	0.166	0.197	0.211
54	0.103	0.103	0.103	0.143	0.204	0.241	0.258
55	0.127	0.127	0.127	0.177	0.252	0.298	0.319
56	0.121	0.121	0.121	0.169	0.241	0.285	0.305
57	0.101	0.101	0.101	0.141	0.201	0.238	0.255
58	0.118	0.118	0.118	0.165	0.235	0.279	0.299
59	0.100	0.100	0.100	0.140	0.199	0.236	0.253
60	0.150	0.150	0.150	0.210	0.299	0.354	0.380
61	0.100	0.100	0.100	0.140	0.199	0.236	0.253
62	0.125	0.125	0.125	0.175	0.249	0.295	0.316
63	0.100	0.100	0.100	0.140	0.199	0.236	0.253
64	0.100	0.100	0.100	0.140	0.199	0.236	0.253
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement Public Agency Police – 3%@50							
Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.070	0.070	0.070	0.131	0.193	0.249	0.306
51	0.050	0.050	0.050	0.095	0.139	0.180	0.220
52	0.061	0.061	0.061	0.116	0.171	0.220	0.270
53	0.069	0.069	0.069	0.130	0.192	0.247	0.303
54	0.071	0.071	0.071	0.134	0.197	0.255	0.312
55	0.090	0.090	0.090	0.170	0.250	0.322	0.395
56	0.069	0.069	0.069	0.130	0.191	0.247	0.302
57	0.080	0.080	0.080	0.152	0.223	0.288	0.353
58	0.087	0.087	0.087	0.164	0.242	0.312	0.382
59	0.090	0.090	0.090	0.170	0.251	0.323	0.396
60	0.135	0.135	0.135	0.255	0.377	0.485	0.594
61	0.090	0.090	0.090	0.170	0.251	0.323	0.396
62	0.113	0.113	0.113	0.213	0.314	0.404	0.495
63	0.090	0.090	0.090	0.170	0.251	0.323	0.396
64	0.090	0.090	0.090	0.170	0.251	0.323	0.396
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Non-Work Related Disability

Non-Work Related Disability Retirement							
	Age						
	20	30	40	50	60	70	80
State							
Misc Tier 1 Female	0.0001	0.00048	0.00233	0.00554	0.00312	0.00312	0.00312
Misc Tier 1 Male	No Changes being proposed						
Misc Tier 2 Female	No Changes being proposed						
Misc Tier 2 Male	No Changes being proposed						
Industrial	0.00043	0.00136	0.00315	0.00621	0.00918	0.01003	0.01003
State Safety	0.00036	0.00063	0.00072	0.00216	0.00387	0.00459	0.00459
POFF	0.00010	0.00010	0.00040	0.00098	0.00188	0.00233	0.00233
CHP	0.00014	0.00014	0.00014	0.00028	0.00028	0.00028	0.00028
Schools							
Female	0.00010	0.00010	0.00094	0.00299	0.00239	0.00075	0.00075
Male	0.00010	0.00018	0.00136	0.00439	0.00425	0.00395	0.00395
Public Agency							
Misc Female	0.00010	0.00020	0.00164	0.00311	0.00253	0.00182	0.00182
Misc Male	0.00010	0.00021	0.00145	0.00331	0.00377	0.00279	0.00279
County Peace Officer	0.00010	0.00012	0.00066	0.00180	0.00057	0.00057	0.00057
Fire	No Changes being proposed						
Police	No Changes being proposed						

Work Related Disability

Work Related Disability Retirement							
	Age						
	20	30	40	50	60	70	80
State							
State Industrial	0.00015	0.00015	0.00029	0.00044	0.00058	0.00058	0.00058
State Safety	0.00024	0.00216	0.00432	0.00636	0.00960	0.00960	0.00960
State POFF	0.00030	0.00300	0.00600	0.00900	0.02080	0.02080	0.02080
State CHP	0.00104	0.00288	0.00483	0.00667	0.11890	0.11890	0.11890
Public Agency							
County Peace Officer	0.00025	0.00313	0.00625	0.01013	0.01728	0.01728	0.01728
Fire	0.00024	0.00252	0.00492	0.00744	0.07212	0.07212	0.07212
Police	0.00069	0.00644	0.01288	0.01921	0.06682	0.06682	0.06682

Termination With Refund

Termination With Refund State Miscellaneous Tier 1					
Service	Entry Age				
	20	25	30	35	40
0	0.1401	0.1340	0.1280	0.1220	0.1160
1	0.1249	0.1189	0.1128	0.1068	0.1009
2	0.1097	0.1037	0.0978	0.0917	0.0857
3	0.0945	0.0886	0.0826	0.0766	0.0705
4	0.0794	0.0734	0.0674	0.0614	0.0553
5	0.0104	0.0094	0.0084	0.0075	0.0065
6	0.0094	0.0085	0.0075	0.0066	0.0056
7	0.0085	0.0076	0.0066	0.0057	0.0048
8	0.0076	0.0067	0.0058	0.0049	0.0040
9	0.0067	0.0059	0.0050	0.0041	0.0033
10	0.0059	0.0051	0.0042	0.0034	0.0026
15	0.0040	0.0033	0.0025	0.0018	0.0011
20	0.0025	0.0019	0.0013	0.0007	0.0001
25	0.0013	0.0008	0.0003	0.0001	0.0001
30	0.0005	0.0001	0.0001	0.0001	0.0001
35	0.0001	0.0001	0.0001	0.0001	0.0001

Termination With Refund State Industrial Tier 1					
Service	Entry Age				
	20	25	30	35	40
0	0.0829	0.0794	0.0758	0.0723	0.0687
1	0.0740	0.0704	0.0669	0.0633	0.0598
2	0.0650	0.0615	0.0579	0.0544	0.0507
3	0.0560	0.0524	0.0489	0.0453	0.0418
4	0.0470	0.0435	0.0399	0.0364	0.0328
5	0.0095	0.0086	0.0077	0.0068	0.0059
6	0.0086	0.0078	0.0068	0.0060	0.0052
7	0.0078	0.0069	0.0061	0.0052	0.0044
8	0.0069	0.0061	0.0053	0.0045	0.0036
9	0.0062	0.0053	0.0046	0.0038	0.0030
10	0.0054	0.0046	0.0039	0.0031	0.0024
15	0.0036	0.0030	0.0023	0.0017	0.0010
20	0.0023	0.0017	0.0011	0.0006	0.0002
25	0.0011	0.0007	0.0003	0.0002	0.0002
30	0.0005	0.0002	0.0002	0.0002	0.0002
35	0.0002	0.0002	0.0002	0.0002	0.0002

Termination With Refund Schools					
Service	Entry Age				
	20	25	30	35	40
0	0.1730	0.1627	0.1525	0.1422	0.1319
1	0.1585	0.1482	0.1379	0.1277	0.1174
2	0.1440	0.1336	0.1234	0.1131	0.1028
3	0.1295	0.1192	0.1089	0.0987	0.0884
4	0.1149	0.1046	0.0944	0.0841	0.0738
5	0.0278	0.0249	0.0221	0.0192	0.0164
6	0.0254	0.0227	0.0199	0.0172	0.0144
7	0.0233	0.0206	0.0179	0.0152	0.0126
8	0.0212	0.0186	0.0159	0.0134	0.0107
9	0.0191	0.0166	0.0141	0.0115	0.0090
10	0.0172	0.0147	0.0122	0.0098	0.0074
15	0.0115	0.0094	0.0074	0.0053	0.0032
20	0.0073	0.0055	0.0038	0.0020	0.0002
25	0.0037	0.0023	0.0010	0.0002	0.0002
30	0.0015	0.0003	0.0002	0.0002	0.0002
35	0.0002	0.0002	0.0002	0.0002	0.0002

Termination With Refund Public Agency Miscellaneous					
Service	Entry Age				
	20	25	30	35	40
0	0.1742	0.1674	0.1606	0.1537	0.1468
1	0.1545	0.1477	0.1409	0.1339	0.1271
2	0.1348	0.1280	0.1212	0.1142	0.1074
3	0.1151	0.1083	0.1015	0.0945	0.0877
4	0.0954	0.0886	0.0818	0.0748	0.0680
5	0.0212	0.0193	0.0174	0.0155	0.0136
6	0.0197	0.0178	0.0159	0.0140	0.0122
7	0.0181	0.0163	0.0145	0.0126	0.0108
8	0.0166	0.0149	0.0131	0.0113	0.0095
9	0.0152	0.0134	0.0117	0.0100	0.0083
10	0.0138	0.0121	0.0104	0.0088	0.0071
15	0.0060	0.0051	0.0042	0.0032	0.0023
20	0.0037	0.0029	0.0021	0.0013	0.0005
25	0.0017	0.0011	0.0005	0.0001	0.0001
30	0.0005	0.0001	0.0001	0.0001	0.0001
35	0.0001	0.0001	0.0001	0.0001	0.0001

**Termination With Refund
Safety Plans**

Service	State CHP	State POFF	State Safety	Public Agency CPO	Public Agency Police	Public Agency Fire
0	0.0129	0.1217	0.1313	0.0997	0.1013	0.0710
1	0.0124	0.0779	0.0967	0.0782	0.0636	0.0554
2	0.0121	0.0431	0.0622	0.0566	0.0271	0.0398
3	0.0116	0.0353	0.0461	0.0437	0.0258	0.0242
4	0.0113	0.0275	0.0374	0.0414	0.0245	0.0218
5	0.0040	0.0056	0.0080	0.0145	0.0086	0.0029
6	0.0038	0.0052	0.0075	0.0133	0.0079	0.0024
7	0.0036	0.0049	0.0071	0.0121	0.0072	0.0020
8	0.0034	0.0046	0.0066	0.0110	0.0066	0.0016
9	0.0031	0.0042	0.0062	0.0100	0.0059	0.0012
10	0.0029	0.0039	0.0058	0.0089	0.0053	0.0009
15	0.0019	0.0025	0.0039	0.0045	0.0027	0.0006
20	0.0011	0.0015	0.0025	0.0020	0.0017	0.0005
25	0.0006	0.0006	0.0013	0.0009	0.0012	0.0003
30	0.0003	0.0003	0.0009	0.0006	0.0009	0.0003
35	0.0003	0.0003	0.0009	0.0006	0.0009	0.0003

Termination With Vested Benefits

Termination With Vested Benefits State Miscellaneous Tier 1					
Service	Entry Age				
	20	25	30	35	40
5	0.0556	0.0504	0.0452	0.0400	0.0349
6	0.0526	0.0472	0.0420	0.0368	0.0316
7	0.0495	0.0441	0.0389	0.0335	0.0280
8	0.0463	0.0409	0.0356	0.0299	0.0245
9	0.0430	0.0374	0.0321	0.0264	0.0209
10	0.0395	0.0340	0.0283	0.0226	0.0000
15	0.0335	0.0275	0.0216	0.0000	0.0000
20	0.0262	0.0198	0.0000	0.0000	0.0000
25	0.0179	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

Termination With Vested Benefits State Industrial Tier 1					
Service	Entry Age				
	20	25	30	35	40
5	0.0496	0.0449	0.0405	0.0356	0.0311
6	0.0470	0.0421	0.0377	0.0328	0.0281
7	0.0442	0.0393	0.0346	0.0297	0.0250
8	0.0414	0.0365	0.0316	0.0267	0.0220
9	0.0384	0.0335	0.0285	0.0234	0.0187
10	0.0353	0.0302	0.0253	0.0201	0.0000
15	0.0302	0.0246	0.0194	0.0000	0.0000
20	0.0232	0.0176	0.0000	0.0000	0.0000
25	0.0159	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

**Termination With Vested Benefits
Schools**

Service	Entry Age				
	20	25	30	35	40
5	0.0816	0.0733	0.0649	0.0566	0.0482
6	0.0782	0.0697	0.0613	0.0527	0.0443
7	0.0745	0.0660	0.0573	0.0487	0.0400
8	0.0708	0.0621	0.0534	0.0446	0.0359
9	0.0671	0.0582	0.0493	0.0404	0.0316
10	0.0629	0.0540	0.0450	0.0359	0.0000
15	0.0537	0.0440	0.0344	0.0000	0.0000
20	0.0420	0.0317	0.0000	0.0000	0.0000
25	0.0291	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

**Termination With Vested Benefits
Public Agency Miscellaneous**

Service	Entry Age				
	20	25	30	35	40
5	0.0656	0.0597	0.0537	0.0477	0.0418
6	0.0632	0.0573	0.0511	0.0452	0.0392
7	0.0609	0.0547	0.0486	0.0426	0.0363
8	0.0583	0.0521	0.0460	0.0397	0.0335
9	0.0558	0.0495	0.0431	0.0369	0.0306
10	0.0530	0.0466	0.0403	0.0339	0.0000
15	0.0443	0.0373	0.0305	0.0000	0.0000
20	0.0333	0.0261	0.0000	0.0000	0.0000
25	0.0212	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.0000	0.0000

**Termination With Vested Benefits
Safety Plans**

Service	State Safety	State POFF	State CHP	Public Agency CPO	Public Agency Police	Public Agency Fire
5	0.0369	0.0173	0.0093	No Changes	0.0163	No Changes
6	0.0363	0.0168	0.0091	No Changes	0.0157	No Changes
7	0.0357	0.0164	0.0090	No Changes	0.0149	No Changes
8	0.0349	0.0159	0.0087	No Changes	0.0142	No Changes
9	0.0341	0.0155	0.0085	No Changes	0.0134	No Changes
10	0.0333	0.0149	0.0082	No Changes	0.0126	No Changes
15	0.0286	0.0120	0.0070	No Changes	0.0082	No Changes
20	0.0226	0.0086	0.0053	No Changes	0.0065	No Changes
25	0.0159	0.0046	0.0033	No Changes	0.0058	No Changes
30	0.0131	0.0030	0.0026	No Changes	0.0056	No Changes
35	0.0000	0.0000	0.0000	No Changes	0.0000	No Changes

Non-Work Related Mortality

Age	Female	Male
20	0.00016	0.00047
25	0.00026	0.00050
30	0.00036	0.00053
35	0.00046	0.00067
40	0.00065	0.00087
45	0.00093	0.00120
50	0.00126	0.00176
55	0.00176	0.00260
60	0.00266	0.00395
65	0.00419	0.00608
70	0.00649	0.00914
75	0.00878	0.01220
80	0.01108	0.01527

Work Related Mortality

Age	Unisex
20	0.00003
25	0.00007
30	0.00010
35	0.00012
40	0.00013
45	0.00014
50	0.00015
55	0.00016
60	0.00017
65	0.00018
70	0.00019
75	0.00020
80	0.00021

Service Retiree and Beneficiary Mortality

Age	Female	Male
20	0.00025	0.00041
25	0.00026	0.00057
30	0.00031	0.00070
35	0.00043	0.00075
40	0.00062	0.00093
45	0.00085	0.00133
50	0.00125	0.00239
55	0.00243	0.00474
60	0.00431	0.00720
65	0.00775	0.01069
70	0.01244	0.01675
75	0.02071	0.03080
80	0.03749	0.05270
85	0.07005	0.09775
90	0.12404	0.16747
95	0.21556	0.25659
100	0.31876	0.34551
105	0.56093	0.58527
110	1.00000	1.00000

Non-Work Related Disability Retiree Mortality

Age	Female	Male
20	0.00478	0.00664
25	0.00492	0.00719
30	0.00512	0.00790
35	0.00548	0.00984
40	0.00674	0.01666
45	0.00985	0.01646
50	0.01245	0.01632
55	0.01580	0.01936
60	0.01628	0.02293
65	0.01969	0.03174
70	0.03019	0.03870
75	0.03915	0.06001
80	0.05555	0.08388
85	0.09577	0.14035
90	0.14949	0.21554
95	0.23055	0.31025
100	0.37662	0.45905
105	0.61523	0.67923
110	1.00000	1.00000

Work Related Disability Retiree Mortality

Age	Female	Male
20	0.00138	0.00167
25	0.00147	0.00177
30	0.00162	0.00182
35	0.00177	0.00184
40	0.00197	0.00188
45	0.00261	0.00245
50	0.00356	0.00443
55	0.00546	0.00563
60	0.00798	0.00777
65	0.01184	0.01388
70	0.01716	0.02236
75	0.02665	0.03585
80	0.04528	0.06926
85	0.08017	0.11799
90	0.13775	0.16575
95	0.23331	0.26108
100	0.35165	0.40918
105	0.60135	0.64127
110	1.00000	1.00000

Salary Increase

The following tables list the proposed Seniority, Merit, and Promotion salary increases added to the current 3.25% wage inflation assumptions.

Salary Increase State Miscellaneous			
Service	Entry Age		
	20	30	40
0	13.35%	10.95%	8.25%
3	8.95%	8.05%	6.55%
5	7.25%	6.75%	5.85%
10	4.95%	4.85%	4.45%
15	4.25%	4.15%	3.95%
20	3.85%	3.85%	3.75%
25	3.75%	3.75%	3.65%
30	3.75%	3.75%	3.65%

Salary Increase State Industrial			
Service	Entry Age		
	20	30	40
0	9.55%	8.85%	8.25%
3	8.15%	7.75%	7.35%
5	7.35%	7.15%	6.95%
10	6.05%	5.85%	5.75%
15	5.15%	5.05%	4.95%
20	4.55%	4.45%	4.35%
25	3.85%	3.85%	3.85%
30	3.85%	3.85%	3.85%

Salary Increase State Safety			
Service	Entry Age		
	20	30	40
0	7.55%	7.35%	7.15%
3	6.15%	5.65%	4.85%
5	5.55%	5.05%	4.05%
10	4.85%	4.35%	3.55%
15	4.35%	4.05%	3.45%
20	3.95%	3.75%	3.45%
25	3.85%	3.75%	3.45%
30	3.85%	3.75%	3.45%

Salary Increase State POFF			
Service	Entry Age		
	20	30	40
0	19.95%	18.55%	16.85%
3	9.05%	8.85%	8.25%
5	6.85%	6.65%	6.05%
10	4.65%	4.55%	4.35%
15	4.15%	4.05%	4.05%
20	3.85%	3.75%	3.75%
25	3.65%	3.65%	3.65%
30	3.65%	3.65%	3.65%

Salary Increase CHP			
Service	Entry Age		
	20	30	40
0	9.05%	9.05%	9.05%
3	6.25%	6.25%	6.25%
5	5.15%	5.15%	5.15%
10	3.95%	3.95%	3.95%
15	3.75%	3.75%	3.75%
20	3.65%	3.65%	3.65%
25	3.65%	3.65%	3.65%
30	3.65%	3.65%	3.65%

Salary Increase Schools			
Service	Entry Age		
	20	30	40
0	11.05%	9.85%	8.45%
3	7.75%	7.25%	6.45%
5	6.55%	6.25%	5.55%
10	4.75%	4.65%	4.35%
15	4.15%	4.05%	3.75%
20	3.85%	3.75%	3.45%
25	3.65%	3.65%	3.45%
30	3.65%	3.65%	3.45%

Salary Increase Public Agency Miscellaneous			
Service	Entry Age		
	20	30	40
0	14.45%	12.65%	10.05%
3	9.05%	8.25%	6.95%
5	7.25%	6.75%	5.85%
10	5.05%	4.85%	4.35%
15	4.55%	4.35%	3.85%
20	4.15%	3.95%	3.55%
25	3.85%	3.85%	3.55%
30	3.85%	3.85%	3.55%

Salary Increase Public Agency Police			
Service	Entry Age		
	20	30	40
0	11.15%	11.15%	11.15%
3	7.45%	7.25%	6.65%
5	6.15%	5.75%	5.05%
10	4.75%	4.45%	3.65%
15	4.35%	4.15%	3.55%
20	3.95%	3.85%	3.55%
25	3.75%	3.65%	3.55%
30	3.75%	3.65%	3.55%

Salary Increase Public Agency Firefighter			
Service	Entry Age		
	20	30	40
0	10.75%	10.75%	10.45%
3	8.25%	7.75%	6.25%
5	7.15%	6.45%	4.75%
10	5.35%	4.85%	3.75%
15	4.35%	4.15%	3.65%
20	3.95%	3.85%	3.55%
25	3.75%	3.75%	3.55%
30	3.75%	3.75%	3.55%

Salary Increase Public Agency County Peace Officer			
Service	Entry Age		
	20	30	40
0	13.15%	13.15%	13.15%
3	8.45%	7.95%	7.35%
5	6.85%	6.25%	5.55%
10	4.85%	4.45%	4.05%
15	4.35%	4.05%	3.85%
20	3.95%	3.85%	3.65%
25	3.75%	3.65%	3.55%
30	3.75%	3.65%	3.55%