California Public Employees' Retirement System

Independent Review of the Actuarial Audit Report Under Agreement No. 2009-5377

Produced by Cheiron

February 2015

CHEIRON Classic Values, Innovative Advice

Table of Contents

LETTER OF TRANSMITTAL

February 26, 2015

Ms. Young Hamilton, Acting Chief
California Public Employees' Retirement System
Office of Audit Services
P.O. Box 942701
Sacramento, CA 94229-2701

Dear Ms. Hamilton:

Under the terms of Agreement No. 2009-5377, we have performed periodic actuarial audits of pension plans within the California Public Employees' Retirement System (CalPERS). In each case, the purpose of the audit was to validate independently the actuarial valuations of these plans performed by CalPERS staff actuaries and to identify any potential problems or issues.

The following assignments were performed during the term of Contract 2009-5377.

- Parallel Valuation and Certification of the Actuarial Valuations of the CalPERS Contracting Public Agency Plans as of June 30, 2008

- Parallel Valuation and Certification of the Actuarial Valuations of the CalPERS State and Schools Plans as of June 30, 2009

- Parallel Valuation and Certification of the Actuarial Valuations of the Judges' Retirement Systems I and II, the Legislators' Retirement System, and the 1959 Survivor Benefit Program as of June 30, 2010

- Parallel Valuation and Certification of the Actuarial Valuations of the CalPERS Contracting Public Agency Plans as of June 30, 2011

- Parallel Valuation and Certification of the Actuarial Valuations of the CalPERS State and Schools Plans as of June 30, 2012

- Parallel Valuation and Certification of the Actuarial Valuations of the Judges' Retirement Systems I and II, the Legislators' Retirement System, and the 1959 Survivor Benefit Program as of June 30, 2013

Overall, our independent replication of the actuarial valuations found very few material differences in the calculations of present value of future salaries, present value of future benefits, actuarial liability, normal cost rate, and employer contribution rates compared to the amounts calculated by the CalPERS Actuarial Office. In each report we pointed out some areas in which procedures and computations could be improved; however, the impact of such changes on liabilities and costs was generally not material.

In preparing our report, we relied on information (some oral and some written) supplied by CalPERS. This information includes, but is not limited to, plan provisions, employee data, actuarial calculations, and financial information. We performed a brief, informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

This report was prepared for the Board of Administration to provide an independent review of the actuarial methods and assumptions used by the Actuarial Office to compute the funding status and required employer contributions for the plans studied. In addition, this report is for the use by CalPERS staff in assessing their systems, procedures, and computations. This report is not intended to benefit any other party, and Cheiron assumes no duty or liability to any such party.

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

We appreciate being of service to you, and we look forward to working with you in the future.

Sincerely,
Cheiron

Robert T. McCrory, FSA, FCA, EA, MAAA
Principal Consulting Actuary

Timothy S. Doyle, ASA
Associate Actuary

Introduction

Under Task 7 of Agreement No. 2009-5377 (the Contract, the Agreement), Cheiron is charged with preparing a Final Actuarial Audit Report (the Report) for the period of the Contract, which originally ran from March 1, 2010 through November 30, 2014, but has been extended into 2015. The purpose of this Report is to fulfill that requirement.

The Contract language dealing with the Report is as follows:

> Contractor will prepare a Final Actuarial Audit Report for the contract period. The report shall contain at a minimum: A recap of issues found during each actuarial review, how issues were resolved, and what issues remain outstanding. This report also provides Cheiron an opportunity to comment on the overall status of the actuarial process at CalPERS for items such as funding status, actuarial assumptions, and member data.

In this Report we will make some general comments and then follow the outline contained in the Contract language, reviewing the issues that have arisen during the Contract term and their resolutions.

General Comments

In general, the work produced by the Actuarial Office achieves a high professional standard, and it continues to improve. During the term of the Contract, the actuarial valuations of the State, Schools, and public agency plans were of consistently high quality, as were the valuations of the Judges' and Legislators' plans and the 1959 Survivor Benefit Program.

This Report concerns itself with the computation of liabilities and costs relying on the available member data; prior reports prepared by EFI Actuaries have had the same focus. Based on the project parameters specified by the Board and staff, the issue of the accuracy of the underlying member data has been and continues to be excluded from our analysis.

Over the past several years, the Society of Actuaries' Retirement Plans Experience Committee (RPEC) has been studying the life expectancy after retirement among pension plan participants in the United States. In addition, rates of improved mortality and increased life expectancy were studied. RPEC developed an advanced actuarial methodology for combining mortality improvement trends with actual recent mortality experience.

RPEC concluded that the rate of improvement in mortality rates has increased, particularly at the ages that affect pension plans. Actuaries are now strongly encouraged by their professional organizations to include these more rapid expected future changes in life expectancy in their actuarial assumptions.

It is our understanding that the Actuarial Valuation System (AVS) used by the CalPERS Actuarial Office is not capable of computing liabilities using dynamic mortality tables that include future increases in life expectancy. Consequently, a new valuation system is likely to be installed. It will be particularly important after installing the new system to compare results with the current AVS, and to have the actuarial auditor pay particular attention to the methods used to reflect expected mortality improvement.

Summary of Audit Results

Review of Contracting Public Agencies as of June 30, 2008

- Principal Results

  We were able to certify that the liabilities and costs computed in the staff valuations as of June 30, 2008 are reasonably accurate and were computed in accordance with generally accepted actuarial principles.

  Based on the data, assumptions, and methods employed in the staff valuations, the actuarial liabilities and normal costs independently computed by EFI/Cheiron were within 5% of those in the staff valuations in all cases. The total employer contribution rate was within 5% in most cases as well. Exceptions occurred for some plans that were well funded; in these cases, very small differences in actuarial liabilities had an outsized effect on the employer contribution rate.

  An additional step that was taken for this audit was a two day on-site visit by one of our actuaries. The purpose of this visit was to gain a better understanding of staff processes and procedures for conducting annual valuations for all plans within CalPERS. During this visit and during the course of the audit, we found that the valuation work done by the CalPERS staff was well organized and documented. The staff demonstrated a high level of competence and thoroughness.

- Comments

  During our most recent audit of risk pools, we made a recommendation pertaining to Class 1 surcharges. We recommended the following steps for future valuations.

  - There are two benefit types, Cost of Living Adjustments (COLA) and Post Retirement Survivor Allowances (PRSA), which have been "grouped" for the purpose of pooled plan surcharges. The same risk pool surcharge is applied for 3%, 4%, or 5% COLAs. This is appropriate for the actuarial valuation since 3% is assumed to be the maximum (COLA cannot exceed inflation); however, in reality a 4% or 5% COLA is a more valuable benefit than a 3% COLA. Use of a stochastic model for future inflation may be useful to determine an adjustment to these surcharges.

  - Likewise, the PRSA surcharge is the same for both the 25% and the 50% survivor benefit allowance. Our understanding is that this is a practical decision made to simplify the administration of the plan.

  The consequence of the valuation of the PRSA and COLA surcharges discussed above is to spread the additional costs of these benefits throughout the pool. Since the purpose of the surcharges is to adjust the costs for agencies with significantly different benefits, we recommended considering a revision in the methods employed to determine and apply the surcharges.

Review of State and Schools Plans as of June 30, 2009

- Principal Results

  We were able to certify that the liabilities and costs computed by the CalPERS staff as of June 30, 2009 were reasonably accurate and were computed in accordance with generally accepted actuarial principles. Based on the data, assumptions, and methods employed in the staff valuations, the employer contribution rates independently computed by EFI/Cheiron were within 5% of those in the staff valuations for each plan. The total FY 2011 contribution determined by EFI was within 2.0% of the amount computed in the staff valuations.

  Additionally, the liabilities (fully projected basis as well as accrued basis) computed by EFI/Cheiron were within 3% of those in the staff valuations for all of the plans, and within ½% for the combined State plans, as well as the County Schools Pool.

- Comments

  As part of the Review, EFI/Cheiron conducted an in-depth analysis of a number of special circumstances, including the handling of death and refund decrements, the liabilities for part-time schools employees, and the actuarial implications of the option of Tier 2 members eligible to transfer to Tier 1.

  In each of these cases, the CalPERS Actuarial Office has special procedures in place to compute the liabilities associated with the affected members. We reviewed these procedures and found them to be well-considered and appropriate. We recommended in two cases that the special procedures be more fully disclosed in the valuation reports, and we recommended that part-time Schools employees be analyzed separately in future actuarial experience studies.

Review of Judges Retirement System as of June 30, 2010

- Principal Results

  EFI/Cheiron determined that the actuarial methods and assumptions used in the JRS Valuation are within acceptable standards of actuarial practice.

- Comments

  One area in which the valuation results were not within the expected tolerance levels was the Present Value of Benefits for inactive members with a deferred benefit (including those members with Domestic Relations Orders (DROs)). Through an analysis of test lives, we discovered that the liability for these participants was computed as their contribution balance, which is generally much lower than the value of their deferred benefits. Due to the magnitude of the discrepancy - a 245% difference - this issue was immediately brought to the attention of the CalPERS staff.

After internal review by CalPERS, it was discovered that the decrease in liabilities for this group was caused by an error introduced during a programming change to the CalPERS valuation system. This change was intended to reflect the updated retirement assumptions for vested terminated members; the unintended result was that vested terminated members were valued with only their current account balance, rather than the much larger present value of deferred benefit payments.

We discussed the issue with CalPERS staff, and our understanding is that the programming error has been fixed and is unlikely to impact future valuations.

Review of Judges Retirement System II as of June 30, 2010

- Principal Results

  Overall, EFI/Cheiron was able to certify that the liabilities and costs computed in this valuation are reasonable and were computed in accordance with generally accepted actuarial principles and practices. However, we did discover a problem with the total actuarial liability for retired members. A discussion of this issue is presented below.

- Comments

  The only area for which the independent valuation was not within the expected tolerance levels was the Present Value of Benefits for retired members. Upon examination of a group of test lives, we discovered that the Post Retirement Survivor Allowance (PRSA) was not valued for any retirees, even though most of them have spouses eligible to receive this additional benefit. All retirees were valued assuming that they were receiving a single life annuity; instead, many are receiving their benefit in the form of a 50% or 100% joint and survivor annuity.

  This issue was brought to the attention of the CalPERS staff, and they confirmed it. After internal review by CalPERS, a recalculation was made, resulting in an increase in the retiree liabilities of approximately $2.3 million, which brings the liability well within 5% of the figure determined by EFI/Cheiron.

Review of Legislators' Retirement System as of June 30, 2010

- Principal Results

  We were able to certify that the liabilities computed in this Valuation are reasonable and were computed in accordance with generally accepted actuarial principles. However, EFI/Cheiron did discover a problem with the total actuarial liability for terminated members and for members entitled to deferred benefits under a Domestic Relations Order (DRO).

- Comments

  One area in which the valuation results were not within the acceptable tolerance levels was the Present Value of Benefits for inactive members with a deferred benefit. Through

an analysis of test lives, we discovered that this issue can be narrowed down to three individuals. The members in question were listed in the Review; usually members covered by a DRO are handled manually in a plan of this size.

Review of 1959 Survivor Benefit Program as of June 30, 2010

- Principal Results

  Overall, we found the Report to be accurate and complete, and fully compliant with generally accepted actuarial principles and with all standards of practice. We reviewed the actuarial methods and assumptions used for the Valuation, and find them to be reasonable and within acceptable standards of practice. EFI/Cheiron assessed the correctness of the valuation calculations by creating two *independent* valuation models to develop liabilities for all members. The resulting liabilities are within acceptable tolerances.

- Comments

  A modified Term Cost method is used to determine the rates for Levels 1 through 5, while the Entry Age Normal method is used for the Indexed Level. The latter has been implemented to account for the increasing nature of the benefit levels. We believe that these methods are appropriate; however, it may be useful to validate the rates for Levels 1 through 5 by computing them using the Entry Age Normal method.

  The valuation method employed by CalPERS is to apply Miscellaneous 2%@55 decrements for all Miscellaneous members and 2%@50 Police decrements for all Safety members. This is a reasonable approach; however, an alternative would be to use separate decrements for each active participant, depending on which pension plan they belong to. We tested the sensitivity of this by applying the Miscellaneous 2.5%@55 and Safety 3%@50 decrements to all Indexed Level members. This did not produce a material difference in the computed rate; therefore a change in this approach is not warranted at this time.

  The results produced by CalPERS staff and by EFI are in very close agreement for all of the Survivors, deviating by at most 7.4% in the case of Indexed Level employees. This difference seems to be caused by the following:

  - Liabilities for Indexed Level survivors were computed as of January 1, 2011, and
  - Disabled children of Indexed Level survivors were valued using full life annuities, instead of receiving 1 year of benefits.

  If we apply those two changes to our valuation system, we calculate a PVB of 95.4% of the CalPERS number.

  In addition, a number of suggestions were made concerning the wording in the CalPERS valuation report.

Review of Contracting Public Agencies as of June 30, 2011

- Principal Results

  We were able to certify that the liabilities and costs computed in the CalPERS staff valuations as of June 30, 2011 are reasonably accurate and were computed in accordance with generally accepted actuarial principles.

  Based on the data, assumptions, and methods employed in the staff valuations, the actuarial liabilities and normal costs independently computed by Cheiron were within 5% of those in the staff valuations in all cases. The total employer contribution rate was within 5% in most cases as well. Exceptions are described below.

- Comments

  Our independent valuation results for the liability measures are within 5% for all of the plans within the audit, without exception. The same is true for the two risk pools. Furthermore, results were within 3% for all but one measure of liabilities relating to one plan. Accordingly, we are able to confidently certify the results of the actuarial valuations as of June 30, 2011.

  When we compare the total employer contribution rate, the following valuations fell outside of the pre-established 5% tolerance.

  - City of Long Beach, Safety
  - County of Riverside, Safety
  - Santa Clara County Central Fire Protection District, Safety

  In the above cases, the liability measures described above are within a 2.6% tolerance and the differences in the employer contribution rates are a result of cost sensitivity resulting from high funded ratios rather than material differences. Accordingly, we feel no hesitation in confirming the results of the CalPERS staff valuations for these plans.

  While reviewing the CalPERS liability calculations for some Safety members, we found that Industrial Disability, Industrial Death, and Vested Deferred benefits were often less than expected based on member age. Discussions with the CalPERS actuarial office confirmed that this was a result of the application of limits on benefits under Section 415 of the Internal Revenue Code (Section 415 limits).

  The CalPERS actuarial office confirmed that the limits were applied correctly to safety members with 15 or more years of service, but not to the pre-retirement death survivor's allowance or to disability retirements before age 62. The CalPERS actuarial office stated that this has been fixed for the June 30, 2012 actuarial valuations.

The CalPERS actuarial office also stated the 415 limit for Vested Deferred benefits was being reduced for commencement prior to the deferral age and would require correction in future valuations.

We did a small sampling of plans and estimated that revising these 415 limits would have a minor impact, increasing Present Value of Benefits and Actuarial Accrued Liabilities by less than 0.2%, and increasing plan cost by less than 0.2% of payroll.

The CalPERS actuarial office provided Cheiron with a test computation for a deferred Domestic Relations Order (DRO) in which the 66 year-old member's 47 year-old former spouse was scheduled to begin receiving a benefit at age 80. The CalPERS actuarial office confirmed the following:

Alternate payees follow the same retirement pattern as the member. However, the retirement pattern is based on entry date, which is a field that is NOT populated for alternate payees so the person "falls" through the valuation until we decrement them out at age 80. We will need to develop a policy on how to handle these cases and then implement the solution in future valuations.

As deferred DROs are a very small subset of total liabilities, we estimate this will have a minor overall impact, but should be fixed nonetheless. Using one Safety plan as an example, we estimate this could increase actuarial accrued liability and the present value of benefits by 0.1%, and could increase cost by about 0.05% of payroll for this group. The impact for each plan will depend on the number of deferred DROs represented in the plan demographics.

Member benefits are computed based on highest average pay over some period of years. In times of low or negative pay increases, and for members with unique salary histories, the highest average pay may have occurred some years in the past, and current pay may be below the highest past average used to compute benefits. In these situations, liabilities based on most recent pay may understate true plan liabilities.

The CalPERS actuarial office provided a data field called "Maximum Historical Comp Amt." In many cases this amount was greater than the average pay being used to calculate plan liabilities. The CalPERS actuarial office confirmed that,

"The current core (or Actuarial Valuation System (AVS)) does not use the Max Historical Comp Amt. The Max Comp is currently being stored for the ability to be used in future enhancements to AVS."

We estimate that incorporating this amount as a minimum bound for compensation when calculating plan liabilities would have a minor impact. In the case of one sample plan, liabilities could increase by 0.1%, and employer cost could increase by about 0.04% of payroll.

The CalPERS actuarial office provided test cases in which the entry age calculated using the Normal Cost Start Date was different than that using the benefit service. Actuarial

calculations were performed using the entry age calculated based on the Normal Cost Start Date.

If the normal cost start date reflects periods in which eligibility or vesting service accrued, but not benefit service, the CalPERS actuarial office may want to reconsider using this date in entry age calculations for accounting purposes. GASB 67 states that:

The beginning of the attribution period should be the first period in which the member's service accrues pensions under the benefit terms, notwithstanding vesting or other similar terms.

As such, we believe that the CalPERS actuarial office should consider modifying their entry age calculations to be based on the accumulated benefit service, instead of using the Normal Cost Start Date, if the CalPERS actuarial office desires to avoid using different liability measures for funding versus accounting.

During our most recent audit of risk pools, we made a recommendation pertaining to Class 1 surcharges. We continue to recommend the following steps for future valuations.

- There are two benefit types, Cost of Living Adjustments (COLA) and Post Retirement Survivor Allowances (PRSA), which have been "grouped" for the purpose of pooled plan surcharges. The same surcharge is applied for 3%, 4%, or 5% COLAs. This is appropriate for the actuarial valuation since 3% is assumed to be the maximum (COLA cannot exceed inflation); however, in reality a 4% or 5% COLA is a more valuable benefit than a 3% COLA. Use of a stochastic model for future inflation may be useful to determine an adjustment to these surcharges.

- Likewise, the PRSA surcharge is the same for both the 25% and the 50% survivor benefit allowance. Our understanding is that this is a practical decision made to simplify the administration of the plan.

The consequence of the administration of the PRSA and COLA surcharges discussed above is to spread the additional costs of these benefits throughout the pool. Since the purpose of the surcharges is to adjust the costs for agencies with significantly different benefits, we recommend considering a revision in the methods employed to determine and apply the surcharges.

Review of State and Schools Plans as of June 30, 2012

- Principal Results

Our independent replication of the June 30, 2012 actuarial valuations found no material difference in calculations of present value of future salaries, present value of future benefits, actuarial liability, normal cost rate, and employer contribution rates compared to the amounts calculated by the CalPERS Actuarial Office.

Based on the data, assumptions, and methods employed in the staff valuations, the present value of future salaries, present value of future benefits, actuarial liabilities

normal cost rates, and employer contribution rates independently computed by Cheiron were within 5% of those in the staff valuations in all cases except one.

- Comments

  Our independent valuation results are within 5% for all of the plans within the audit, with the exception of the Police Officers & Firefighters plan, where Cheiron's Present Value of Future Payroll was 5.4% higher than CalPERS. This difference was due to an anomaly in the CalPERS actuarial office's data processing.

  During the audit process, we use the "log files" provided by CalPERS staff to verify that member counts, payroll, and service are consistent with the data provided by the CalPERS Actuarial Office. While comparing the data supplied by the CalPERS Actuarial Office to the totals in the log files, we observed that the payroll we used for our matching valuation for the State Peace Officers and Firefighters plan was approximately $120 million more than the $2,952 million reported by CalPERS and used in their calculations. While the accuracy of the underlying member data has been and continues to be excluded from our analysis, but we felt it worth discussing with the Actuarial Office.

  The Actuarial Office confirmed the source of the payroll import error: In some cases payroll was divided by a hundred when no decimal point was present in the annual compensation fields. They have stated that this will be fixed for the June 30, 2013 actuarial valuations. We performed matching valuations with payroll as calculated by Cheiron and with payroll calculated using the same methodology use by CalPERS staff. The liability measures used in this report – present value of future payroll, present value of benefits, actuarial accrued liability, and total normal cost – were all within 5% after correcting the compensation data.

  The log files the CalPERS Actuarial Office provided Cheiron with also included many lines of data flagged as "defective." The error messages for these records included the following:

  - Earliest entry age greater than entry age
  - Earliest entry age less than or equal to minimum active age
  - Member as too much eligibility service
  - Attained age greater than maximum active age
  - Member status should be 4
  - Earliest entry age less than or equal to one

  The Schools data file contained 4,889 such error messages, out of 791,811 total records. Discussions with the CalPERS Actuarial Office confirm that they are aware of these data issues and that correcting these records remains an ongoing process.

Review of Judges Retirement System as of June 30, 2013

- Principal Results

  Overall, we were able to certify that the liabilities and costs computed in this valuation are reasonable and were computed in accordance with generally accepted actuarial principles and practices. However, Cheiron did discover a problem with the total actuarial liability for active members, terminated members and members entitled to deferred benefits under a Domestic Relations Order (DRO).

- Comments

  There were several areas in which the valuation results were not within the expected tolerance levels. These include the Present Value of Benefits and Actuarial Accrued Liability for active members, the Present Value of Benefits for inactive members with a deferred benefit (including those members with Domestic Relations Orders (DROs)), the Employer Normal Cost, and the Actuarial Required Contribution (ARC).

  Through an analysis of test lives and discussion with CalPERS staff we found the following discrepancies:

  - A benefit multiplier of 65% is currently being used for all active members. Members that retire after age 60 with at least 20 years of service should have a 75% benefit multiplier.

  - For vested terms that are eligible for retirement as of the valuation date, the benefit amount being valued for them is the retirement benefit (65% of pay of the last judicial office held). Their benefit amount should be equal to the termination benefit (3.75% reduced if service is less than 12 years) of pay of last judicial office held multiplied by years of service up to a maximum of 20 years)

  - For DROs that have a deferred benefit, the full service of the participant should be used to determine eligibility (start date and deferral period) and the benefit multiplier for the DRO record. Currently the service allocated to the DRO's share of the benefit amount is being used to determine eligibility and the benefit multiplier.

  We discussed the issues with CalPERS staff, and our understanding is that the programming errors have been fixed and unlikely to impact future valuations.

  In addition, the following discrepancies were found, but have a minimal effect on liabilities:

  - Appendix A of the valuation report states that Disability Rates should extend past the point that a member becomes eligible for retirement. CalPERS staff confirmed that this is the intended assumption. However, upon analysis of test lives, the Disability Rates currently being used are set to zero when a member is eligible for retirement.

- In the case where a retiree has elected a form of payment that allows the balance of their accumulated contributions to be paid to a beneficiary at the time of their death, their liabilities should reflect this possible additional lump sum payment. These retirees are currently valued as having a single life annuity with no possibility of a contribution refund at the time of their death.

After fixing the CalPERS programming errors, the valuation results computed by Cheiron are close to the revised results computed by CalPERS staff, and fall within our valuation tolerances.

Review of Judges Retirement System II as of June 30, 2013

- Principal Results

  Cheiron completed an independent review of the Actuarial Valuation of the Judges' Retirement System II (JRS II, the System) as of June 30, 2013. Overall, we were able to certify that the liabilities and costs computed in this valuation are reasonable and were computed in accordance with generally accepted actuarial principles and practices.

- Comments

  We encountered some minor and immaterial differences in the JRS II member data. In the JRS II valuation prepared by CalPERS staff, it is noted that the member data excludes one beneficiary receiving a 36-month pre-retirement death benefit. In addition, there are three inactive members entitled to lump sum payments and two members in pay status who are due a short period of annuity payments who were not included in the data provided to Cheiron. These data exclusions are within the scope of normal actuarial practice and did not reflect the results materially.

Review of Legislators' Retirement System as of June 30, 2013

- Principal Results

  Cheiron conducted an independent review of the Actuarial Valuation of the Legislators' Retirement System (LRS, the System) as of June 30, 2013. We are able to certify that the liabilities and costs computed in this valuation are reasonable and were computed in accordance with generally accepted actuarial principles. Based on the assumptions and methods employed in the valuation, the actuarial liabilities and costs independently computed by Cheiron closely matched those in the Valuation prepared by CalPERS.

- Comments

  There is one area in which the valuation results were not within the acceptable tolerance levels: the Required Employer Contribution. CalPERS and Cheiron's calculations of the UAAL Amortization and Employer Normal Cost are in close agreement. However when added together to calculate the Required Employer Contribution, these results cause an apparently material difference, though the underlying calculations performed by Cheiron closely match those performed by CalPERS.

The LRS is well funded, with assets in excess of the Actuarial Liability. Because of this level of funding, the net employer contribution, after allowing for assets and employee contributions, is relatively small. Accordingly, small differences in the Actuarial Liability and in the Normal Cost are magnified into large relative changes in the net employer cost, It is because of this dynamic that we are able to say that the valuation results computed by Cheiron are within acceptable tolerances of those computed by CalPERS staff.

Review of 1959 Survivor Benefit Program as of June 30, 2013

- Principal Results

  Cheiron conducted an independent review of the Actuarial Valuation of the 1959 Survivor Benefit Program (the Plan, the Program) as of June 30, 2013. The scope of this study was a review of the Actuarial Valuation Report (the Valuation, the Report), an evaluation of actuarial methods and assumptions, and verification of the actuarial liabilities and costs calculated by CalPERS Staff.

  As a result of our efforts, we are able to attest to the following.

  - Overall, we found the Report to be accurate and complete, and fully compliant with generally accepted actuarial principles and with all standards of practice.

  - We reviewed the actuarial methods and assumptions used for the Valuation, and find them to be reasonable and within acceptable standards of practice.

  - Cheiron assessed the correctness of the valuation calculations by creating an *independent* valuation model to develop liabilities for all members. The resulting liabilities are within acceptable tolerances.

- Comments

  A modified Term Cost method is used to determine the rates for Levels 1 through 5, while the Entry Age Normal method is used for the Indexed Level. The latter has been implemented to account for the increasing nature of the benefit Levels. We believe that these methods are appropriate; however, it may be useful to validate the rates for Levels 1 through 5 by computing them using the Entry Age Normal method.

  We developed a separate Active Model for active members in the Program. This Model was designed to determine the present value of benefits for each member in the same manner as that employed by CalPERS, applying Miscellaneous 2%@55 decrements for Miscellaneous members and 2%@50 Police decrements for Safety members. This is a reasonable approach; however, an alternative would be to use separate decrements for each active participant, depending on which pension plan they belong to.

Methodology

For each of the plans under the scope of the Agreement, we performed parallel valuations. These parallel valuations and certifications involved three steps:

- Review of Methods and Assumptions

  The actuarial assumptions and methods employed in the actuarial valuations were reviewed by Cheiron in order to establish whether they met acceptable standards of actuarial practice.

- Independent Parallel Valuation

  In order to verify the correctness of calculations in the valuations, Cheiron conducted a number of independent, parallel valuations using its own actuarial models. These independent valuations determined whether actuarial assumptions and methods are applied properly and yield the reported results.

  In preparing our parallel valuations, we relied on member and asset data supplied by CalPERS' staff. As is usual in actuarial audits, this data was neither reconciled with other data sets nor independently verified. We performed a brief, informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

- Reconciliation of Results

  In the event that the costs computed by Cheiron differed by more than 5% from those computed by CalPERS' staff, reconciliations were required. This reconciliation proceeded in three steps:

  1. Establishing that the same member data has been used by Cheiron and by staff;

  2. Researching methodological differences between the Cheiron and staff approaches to computing liabilities and costs; and

  3. Comparing test life results to uncover subtle differences in approach that may result in material differences in liabilities and costs.

Merger of EFI Actuaries and Cheiron

On January 1, 2013, EFI Actuaries merged with Cheiron. Agreement No. 2009-5377 was amended to reflect that event, and the EFI actuarial team, now part of Cheiron with additional staff and support, continued to perform audits under the Agreement.

A benefit to CalPERS has been that new actuarial staff and actuarial systems are being used in the audit projects, adding an additional perspective to that provided by EFI staff and systems. At this point, no fewer than four actuarial systems have been used to compute and check liabilities and costs for CalPERS.

- The CalPERS Actuarial Valuation System (AVS) has been used by CalPERS staff to prepare the valuation reports.

- The EFI Visualization and Animation (V&A) Actuarial Model has been used by both EFI and Cheiron in the audit process.

- A special valuation system was developed by EFI for actuarial audits of the CalPERS public agency and State & Schools valuations.

- A commercial actuarial valuation system (Proval) leased by Cheiron has been used in several audits since the merger.

These valuation systems have no components in common, and they are programmed and operate on different principles.

The use of different staff and systems benefits CalPERS in many ways.

- Different Perspectives

  An actuarial valuation system may be regarded as a kind of language for modeling a pension plan. In the case of human languages, some concepts are easier to express and deal with in one language than in another. In the case of actuarial valuation systems, benefit provisions that are easily and naturally handled in one system may require approximations in another.

  As this issue applies to an actuarial audit, errors and other issues that are easily uncovered by a parallel valuation in one system may be extremely difficult to detect under another. Therefore, changing the valuation system allows us to review the CalPERS staff valuations in a new way, focusing on new issues and different types of potential error.

  Furthermore, as new staff begins to work on the CalPERS audits, the basics of the plans and the assumptions have to be reexamined and explained to the new personnel. This process causes a de novo review of plan provisions, assumptions, system coding, and output that can be healthy and invigorating in the audit process. Frequently, new personnel bring fresh and invigorating perspectives to the project.

- Strengthening the Audit Process

  As noted above, developing and deploying a new valuation system forced Cheiron staff to approach the certification process from scratch. New actuarial models had to be developed, tested, and used in our audit effort. All aspects of the audit were reexamined.

  In a real sense, by changing its systems and staff, Cheiron has changed the auditor on the Board's behalf. While former EFI staff has not departed – retaining the knowledge and experience of that staff – the software and supporting systems have been replaced and new staff has been added, forcing a new approach to the audit. Therefore, without the disadvantage of losing the experience and knowledge of the current auditor, the traditional advantages of changing the auditing firm have been realized.

Overall, the new staff and multiple valuation system get to the same destination – the same liabilities and costs – but do so by different routes. This orthogonal approach to parallel valuation greatly improves the quality and thoroughness of these audits.

Appendix: Full Reports

- Parallel Valuation and Certification of the Actuarial Valuations of the CalPERS Contracting Public Agency Plans as of June 30, 2008
- Parallel Valuation and Certification of the Actuarial Valuations of the CalPERS State and Schools Plans as of June 30, 2009
- Parallel Valuation and Certification of the Actuarial Valuations of the Judges' Retirement Systems I as of June 30, 2010
- Parallel Valuation and Certification of the Actuarial Valuations of the Judges' Retirement System II as of June 30, 2010
- Parallel Valuation and Certification of the Actuarial Valuations of the Legislators' Retirement System as of June 30, 2010
- Parallel Valuation and Certification of the Actuarial Valuations of the 1959 Survivor Benefit Program as of June 30, 2010
- Parallel Valuation and Certification of the Actuarial Valuations of the CalPERS Contracting Public Agency Plans as of June 30, 2011
- Parallel Valuation and Certification of the Actuarial Valuations of the CalPERS State and Schools Plans as of June 30, 2012
- Parallel Valuation and Certification of the Actuarial Valuations of the Judges' Retirement Systems I as of June 30, 2013
- Parallel Valuation and Certification of the Actuarial Valuations of the Judges' Retirement System II as of June 30, 2013
- Parallel Valuation and Certification of the Actuarial Valuations of the Legislators' Retirement System as of June 30, 2013
- Parallel Valuation and Certification of the Actuarial Valuations of the 1959 Survivor Benefit Program as of June 30, 2013

Review of Contracting Public Agencies as of June 30, 2008

Overview

Under Task 1 of Agreement 2009-5377, EFI Actuaries (EFI) conducted actuarial valuations as of June 30, 2008 of a sample of the Pension Plans for Contracting Public Agencies of the California Public Employees' Retirement System (CalPERS). The purpose of these valuations was to validate independently the actuarial valuations of these plans performed by CalPERS staff actuaries as of the same date, and to identify any potential problems or issues.

As a result of our efforts, EFI was able to certify that the liabilities and costs computed in the staff valuations as of June 30, 2008 are reasonably accurate and were computed in accordance with generally accepted actuarial principles.

Based on the data, assumptions, and methods employed in the staff valuations, the actuarial liabilities and normal costs independently computed by EFI were within 5% of those in the staff valuations in all cases. The total employer contribution rate was within 5% in most cases as well. Exceptions are described below.

An additional step that was taken for this assignment was a two day on-site visit by one of the actuaries for EFI. The purpose of this visit was to gain a better understanding of staff processes and procedures for conducting annual valuations for all plans within CalPERS. During this visit and during the course of the audit, we found that the valuation work done by the CalPERS staff was well organized and documented. The staff demonstrated a high level of competence and thoroughness.

This Review concerned itself with the computation of liabilities and costs relying on the available member data; prior reports prepared by EFI Actuaries have had the same focus. Based on the project parameters specified by the Board and staff, the issue of the accuracy of the underlying member data has been and continues to be excluded from our analysis.

The appendices at the end of this Report summarize the results of the parallel valuations of the public agency plans and risk pools.

Review of Methods and Assumptions

The actuarial methods and assumptions* used in the public agency valuations were found to be within acceptable standards of actuarial practice.

* Since the time of this valuation, an experience study was conducted. This study resulted in several assumption change recommendations, which were also reviewed by EFI under a separate report. New assumptions will be applied for the June 30, 2010 valuations.

Both CalPERS staff and EFI ignored the possible impact of benefit limitations under Internal Revenue Code Section 415 on liabilities and contribution rates. The effect of this Code section on liabilities and costs is negligible.

Parallel Valuation Results

Individual Plans

Our actuarial model allows us to compare many of our calculations to the figures shown in the CalPERS valuation reports. To assess overall reasonableness of the CalPERS figures, we focused on four specific actuarial calculations:

- **Total Present Value of Future Payroll** – This is the present value of all pay expected to be paid to currently active members during their working lifetimes within CalPERS. A close match here indicates that the actuarial assumptions were likely to have been programmed and computed correctly.

- **Total Present Value of Benefits** – This represents the present value of all benefits expected to be paid to all current members after they leave active employment. A close match here also indicates that the actuarial assumptions were likely to have been programmed and computed correctly, and it also indicates that benefit provisions have been properly applied.

- **Total Actuarial Accrued Liability** – This is the portion of the Present Value of benefits that is allocated to past service (benefits that are deemed to have been earned in the past). A close match here indicates that the actuarial cost method (Entry Age Normal) has been applied properly.

- **Total Normal Cost** – This represents the present value of benefits deemed to be earned during the current year. A close match here indicates that annual benefit cost is being correctly computed according to actuarial cost method, and that employers are being charged the proper amount (total actuarial cost less employee contributions).

The table below summarizes the comparison of these four calculations done independently by EFI, and compared to those reported within the CalPERS valuation reports.

Table 1: Summary of Comparison of Key Actuarial Calculations

Actuarial Calculation	Proportion of Audited Agencies within 1%	Proportion of Audited Agencies within 3%	Proportion of Audited Agencies within 5%
Total Present Value of Future Payroll	0%	54%	100%
Total Present Value of Benefits	42%	96%	100%
Total Actuarial Accrued Liability	42%	92%	100%
Total Normal Cost	33%	75%	100%

As shown in Table 1, our independent valuation results for the four key measures described above are within 5% for all of the plans within the audit, without exception. The same is true for the two risk pools. Furthermore, results were within 3% for a good portion of the plans. Accordingly, we are able to confidently certify the results of the actuarial valuation as of June 30, 2008.

When we compare the total employer contribution rate, the following valuations fell outside of the pre-established 5% tolerance. Reasons for this are described in the Reconciliation of Results.

- City of Corona, Miscellaneous
- County of Siskiyou, Miscellaneous
- Sacramento Municipal Utility District, Miscellaneous
- San Francisco Bay Area Rapid Transit, Miscellaneous
- 2% at 60 Miscellaneous Risk Pool

In the above cases, the four key measures described above are within a 3.5% tolerance and that the differences in the employer contribution are a result of sensitivities rather than material differences. Accordingly, we feel no hesitation in confirming the results of the CalPERS staff valuations for these plans.

Risk Pools

Many of the public agency plans within CalPERS have been combined into various risk pools, primarily based on benefit formula. The computation of cost for a plan within a risk pool is comprised of three components: an amortization of the side fund created at entry into the pool, normal cost, and amortization of the pool's unfunded actuarial accrued liability since pool entry. The normal cost for a given agency is determined based on the pool at large, with additional surcharges for Class 1 benefits as applicable.

Class 1 benefits include cost of living adjustments (COLAs) above 2%, automatic post-retirement survivor allowances (PRSAs) paid by the employer, and an average final pay period of one year.

To verify the actuarial liabilities and costs for an entire risk pool, a parallel valuation is conducted in the same manner as is done for the non-pooled plans (described above). We conducted parallel valuations for one miscellaneous risk pool (2% at 60, Pool 1) and one safety risk pool (2% at 55, Pool 6). The actuarial liabilities and costs measured by EFI were within the 5% of those measured by CalPERS staff for both pools; however, the total cost was slightly outside of the 5% range for one of the pools. More detail is provided in the next section of this report.

The most important calculation for the plans within risk pools is the determination of normal cost, as it comprises the majority of the employer cost. Accordingly, we reviewed normal

costs and common surcharges for Class 1 benefits, as shown in the valuation reports for Pools 1 and 6. We verified both the gross normal cost (with all applicable Class 1 benefits) and the net normal cost (with no Class 1 benefits) for each of the selected risk pools.

The employer normal cost is the difference between the total normal cost and employee contributions; accordingly, small changes in the total normal cost result in much larger changes in the net employer normal cost. To compensate for this leveraging, we calibrated all of our normal cost calculations by applying the ratio of CalPERS gross normal cost to EFI gross normal cost. A comparison was done based on these calibrated results and, as shown in Table 2, all of the calculations were within a 5% tolerance.

Table 2: Comparison of Risk Pool Surcharges

	CalPERS Report	EFI Calculation	EFI Calculation, Calibrated	Ratio of EFI Calibrated to CalPERS
Employer Normal Cost Rates for Miscellaneous Pool 2% at 60				
Total (Gross)	6.855%	6.350%	6.855%	100.0%
Net (no Class 1 Benefits)	6.533%	6.144%	6.633%	101.2%
Net, with One Year Final Average Pay*	7.007%	6.534%	7.054%	100.7%
Net, with 3% COLA*	7.533%	7.309%	7.890%	104.7%
Net, with 50% PRSA*	7.339%	6.964%	7.518%	102.4%
Employer Normal Cost Rates for Safety Pool 2% at 55				
Total (Gross)	11.217%	10.582%	11.217%	100.0%
Net (no Class 1 Benefits)	10.957%	10.333%	10.953%	100.0%
Net, with One Year Final Average Pay*	11.591%	10.877%	11.530%	99.5%
Net, with 3% COLA*	12.490%	12.195%	12.927%	103.5%
Net, with 50% PRSA*	12.153%	11.697%	12.399%	102.0%

* CalPERS amount = Net normal cost rate, plus surcharge rate.

Reconciliation of Results

As shown above, the actuarial liabilities, present values, and total normal costs calculated independently by EFI are within 5% of those calculated by CalPERS Actuarial Valuation System (AVS) in all cases. The reasons for the differences in total cost for the plans listed below is the sensitivity of their employer contribution rates to changes in accrued liabilities and total normal costs.

Many of the agencies have funding ratios (Assets / Accrued Liability) as of June 30, 2008 that were very close to 100%, which increases the sensitivity of employer contribution rates to changes in actuarial accrued liability (AAL). For example, a 1% increase in AAL for the San Francisco Bay Area Rapid Transit plan as of June 30, 2008 would have increased the amortization rate by over 30%, and the total rate by 6.5%. This sensitivity has a similar effect on our independent cost comparisons, occasionally causing an apparent material difference in employer contribution rates (over 5%) even when the underlying liability computed by EFI is very close to that reported by CalPERS.

A similar sensitivity occurs with the employer portion of the normal cost. This is especially true when the employer and employee portions of the normal cost are approximately equal, or when the employer portion is lower. For example, the Fresno County Housing Authority has employee and employer portions of normal cost that are approximately equal. Therefore, for every 1% change in the total normal cost, the employer portion changes by 2%.

Table 3: Audited Agencies with Employer Contribution Rates Outside of Established Tolerances

Agency	Ratio of EFI Calculation to CalPERS Report				
	Total Normal Cost	**Employer Normal Cost**	**Actuarial Accrued Liability (AAL)**	**Amortization of UAAL**	**Employer Contribution Rate**
City of Corona (Misc.)	98.0%	96.4%	95.1%	82.9%	89.0%
Sacramento Municipal Utility District (Misc.)	100.5%	100.9%	102.0%	240.4%	111.9%
County of Siskiyou (Misc.)	98.5%	97.3%	103.1%	159.9%	109.7%
San Francisco Bay Area Rapid Transit (Misc.)	98.7%	97.6%	101.1%	136.9%	105.3%
2% at 60 Miscellaneous Risk Pool	96.3%	92.6%	100.8%	122.8%	93.5%

This issue has appeared in the past, and is always prone to cause anomalies within the audit. It is also important to keep in mind that the same forces also cause actual plan costs for many agencies to be sensitive to annual gains and losses.

In addition to the sensitivity issue described above, we found one other disparity in the comparison of valuation results. Initially, the liability we determined for the City of Corona retirees was about 14% lower than that computed by CalPERS. In investigating the source of this discrepancy, we were informed that a 15% load was applied to the retiree liability, in accordance with California Public Employees' Retirement Law (PERL) Section 21628, to estimate the impact of a post-valuation plan change. The plan change would automatically increase the benefits for many retirees who had elected certain benefit options. The 15% load is specified in PERL.

After learning of this, we took the following steps:

- We compared our valuation results with the 15% retiree load to the CalPERS report,
- We assessed the reasonableness of the load, and
- We determined if we have any other recommendations related to this procedure.

The results of this procedure were as follows:

- When we included the load in our valuation of the City of Corona, Miscellaneous Plan, our employer contribution rate was within 1% of the rate shown in the valuation report.
- We reviewed the retiree population to which this load was intended to apply, and found that there were about 300 affected retirees. The total liability, as computed by EFI, for these retirees was about $59 million, with no load applied. This suggests that a load of $8.8 million (15% of $59 million) should have been applied.

  The 15% load was erroneously applied to all retirees, regardless of benefit election. This resulted in a slight overstatement of the total liability, about $2.9 million. This is not a material discrepancy, and thus did not require further reconciliation. CalPERS staff has acknowledged this overstatement, and agreed it is not a material issue.

  Our understanding is that the estimate will be reconciled next year with an actual calculation, and that if the load was indeed too high, then an actuarial gain would occur.

  Our recommendation regarding this practice is that the load used for the valuation should be disclosed and explained in the valuation report, along with the possible gain or loss impacts of the following valuation.

Other Comments

During our most recent audit of risk pools, we made a recommendation pertaining to Class 1 surcharges. We continue recommend the following steps for future valuations.

- There are two benefit types, Cost of Living Adjustments (COLA) and Post Retirement Survivor Allowances (PRSA), which have been "grouped" for the purpose of pooled plan surcharges. The same surcharge is applied for 3%, 4%, or 5% COLAs. This is appropriate for the actuarial valuation since 3% is assumed to be the maximum (COLA cannot exceed inflation); however, in reality a 4% or 5% COLA is a more valuable benefit than a 3% COLA. Use of a stochastic model for future inflation may be useful to determine an adjustment to these surcharges.

- Likewise, the PRSA surcharge is the same for both the 25% and the 50% survivor benefit allowance. Our understanding is that this is a practical decision made to simplify the administration of the plan.

The consequence of the administration of the PRSA and COLA surcharges discussed above is to spread the additional costs of these benefits throughout the pool. Since the purpose of the surcharges is to adjust the costs for agencies with significantly different benefits, we recommend considering a revision in the methods employed to determine and apply the surcharges.

Appendix 1: Demographic Data Comparison

			Average Age		Average Service		Average Pay	
Selected Plan	**Plan**	**Formula**	**6/30/2008 Data**	**AVS 6/30/2008**	**6/30/2008 Data**	**AVS 6/30/2008**	**6/30/2008 Data**	**AVS 6/30/2008**
Alameda, City of	Safety	3% @ 50	41	41	12.5	12.6	116,967	116,967
Colton, City of	Miscellaneous	2.7% @ 55	41	41	8.2	8.3	51,829	51,829
Compton, City of	Miscellaneous	2.7% @ 55	46	46	11.6	11.9	49,850	49,850
Corona, City of	Miscellaneous	2.7% @ 55	42	42	8.7	8.8	62,599	62,599
El Monte, City of	Miscellaneous	2% @ 55	45	45	11.5	11.7	64,997	64,997
Fresno County Housing	Miscellaneous	2% @ 60	43	43	8.8	8.8	38,452	38,452
Huntington Beach, City of	Miscellaneous	2.5% @ 55	46	46	13.0	13.1	64,444	64,444
Inland Empire Health Plan	Miscellaneous	3% @ 60	39	39	4.5	4.5	52,913	52,913
La Mesa, City of	Safety	3% @ 50	40	40	12.6	12.6	86,551	86,551
Long Beach, City of	Miscellaneous	2% @ 55, 2.5% @ 55 2.7% @ 55	45	45	10.6	10.9	59,225	59,225
Long Beach, City of	Safety	3% @ 50	40	40	12.4	12.6	92,159	92,159
Madera, County of	Miscellaneous	2.7% @ 55	45	45	7.8	8.0	45,771	45,771
Metropolitan Water District of Southern California	Miscellaneous	2% @ 55	49	49	14.7	14.7	97,384	97,384
Oakland, City of	Miscellaneous	2.7% @ 55	47	47	10.8	11.2	78,968	78,968
Riverside, County of	Miscellaneous	3% @ 60	43	43	7.5	7.7	51,563	51,563
Riverside, County of	Safety	3% @ 50	38	38	8.5	8.2	69,439	69,439
Roseville, City of	Safety	3% @ 50	39	39	9.6	9.7	97,873	97,873

			Average Age		Average Service		Average Pay	
Selected Plan	**Plan**	**Formula**	**6/30/2008 Data**	**AVS 6/30/2008**	**6/30/2008 Data**	**AVS 6/30/2008**	**6/30/2008 Data**	**AVS 6/30/2008**
Sacramento Municipal Utility District	Miscellaneous	2% @ 55	46	46	13.7	13.9	84,439	84,439
San Francisco BART	Miscellaneous	2% @ 55	49	49	13.0	13.4	73,036	73,036
Santa Clara, County of	Miscellaneous	2.5% @ 55	46	46	10.6	11.1	82,476	82,475
Santa Clara, County of	Safety	3% @ 50	41	41	11.2	11.3	91,554	91,538
Santa Cruz, City of	Miscellaneous	2% @ 55	47	47	10.5	11.0	57,337	57,337
Siskiyou, County of	Miscellaneous	2% @ 55	49	49	9.1	9.4	41,048	41.048
Pool 1	Miscellaneous	2% @ 60	45	45	7.6	7.8	51,183	51,183
Pool 6	Safety	2% @ 55	37	37	5.9	6.1	52,789	52,789

Appendix 2a: Individual Plan Liability and Cost Comparison – Largest Plans

			Fully Projected Liabilities		Accrued Liabilities		Total Normal Cost (Employer + Employee)		Employer Cost as a % of Payroll	
Selected Plan	**Plan**	**Formula**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**
Long Beach, City of	Miscellaneous	2% @ 55, 2.5% @ 55 2.7% @ 55	2,002,426,516	1,977,841,276	1,689,331,159	1,677,773,030	41,014,393	42,324,125	12.532%	12.297%
				101.2%		100.7%		96.9%		101.9%
Long Beach, City of	Safety	3% @ 50	1,901,006,123	1,903,617,262	1,579,667,106	1,592,666,635	38,616,892	38,382,218	16.875%	17.097%
				99.9%		99.2%		100.6%		98.7%
Metropolitan Water District of Southern California	Miscellaneous	2% @ 55	1,541,607,352	1,544,965,567	1,330,365,606	1,334,233,253	30,254,043	31,151,983	11.296%	11.873%
				99.8%		99.7%		97.1%		95.1%
Oakland, City of	Miscellaneous	2% @ 55, 2.7% @ 55	2,073,800,848	2,070,110,550	1,723,723,493	1,727,976,732	48,795,968	49,445,567	19.501%	19.885%
				100.2%		99.8%		98.7%		98.1%
Riverside, County of	Miscellaneous	2% @ 55, 3% @ 60	4,723,553,858	4,674,511,386	3,393,165,535	3,350,222,866	170,197,972	176,787,605	11.967%	12.165%
				101.0%		101.3%		96.3%		98.4%
Riverside, County of	Safety	3% @ 50	2,122,518,482	2,072,408,800	1,499,722,413	1,469,415,642	72,364,123	72,130,333	20.034%	19.335%
				102.4%		102.1%		100.3%		103.6%
Sacramento Municipal Utility District	Miscellaneous	2% @ 55	1,635,001,281	1,600,653,699	1,421,400,075	1,393,705,352	28,541,219	28,409,612	9.042%	8.081%
				102.1%		102.0%		100.5%		111.9%

			Fully Projected Liabilities		Accrued Liabilities		Total Normal Cost (Employer + Employee)		Employer Cost as a % of Payroll	
Selected Plan	**Plan**	**Formula**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**
San Francisco BART	Miscellaneous	2% @ 55	1,644,812,471	1,672,812,471	1,407,366,759	1,391,791,770	34,707,065	35,154,323	9.945%	9.446%
				98.3%		101.1%		98.7%		105.3%
Santa Clara County	Miscellaneous	2% @ 55, 2.5% @ 55	7,169,468,046	7,072,291,277	5,552,350,053	5,473,388,570	211,397,872	218,227,519	13.387%	13.334%
				101.4%		101.4%		96.9%		100.4%
Santa Clara County	Safety	3% @ 50	1,979,832,387	1,982,799,481	1,589,497,618	1,603,444,059	50,350,210	49,730,263	23.381%	23.527%
				99.9%		99.1%		101.2%		99.4%

Appendix 2b: Individual Plan Liability and Cost Comparison – Random Plans

			Fully Projected Liabilities		Accrued Liabilities		Total Normal Cost (Employer + Employee)		Employer Cost as a % of Payroll	
Selected Plan	**Plan**	**Formula**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**
Alameda, City of	Safety	3% @ 50	318,468,742	313,570,052	262,906,952	260,064,538	6,649,270	6,674,985	31.633%	31.038%
				101.6%		101.1%		99.6%		101.9%
Colton, City of	Miscellaneous	2% @ 55, 2.7% @ 55	105,095,773	103,916,504	83,297,347	82,449,139	2,610,318	2,637,865	8.402%	8.339%
				101.1%		101.0%		99.0%		100.8%
Compton, City of	Miscellaneous	2% @ 55	158,786,395	157,794,693	137,711,160	136,746,394	2,857,977	2,949,144	17.842%	17.993%
				100.6%		100.7%		96.9%		99.2%
Corona, City of	Miscellaneous	2% @ 55	262,418,243	263,266,982	204,821,425	206,180,050	6,867,665	7,005,501	20.967%	21.587%
(w/corrected retiree load)				99.7%		99.3%		98.0%		97.1%
Cucamonga Valley Water District	Miscellaneous	2% @ 55, 2.5% @ 55	53,457,124	53,312,507	39,249,604	38,916,161	1,604,224	1,670,488	11.689%	12.125%
				100.3%		100.9%		96.0%		96.4%
El Monte, City of	Miscellaneous	2% @ 55	132,085,739	130,324,015	111,236,070	109,933,521	2,666,267	2,675,682	17.323%	16.607%
				101.4%		101.2%		99.6%		104.3%
Fresno County Housing Authority	Miscellaneous	2% @ 60	22,200,202	22,113,180	17,649,789	17,516,811	526,222	540,105	3.813%	3.933%
				100.4%		100.8%		97.4%		96.9%
Huntington Beach, City of	Miscellaneous	2% @ 55, 2.5% @ 55	383,287,534	381,129,942	321,236,707	320,208,729	8,130,155	8,229,097	10.244%	10.222%
				100.6%		100.3%		98.8%		100.2%

			Fully Projected Liabilities		Accrued Liabilities		Total Normal Cost (Employer + Employee)		Employer Cost as a % of Payroll	
Selected Plan	**Plan**	**Formula**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**
Inland Empire Health Plan	Miscellaneous	2% @ 60, 3% @ 60	71,314,774	70,704,073	34,798,035	33,918,399	4,426,241	4,590,520	10.550%	11.017%
				100.9%		102.6%		96.4%		95.8%
La Mesa, City of	Safety	3% @ 50	133,430,424	132,027,994	110,960,869	110,208,905	2,672,947	2,664,041	25.861%	25.296%
				101.1%		100.7%		100.3%		102.2%
Madera, County of	Miscellaneous	2% @ 55, 2.7% @ 55	303,706,336	297,334,559	227,821,757	222,544,071	10,417,755	10,576,509	16.527%	16.152%
				102.1%		102.4%		98.5%		102.3%
Roseville, City of	Safety	3% @ 50	219,192,538	213,183,120	153,468,416	150,031,140	7,351,294	7,305,749	30.308%	29.293%
				102.8%		102.3%		100.6%		103.5%
Santa Cruz, City of	Miscellaneous	2% @ 55	273,360,127	271,603,707	225,171,061	224,181,921	6,865,061	6,927,720	13.445%	13.422%
				100.6%		100.4%		99.1%		100.2%
Siskiyou, County of	Miscellaneous	2% @ 55	179,043,207	174,565,050	147,560,184	143,184,624	4,450,308	4,517,599	11.732%	10.696%
				102.6%		103.1%		98.5%		109.7%

Appendix 3: Risk Pool Liability and Cost Comparison

			Fully Projected Liabilities		Accrued Liabilities			Total Normal Cost (Employer + Employee)		Employer Cost as a % of Payroll
Selected Pool	**Plan**	**Formula**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**	**EFI 6/30/2008**	**AVS 6/30/2008**
Risk Pool 1	Miscellaneous	2% @ 60	746,603,343	747,912,425	536,887,638	532,483,463	26,682,847	27,714,733	6.597%	7.057%
				99.8%		100.8%		96.3%		93.5%
Risk Pool 6	Safety	2% @ 55	109,732,148	109,412,275	69,538,143	69,011,153	4,143,834	4,294,285	11.227%	11.813%
				100.3%		100.8%		96.5%		95.0%

Review of State and Schools Plans as of June 30, 2009

Overview

Under Task 2 of Agreement 2009-5377 (the Agreement, the Contract), EFI Actuaries was charged with preparing a parallel valuation and certification (the Report) of the June 30, 2009 actuarial valuations of the CalPERS State and Schools Pension Plans (the Plans). The purpose of these valuations was to validate independently the actuarial valuations of these plans performed by CalPERS' staff actuaries.

Based on parallel valuations of the State Plans and the County Schools Pool, EFI Actuaries was able to certify that the actuarial present values, accrued liabilities, normal costs, and employer contributions computed by the CalPERS Actuarial Office are accurate within professional tolerances and were calculated in accordance with generally accepted actuarial principles.

Table 1 below, shows a high level summary of the comparisons made, with a comparison of the total Fiscal Year 2011 contribution in dollars. More detailed tables with individual plan information are shown below.

Table 1: Comparison of Employer Cost[1] ($ millions)

Plan	PERS Total Contribution for Fiscal Year 2011[1]	EFI Total Contribution for Fiscal Year 2011	Relative Difference
State	$ 3,882	$ 3,951	1.8%
County Schools Pool	1,189	1,220	2.6%
Total	$5,071	$5,171	2.0%

[1] Does not include contributions for GTLI benefits.

In general, we found that the liability and cost computations continue to be prepared by CalPERS' staff in a systematic, careful, and thorough manner. Further areas of investigation that we pursued in more depth are outlined below.

Parallel Valuation Results

As a result of our efforts, we are able to certify that the liabilities and costs computed by the staff as of June 30, 2009 are reasonably accurate and were computed in accordance with generally accepted actuarial principles. Based on the data, assumptions, and methods employed in the staff valuations, the employer contribution rates independently computed by EFI were within 5% of those in the staff valuations for each plan. The total FY 2011 contribution determined by EFI was within 2.0% of the amount computed in the staff valuations.

Additionally, the liabilities (fully projected basis as well as accrued basis) computed by EFI were within 3% of those in the staff valuations for all of the plans, and within ½% for the combined State plans, as well as the County Schools Pool.

Methodology

In order to verify the correctness of calculations in the State & Schools valuations, EFI conducted independent, parallel valuations using its own actuarial models. These independent valuations determine whether actuarial assumptions and methods as described in the CalPERS staff valuation reports are applied properly and yield the reported results.

In preparing our parallel valuations, we relied on member and asset data supplied by CalPERS staff. This data was neither audited nor independently verified. Parallel valuations were conducted for all plans.

We also examined various “log files” and test life files that were provided by Staff. The log files show all tabular valuation inputs as well as factors used in computation of present values and costs.

We compared the results of “test life” computations performed by CalPERS staff with those performed by EFI. A test life is a single member record that is analyzed in detail by an actuarial modeling system. By studying the output of such test life calculations, the accuracy of the actuarial software can be verified.

Valuation Comparisons

Tables 2 through 5 below show the liabilities, total normal cost rates, and employer contribution rates computed separately by CalPERS staff and by EFI for each of the State and Schools plans.

As shown in the tables below, the accrued liability and total normal cost calculations determined by EFI are within 5% of those determined by PERS in all cases, and within a much smaller margin in most cases. The total contribution based on EFI calculations for all plans combined is $5.71 billion, which is within 2.0% of the amount of $5.071 billion shown in the valuation report.

In performing a parallel valuation, it is important to note that the employer contribution rate is very sensitive to small changes in plan liabilities. For a funded plan, a small difference in accrued liability will result in a much larger difference in the unfunded accrued liability. Add to this the presence of employee contributions, and small liability differences translate to large impacts on the total contribution rate. For example, even though the accrued liability and total normal cost computed by EFI for the California Highway Patrol Plan were within 1.4% and 0.5% respectively of those determined in the staff valuations, the total cost computed by EFI was more 2.5% higher.

Table 2: Comparison of Present Value of Future Benefits ($ millions)

Plan	PVFB as Computed by PERS	PVFB as Computed by EFI	Relative Difference
State Miscellaneous	85,804	86,108	0.4%
State Industrial	3,292	3,203	(2.7%)
State Safety*	9,111	9,102	(0.1%)
State Peace Officers & Firefighters*	34,245	34,310	0.2%
California Highway Patrol	8,902	8,979	0.9%
Total State	141,354	141,702	0.2%
County Schools Pool	63,761	64,089	0.5%

* Reflects liability transfer of $356 million to the State POFF from the State Safety Plan.

Table 3: Comparison of Accrued Liabilities ($ millions)

Plan	Accrued Liability as Computed by PERS	Accrued Liability as Computed by EFI	Relative Difference
State Miscellaneous	74,763	74,615	(0.2%)
State Industrial	2,467	2,480	0.5%
State Safety*	6,006	6,084	1.3%
State Peace Officers & Firefighters*	26,291	26,329	0.1%
California Highway Patrol	7,300	7,402	1.4%
Total State	116,827	116,910	0.1%
County Schools Pool	52,493	52,744	0.5%

* Reflects liability transfer of $356 million to the State POFF from the State Safety Plan.

Table 4: Comparison of Total Normal Cost Rates (% of payroll)

Plan	Normal Cost Rate as Computed by PERS	Normal Cost Rate as Computed by EFI	Relative Difference
State Miscellaneous Tier 1	14.40%	15.12%	5.0%
State Miscellaneous Tier 2	9.56%	9.62%	0.6%
State Industrial	17.71%	17.41%	(1.7%)
State Safety	22.10%	21.72%	(1.7%)
State Peace Officers & Firefighters	25.39%	25.36%	(0.1%)
California Highway Patrol	22.54%	22.43%	(0.5%)
Total State	17.92%	18.27%	2.0%
County Schools Pool	14.17%	14.37%	1.4%

Table 5: Comparison of Employer Contribution Rates[2] (% of payroll)

Plan	Contribution Rate as Computed by PERS	Contribution Rate as Computed by EFI	Relative Difference
State Miscellaneous Tier 1	19.92%	20.62%	3.5%
State Miscellaneous Tier 2	19.62%	19.62%	0.0%
State Industrial	18.01%	17.59%	(2.3%)
State Safety	20.55%	20.42%	(0.6%)
State Peace Officers & Firefighters	28.81%	29.04%	0.8%
California Highway Patrol	32.63%	33.46%	2.5%
Total State	22.29%	22.76%	2.1%
County Schools Pool	10.71%	11.11%	3.7%

[2] Does not include rate for GTLI benefits.

As indicated in prior audit reports, this issue will always have the potential to distort total cost results. For this reason, during the audit we focus principally on the comparison of normal cost and liabilities, as well as comparisons of data and other present value calculations (see Appendices 1 and 2).

As indicated above, there were several areas of in-depth investigation that EFI undertook. These are outlined below.

Handling of Death and Refund Decrements

Upon examination of test life output files provided by CalPERS Staff, we noticed that the pre-retirement mortality decrements were not in line with the reported mortality assumptions. Through discussions with staff members, we found that there are adjustments made to these decrements for the valuations. The adjustments deal with the percent of members assumed to be married.

For example, for the State Industrial Plan, this assumption is 85%. This factor is applied to the pre-retirement mortality decrement and the remaining 15% (100% - 85%) is applied to the refund decrement.

We found this method to be appropriate and reasonable, and we were able to match the calculations in the test files. This approach properly reflects the survivorship assumptions, and it provides a reliable projection of benefit payments that is in line with the administration of the plan in the case of deaths among active members.

Part Time Schools Employees

The Schools population is unique in that many of the active plan participants are part-time employees. These members are subject to special handling for the purpose of the valuation.

Upon a review of test lives provided by CalPERS Staff, our understanding is that the following procedures apply to these members:

- Benefit service is assumed to continue to accrue at the part-time rate.
- Eligibility service is assumed to continue to accrue at the full-time rate.
- Decrements and assumed salary increases are based on eligibility service.

We were able to verify that these methods were applied properly. At face value, the handling of decrements and salary increases is appropriate; however, it is impossible to make a true determination of this without careful analysis of the Plan’s experience.

After extensive review and analysis, we believe that the methods used by PERS staff to compute Plan costs and liabilities with respect to part time employees are well within reason and acceptable practice. Our recommendations are:

1. Add a brief explanation of the special valuation procedures and assumptions within the valuation report, and

2. Because part-time members represent a substantial segment of the Schools population, they should be analyzed separately in next experience study, to determine if any material difference in demographic experience is evident.

Tier 2 Dynamics for Miscellaneous and Industrial

Current Tier 2 members of the State Miscellaneous and State Industrial plans may transfer to Tier 1, provided that they either pay past employee contributions or accept an actuarially reduced retirement benefit.

Our understanding is that handling of active members is accomplished by the following process:

1. Project the hypothetical Tier 2 employee contribution balance to expected retirement;

2. Assume that all Tier 2 members will elect to join Tier 1 at retirement and take a higher benefit; and

3. Actuarially convert the hypothetical Tier 2 contribution balance into a lifetime deduction from the Tier 1 pension benefit.

We have reviewed this approach and found it to be reasonable and sufficiently conservative, and we created a valuation model which mimics the same methodology. As shown in Table 4 above, the normal cost for Tier 2 members we computed is the same as that computed by CalPERS.

Our only recommendation is to more fully describe this procedure within the valuation report.

Assumption Changes

Many of the valuation assumptions have been updated based on the recently completed "CalPERS Experience Study 1997 to 2007", published in April of 2010. EFI performed an initial review of this Report and provided a full report (dated April 19, 2010) under separate cover. A more detailed audit of this Experience Study is being planned.

In addition to the verification of the final valuation results, we evaluated the impact of the recent assumption changes on each plan. The impact of the new assumptions on Normal Cost, as reported in the State and Schools valuation was fairly small, ranging from a 2.1% relative decrease to a 6.4% relative increase. The impact on total Actuarial Accrued Liability ranged from 2.0% to 4.0% increase, relative.

For each plan, we computed the total Normal Cost and total Actuarial Accrued Liability based on old assumptions and compared them to our computations under the final (new)

assumptions. We then compared the changes in Normal Cost and Actuarial Accrued Liability to those reported by CalPERS. We found all comparisons to be within reasonable tolerances. Table 6 below shows the impact on Total Normal Cost and on Actuarial Accrued Liability for each of the plans, as computed by the CalPERS Actuarial Office, and separately by EFI.

Table 6: Comparison of Impact of Assumption Changes

	Relative Impact on Total Normal Cost			Relative Impact on Total Accrued Liability		
Plan	**CalPERS**	**EFI**	**Diff**	**CalPERS**	**EFI**	**Diff**
State Miscellaneous	-1.0%	-1.2%	-0.2%	2.8%	2.2%	+ 0.6%
State Industrial	-0.9%	-1.6%	-0.7%	2.8%	2.2%	- 0.6%
State Safety	6.4%	5.9%	-0.5%	4.0%	3.6%	- 0.4%
State Peace Officers & Firefighters	2.8%	2.7%	-0.1%	2.5%	2.7%	+ 0.2%
California Highway Patrol	2.5%	2.2%	-0.3%	2.0%	2.1%	+ 0.1%
County Schools Pool	-2.1%	-3.5%	-1.4%	2.0%	5.6%	+ 3.6%

For the five State systems, the difference between the EFI calculation of assumption impact is very close to that determined by CalPERS. The differences were slightly greater for the County Schools Pool valuation than for the State plans. This is likely caused by complications related to the part-time employee issue described above. EFI's Normal Cost impact is lower and our Actuarial Accrued Liability is higher, so the two offset each other in total contribution rates. Based on our analysis we believe that the reported impact of assumption changes on the Schools plan valuation is accurate.

Appendix 1: Demographic Data Comparison

Plan	Active Participants						Retirees	
	Average Age		Average Service		Average Pay		Total Benefits* ($ millions)	
	EFI	PERS	EFI	PERS	EFI	PERS	EFI	PERS
State Miscellaneous Tier 1	48.0	47.9	13.3	13.3	62,343	61,952	3,595.8	3,596.1
State Miscellaneous Tier 2	48.9	48.9	16.4	16.4	52,809	52,893	40.4	40.4
State Industrial	45.4	45.4	8.5	8.5	49,774	49,733	95.5	95.6
State Safety	47.4	47.4	6.7	6.7	74,216	74,278	253.6	253.8
State Peace Officers & Firefighters	41.2	41.2	11.0	11.0	71,717	71,706	942.9	942.6
California Highway Patrol	39.1	39.1	12.7	12.7	93,808	93,813	335.5	335.4
Schools	46.6	46.6	9.9	9.8	34,869	34,846	2,142.7	2,142.7

* Does not include PPPA amounts.

Appendix 2: Liability Comparison
($ millions)

Plan	Present Value of Future Benefits						Present Value of Future Salaries		
	Active Participants			Inactive Participants					
	PERS	EFI	Ratio	PERS	EFI	Ratio	PERS	EFI	Ratio
State Miscellaneous	43,578	44,645	102.4%	42,226	41,463	98.2%	79,356	79,529	100.2%
State Industrial	1,844	1,755	95.2%	1,448	1,449	100.1%	4,910	4,842	98.6%
State Safety*	6,169	6,200	100.5%	2,942	2,902	98.6%	14,756	14,498	98.3%
State Peace Officers & Firefighters*	20,407	20,735	101.6%	13,838	13,575	98.1%	32,088	32,101	100.0%
California Highway Patrol	4,481	4,562	101.8%	4,420	4,417	99.9%	7,108	7,052	99.2%
Total State	76,480	77,897	101.9%	64,873	63,805	98.4%	138,217	138,022	99.9%
Schools	28,996	27,981	96.5%	34,765	36,108	103.9%	82,129	80,978	98.6%

* Reflects liability transfer of $356 million to the State POFF from the State Safety Plan.

Review of Judges' Retirement System I as of June 30, 2010

Overview

EFI Actuaries conducted an independent review of the Actuarial Valuation of the Judges' Retirement System (JRS) as of June 30, 2010. Overall, EFI was able to certify that the liabilities and costs computed in this valuation are reasonable and were computed in accordance with generally accepted actuarial principles and practices. However, EFI did discover a problem with the total actuarial liability for terminated members and for members entitled to deferred benefits under a Domestic Relations Order (DRO). A discussion of this issue is presented below.

Background

The Judges Retirement System provides pensions and ancillary benefits to California state judges who were elected or appointed before November 9, 1994. Judges elected or appointed on or after that date are covered under Judges Retirement System II (JRS II). JRS and JRS II are separate retirement plans with separate memberships, separate asset pools, and no financial interrelationship.

A judge who has reached age 60 and is credited with 20 or more years of service under the System will be awarded a lifetime pension of 75% of pay in the last judicial office held. Death, disability, and termination benefits are also paid from the System.

The System is financed by employer and employee contributions and the investment return on System assets. Participants contribute 8% of pay. Employer Contributions to the plan are determined using the pay as you go method, with no prefunding of liabilities.

Review of Methods and Assumptions

EFI determined that the actuarial methods and assumptions used in the JRS Valuation are within acceptable standards of actuarial practice.

Actuarial assumptions used to compute JRS liabilities and employer costs include:

- A 4.50% annual rate of investment return, net of all expenses;
- Annual salary increases of 3.25%;
- Annual inflation of 3.00%
- Retirement between the ages of 60 and 80 after 10 years of service;
- Termination rates from 0.3% to 2.5% per year, depending on age and service;

- Active and retired mortality rates developed based on actual CalPERS experience during the period from 1997 to 2007.

More detailed information concerning the valuation assumptions can be found in the 2010 CalPERS Experience Study Report. EFI also performed a review of this Experience Study, and evaluated demographic assumptions as part of that review.

Both CalPERS staff and EFI ignored the possible impact of benefit limitations under Internal Revenue Code Section 415 on liabilities and contribution rates. The effect of this Code section on liabilities would be immaterial.

Potential future issues exist relating to the recent Exposure Drafts issued by the Governmental Accounting Standards Board (GASB). The Exposure Drafts propose significant changes to the accounting rules for governmental pension plans. If finalized, which is likely, all plans will be required to use the Entry Age Normal actuarial cost method to determine the total pension liability for accounting purposes. JRS I currently uses the Pay as You Go Method. Other changes impacting discount rates and recognition of gains and losses will impact all of CalPERS' plans.

Note that these changes would be required for accounting purposes only – sponsors are still free to choose the methods used to determine the funding requirements of the plan.

The JRS I System is nearly unfunded; benefits are paid as they come due, and no significant assets have been accumulated. All new judges now become members in JRS II. Therefore, the active membership in JRS I will gradually diminish, and there will be a decreasing payroll over which to fund the cost of benefits. Considering the forgoing, the assumptions listed above are appropriate for this valuation.

Independent Valuation

The JRS Valuation was performed by CalPERS staff using the Actuarial Valuation System (AVS). EFI validated the calculations by creating an *independent* actuarial model to develop the valuation results. The only data common to the models was the participant data; the EFI model was developed separately, without reference to the one used by staff for the Valuation.

As established in our Proposal of Services, we expect the values of comparable items derived from the two models to differ by less than the percentages shown in the following table.

These tolerances are sufficiently stringent to detect material differences between the models. Differences outside of the Acceptable Tolerances listed above would not necessarily cause a failure to certify the valuation, but would result in additional scrutiny and reconciliation to determine the reasons.

Calculated Item	Acceptable Tolerance
Number of members - active, retired, inactive	0%
Annual payroll and member contributions	0%
Present value of pay; present value of member contributions	1%
Present value of benefit obligations	5%
Annual normal cost, employer contribution rates	5%

Tables 1 and 2 below show the principal results of our independent valuations.

Reconciliation of Results

As seen in Table 1, one area in which the valuation results were not within the expected tolerance levels was the Present Value of Benefits for inactive members with a deferred benefit (including those members with Domestic Relations Orders (DROs)). Through an analysis of test lives, we discovered that the liability for these participants was computed as their contribution balance, which is generally much lower than the value of their deferred benefits. Due to the magnitude of the discrepancy - a 245% difference - this issue was immediately brought to the attention of the CalPERS staff.

After internal review by CalPERS, it was discovered that the decrease in liabilities for this group was caused by a glitch related to a programming change to the CalPERS valuation system. This change was intended to reflect the updated retirement assumptions for vested terminated members; the unintended result was that vested terminated members were valued with only their current account balance, rather than the much larger present value of deferred benefit payments.

We discussed the issue with CalPERS staff, and our understanding is that the programming error has been fixed and unlikely to impact future valuations.

Other than this discrepancy, the valuation results computed by EFI are very close to those computed by CalPERS staff.

Table 1: Independent Valuation Results

	CalPERS JRS Valuation	EFI Independent Valuation	EFI to PERS Difference	Within Tolerance
1. Present Value of Benefits for Active Members	$ 1,151,075,812	$ 1,183,132,060	2.78%	Yes
2. Present Value of Benefits for Inactive Members				
Deferred Vested & DRO	26,678,671	91,920,534	244.55%	No
Receiving Benefits	2,378,240,882	2,418,933,231	1.71%	Yes
Total	$2,404,919,553	$2,510,853,765	4.40%	Yes
3. Total Present Value of Benefits	$3,555,995,365	$3,693,985,825	3.88%	Yes
4. Actuarial Accrued Liability for Active Members	1,024,461,351	1,054,775,299	2.96%	Yes
5. Total Actuarial Accrued Liability (4) +(2)	$3,429,380,904	$3,565,629,064	3.97%	Yes
6. Assets	63,828,344	63,828,344	0.00%	Yes
7. Unfunded Actuarial Accrued Liability (UAAL) [(5) – (6)]	$3,365,552,560	$3,501,800,720	4.05%	N/A
8. Amortization of UAAL	$1,265,245,323	$1,316,466,436	4.05%	N/A
9. Employer Normal Cost	$42,603,749	$42,885,007	0.66%	Yes
10. Actuarial Required Contribution (ARC) [(7) +(9)] * 1.045	$1,366,702,280	$1,420,522,258	3.94%	Yes

Table 2: Demographic Comparison

Number of Members	CalPERS JRS Valuation	EFI Independent Valuation	EFI to PERS Difference	Within Tolerance
Active	468	468	0.00%	Yes
Retired	1,843	1,843	0.00%	Yes
Inactive	67	67	0.00%	Yes
Salaries and Contributions				
Total Payroll	$85,947,377	$85,947,377	0.00%	Yes
Present value of Payroll	$224,475,294	$222,324,573	-0.96%	Yes

Review of Judges' Retirement System II as of June 30, 2010

Overview

EFI Actuaries completed an independent review of the Actuarial Valuation of the Judges' Retirement System II (JRS II, the System) as of June 30, 2010. Overall, EFI was able to certify that the liabilities and costs computed in this valuation are reasonable and were computed in accordance with generally accepted actuarial principles and practices. However, EFI did discover a problem with the total actuarial liability for retired members. A discussion of this issue is presented below.

The supporting calculations and the above issues are discussed in more detail below.

Background

Judges Retirement System II provides pensions and ancillary benefits to California state judges who were elected or appointed on or after November 9, 1994. Judges elected or appointed prior to that date are covered under Judges Retirement System I (JRS I). JRS I and JRS II are separate retirement plans with separate memberships, separate asset pools, and no financial interrelationship.

A judge who has reached 65 and is credited with 20 or more years of service under the System, or who has reached age 70 with five or more years, will be awarded either a lifetime pension or will be paid the balance of his or her monetary credits. The retiring judge makes the choice. The pension benefit is an annuity for life of 3.75% of highest 12 months pay per year of service, up to 75% of pay. The monetary credit balance is the accumulation of 8% of pay in employee contributions and 10% of pay designated as employer contributions from date of election or appointment. Death, disability, and termination benefits are also paid from the System.

Review of Methods and Assumptions

The actuarial methods and assumptions used in the JRS II Valuation are well within acceptable standards of actuarial practice.

Annual valuations of JRS II are completed using the Entry Age Normal Funding Method. The valuation date is June 30, 2010. Contributions are determined for the July 1, 2011 through June 30, 2012 fiscal year.

Actuarial assumptions used to compute System liabilities and normal costs include:

- An 7.25% annual rate of investment return, net of all expenses;
- Annual salary increases of 3.25%;

- Annual inflation of 3.00%;
- Retirement between the ages of 65 and 70 after five years of service;
- Termination rates from 0.225% to 0.9% per year, depending on age and service; and
- Active and retired mortality rates developed based on actual CalPERS experience during the period from 1997 to 2007.

More detailed information concerning the valuation assumptions can be found in the 2010 CalPERS Experience Study Report. EFI also performed a review of this Experience Study, and evaluated demographic assumptions as part of that review.

Both CalPERS staff and EFI ignored the possible impact of benefit limitations under Internal Revenue Code Section 415 on liabilities and contribution rates. The effect of this Code section on liabilities would be immaterial.

Potential future issues exist relating to the recent Exposure Drafts issued by the Governmental Accounting Standards Board (GASB). The Exposure Drafts propose significant changes to the accounting rules for governmental pension plans. If finalized, which is likely, all plans will be required to use the Entry Age Normal actuarial cost method to determine the total pension liability for accounting purposes. LRS currently uses the Aggregate Method. Other changes impacting discount rates and recognition of gains and losses will impact all of CalPERS' plans.

Note that these changes would be required for accounting purposes only – sponsors are still free to choose the methods used to determine the funding requirements of the plan.

Independent Valuation

The JRS II Actuarial Valuation was performed by CalPERS staff using the Actuarial Valuation System (AVS). EFI validated the calculations by creating an *independent* actuarial model to develop the valuation results. The only data common to the models was the participant data; the EFI model was developed separately, without reference to the one used by staff for the Valuation.

As established in our Proposal of Services, we expect the values of comparable items derived from the two models to differ by less than the percentages shown in the following table.

These tolerances are sufficiently stringent to detect material differences between the models. Differences outside of the Acceptable Tolerances listed above would not necessarily cause a failure to certify the valuation, but would result in additional scrutiny and reconciliation to determine the reasons.

Calculated Item	Acceptable Tolerance
Number of members- active, retired, inactive	0%
Annual payroll and member contributions	0%
Present value of pay; present value of member contributions	1%
Present value of benefit obligations	5%
Annual normal cost, employer contribution rates	5%

Reconciliation of Results

Tables 1 and 2 below show the principal results of the independent valuations.

As seen in Table 1, the only area for which the independent valuation was not within the expected tolerance levels was the Present Value of Benefits for retired members. Upon examination of a group of test lives, we discovered that the Post Retirement Survivor Allowance (PRSA) was not valued for any retirees, even though most of them have spouses eligible to receive this additional benefit. All retirees were valued assuming that they were receiving a single life annuity; instead, many are receiving their benefit in the form of a 50% or 100% joint and survivor annuity.

This issue was brought to the attention of the CalPERS staff, and they confirmed it.

After internal review by CalPERS, a recalculation was made, resulting in an increase in the retiree liabilities of approximately $2.3 million, which brings the liability well within 5% of the figure determined by EFI.

Other than this discrepancy, the valuation results computed by EFI are very close to those computed by CalPERS staff.

Table 1: Independent Valuation Results

	CalPERS JRS Valuation	EFI Independent Valuation	EFI to PERS Difference	Within Tolerance
1. Present Value of Benefits for Active Members	$ 1,046,312,562	$ 1,044,246,784	(0.20%)	Yes
2. Present Value of Benefits for Inactive Members	14,429,615	16,678,245	15.58%	No
3. Total Present Value of benefits	$1,060,742,177	$1,060,925,029	0.02%	Yes
4. Accrued Actuarial Liability for Active Members	$506,257,856	502,519,002	(0.74%)	Yes
5. Total Accrued Actuarial Liability (4) +(2)	$535,117,086	$519,197,247	(2.98%)	Yes
6. Assets	461,071,403	461,071,403	0.00%	Yes
7. Unfunded Accrued Actuarial Liability (UAAL) [(5) – (6)]	$401,455,335	$58,125,844	(2.50%)	N/A
8. Covered payroll	$212,663,194	$212,663,194	0.00%	Yes
9. Present Value of Future Payroll	$1,880,829,879	$1,868,233,677	(0.67%)	Yes
10. Present Value of Future Employee Contributions	$150,466,427	$149,458,694	(0.67%)	Yes
11. Total Normal cost percentage	29.679%	28.997%	(2.30%)	Yes
12. Employer Normal Cost Percentage: (11) – 8.000%	21.679%	20.997%	0.00%(3.15 %)	Yes
13. Payroll projected to 2012	$226,710,927	$226,710,927	0.00%	Yes
14. Employer Normal Cost for Fiscal 2012: (12) x (13)	$49,148,662	$47,602,493	(3.15%)	Yes
15. Amortization of UAAL	$3,995,474	$3,904,728	(2.50%)	N/A
16. Actuarial Required Contribution for Fiscal 2012	$363,129,621	$51,507,221	-85.82%(85. 82%)	Yes
17. Total Employer Contribution Rate for Fiscal 2012	23.441%	22.719%	(3.08%)	Yes

Table 2: Demographic Comparison

Number of Members	CalPERS JRS Valuation	EFI Independent Valuation	EFI to PERS Difference	Within Tolerance
Active	1,186	1,186	0.00%	Yes
Retired	18*	18*	0.00%	Yes
Inactive	1	1	0.00%	Yes

* Per valuation report, does not include one beneficiary receiving a 36 month pre-retirement death benefit.

Review of Legislators' Retirement System as of June 30, 2010

Overview

EFI Actuaries conducted an independent review of the Actuarial Valuation of the Legislators' Retirement System (LRS) as of June 30, 2010. In general, we are able to certify that the liabilities computed in this Valuation are reasonable and were computed in accordance with generally accepted actuarial principles. However, EFI did discover a problem with the total actuarial liability for terminated members and for members entitled to deferred benefits under a Domestic Relations Order (DRO). A discussion of this issue is presented below.

Based on the assumptions and methods employed in the valuation, the actuarial liabilities and costs independently computed by EFI closely matched those in the Valuation.

The supporting calculations are presented in more detail below.

Review of Methods and Assumptions

The actuarial methods and assumptions used in the LRS Valuation are well within acceptable standards of actuarial practice.

Actuarial assumptions used to compute System liabilities and employer costs include:

- A 6.0% annual rate of investment return, net of all expenses;
- Annual salary increases of 3.25%;
- Annual inflation of 3.0%
- Active and retired mortality rates developed based on actual CalPERS experience during the period from 1997 to 2007.

More detailed information concerning the valuation assumptions can be found in the 2010 CalPERS Experience Study Report. EFI also performed a review of this Experience Study, and evaluated demographic assumptions as part of that review.

Both CalPERS staff and EFI ignored the possible impact of benefit limitations under Internal Revenue Code Section 415 on liabilities and contribution rates. The effect of this Code section on liabilities would be immaterial.

Potential future issues exist relating to the recent Exposure Drafts issued by the Governmental Accounting Standards Board (GASB). The Exposure Drafts propose significant changes to the accounting rules for governmental pension plans. If finalized, which is likely, all plans will be required to use the Entry Age Normal actuarial cost method to determine the total pension liability for accounting purposes. LRS currently uses the

Aggregate Method. Other changes impacting discount rates and recognition of gains and losses will impact all of CalPERS' plans.

Note that these changes would be required for accounting purposes only – sponsors are still free to choose the methods used to determine the funding requirements of the plan.

Independent Valuation

The LRS Valuation was performed by CalPERS staff using the Actuarial Valuation System (AVS). EFI validated the calculations by creating an *independent* actuarial model to develop the valuation results. The only data common to the models was the participant data; the EFI model was developed separately, without reference to the one used by staff for the Valuation.

As established in our Proposal of Services, we expect the values of comparable items derived from the two models to differ by less than the percentages shown in the following table.

Calculated Item	Acceptable Tolerance
Number of members- active, retired, inactive	0%
Annual payroll and member contributions	0%
Present value of pay; present value of member contributions	1%
Present value of benefit obligations	5%
Annual normal cost, employer contribution rates	5%

These tolerances are sufficiently stringent to detect material differences between the models. Differences outside of the Acceptable Tolerances listed above would not necessarily cause a failure to certify the valuation, but would result in additional scrutiny and reconciliation to determine the reasons.

Tables 1 and 2 below show the results of the calculations. We note the fully projected liabilities produced by CalPERS and by EFI are in close agreement in total.

Reconciliation of Results

As seen in Table 1, one area in which the valuation results were not within the acceptable tolerance levels was the Present Value of Benefits for inactive members with a deferred benefit. Through an analysis of test lives, we discovered that this issue can be narrowed down to three individuals. The members in question are listed in Table 3 below.

Other than this discrepancy, the valuation results computed by EFI are well within acceptable tolerances of those computed by CalPERS staff.

Table 1: Independent Valuation Results

	CalPERS LRS Valuation	EFI Independent Valuation	EFI to PERS Difference	Within Tolerance
1. Present Value of Benefits for Active Members	$ 12,277,685	$ 12,747,425	3.83%	Yes
2. Present Value of Benefits for Inactive Members				
Deferred Vested & DRO	9,698,472	11,253,241	16.03%	No
Receiving Benefits	93,974,562	89,304,500	(4.97%)	Yes
Total	$103,673,034	$100,557,741	(3.00%)	Yes
3. Total Present Value of Benefits	$115,950,719	$113,305,166	(2.28%)	Yes
4. Assets	126,641,553	126,641,553		Yes
5. Present Value of Member Contributions	0	0	0.00%	Yes
6. Present Value of Employer Contributions	0	0	0.00%	Yes
7. Employer Contribution Rate	0.00%	0.00%	0.00%	Yes

Table 2: Demographic Comparison

Number of Members	CalPERS LRS Valuation	EFI Independent Valuation	EFI to PERS Difference	Within Tolerance
Active	14	14	0.00%	Yes
Retired	266	266	0.00%	Yes
Inactive	24	24	0.00%	Yes
Salaries and Contributions				
Total Payroll	$ 2,159,181	$ 2,159,181	0.00%	Yes
Present value of EE Contribs	$ 0	$ 0	0.00%	Yes

Table 3: Inactive Members with Discrepancy in Actuarial Liability

Member Last Name	Earnings	Years of Service	Liability - CalPERS	Liability - EFI	EFI vs PERS	EFI to PERS Ratio
Leonard	$159,134	24	$931,687	$1,426,872	$ 495,185	153%
Lockyer	$169,743	24	$811,414	$1,243,967	$ 432,553	153%
O'Connell	$184,301	24	$1,106,857	$1,842,469	$ 735,612	166%

Review of 1959 Survivor Benefit Program as of June 30, 2010

Overview

EFI Actuaries completed an independent review of the Actuarial Valuation of the 1959 Survivor Benefit Program (the Plan, the Program) as of June 30, 2010. The scope of this study was a review of the Actuarial Valuation Report (the Valuation, the Report), an evaluation of actuarial methods and assumptions, and verification of the actuarial liabilities and costs calculated by CalPERS Staff.

As a result of our efforts, EFI was able to attest to the following.

- Overall, we found the Report to be accurate and complete, and fully compliant with generally accepted actuarial principles and with all standards of practice.

- We reviewed the actuarial methods and assumptions used for the Valuation, and find them to be reasonable and within acceptable standards of practice.

- EFI assessed the correctness of the valuation calculations by creating two *independent* valuation models to develop liabilities for all members. The resulting liabilities are within acceptable tolerances.

These findings are discussed in more detail below. In addition, we offer a few suggestions for future improvements.

Background

The 1959 Survivor program was designed to provide pre-retirement death benefits to CalPERS' members not covered by the Federal Old Age and Survivor Insurance (OASI) program. The benefit is available only to those members not covered by OASI benefits. For CalPERS State and School members, this benefit is provided by State statue to certain groups of employees; public agencies are able to contract with CalPERS for the Program. Members who are eligible for the Program are given a one-time option to elect this benefit. Five numbered benefit levels and an indexed level are available, depending on the employer and the date of hire.

The benefit is a monthly payment to the eligible surviving spouse and children. A spouse is eligible if he or she has care of eligible children or is age 62 (60 for levels 3 or higher) or older. A child is eligible if he or she is under age 22 and not married. Physically disabled children are also eligible until the disability ceases. If there are no children or spouse, dependent parents over age 62 are eligible.

Actuarial assumptions used to compute liabilities and normal costs include:

- A 7.75% annual rate of investment return, net of all expenses;

- CalPERS specific mortality assumptions for surviving spouses; no mortality is assumed for child beneficiaries;

- Miscellaneous 2% @ 55 decrements for Miscellaneous Indexed members; and Police 2% @ 50 decrements for Safety Indexed members.

Current (2011) benefit levels are shown in Table 1 below.

Table 1: Monthly Benefit Levels Payable under the 1959 Survivor Benefit Program

	Level					
Coverage Tier:	**1**	**2**	**3**	**4**	**5**	**Indexed**
Spouse with two or more children; or three or more eligible children	$ 430	$ 538	$ 840	$ 2,280	$ 1,800	$ 1,865
Spouse with one child; or two eligible children only	$ 360	$ 450	$ 700	$ 1,900	$ 1,500	$ 1,243
One eligible child only; or spouse age 62 or older; or dependent parents	$ 180	$ 225	$ 350	$ 950	$ 750	$ 622

Methodology

The review process for the Program includes three steps:

- Review of Methods and Assumptions

  The actuarial assumptions and methods employed in the CalPERS 1959 Survivor Program Actuarial Valuation were reviewed by EFI in order to establish that they meet acceptable standards of actuarial practice. We examined current practices to determine if any possible improvements or enhancements are appropriate.

- Independent Valuations

  We independently compute liabilities and normal costs under the 1959 Survivor Benefit Program, based on the assumptions and Plan provisions shown in the Valuation Report published by CalPERS as of June 30, 2010. We then compare these liabilities to those computed and reported by CalPERS.

  Calculations for all benefit recipients from each of the benefit levels (1 through 5 and Indexed Level) are reviewed, as well as all active members (Miscellaneous and Safety) from the Indexed Level population. Benefits for active members from benefit levels 1 through 5 are not calculated for the purposes of the Valuation, but the member counts are

utilized in the calculation of the required employer and employee premiums. We did not verify the counts, but found them to be reasonable in comparison with the prior valuation reports.

- Reconciliation of Results

  In the event that the figures computed by EFI fall outside of the established tolerances (5%) versus those computed by CalPERS' staff, reconciliation is required.

  This reconciliation proceeds in four steps:

  1. Establishing that the same member data has been used by EFI and by staff;

  2. Researching methodological differences between the EFI and staff approaches to computing liabilities and costs;

  3. Comparing individual test life results to uncover subtle differences in approach that may result in material differences in liabilities and costs.

  4. Discuss with CalPERS Staff the nature and magnitude of the discrepancy and come to agreement on the cause and remedy.

Review of Actuarial Methods and Assumptions

Member Data

We did not audit the participant data nor did we audit the asset information that was provided to us. The only element of the data that we found to be a potential issue was that the payment amounts listed for some of the survivors did not seem to match their benefit level and coverage tier. It is our understanding that such data issues are common for this plan, and that the normal cost weighting, as described in the Valuation Report, is intended to mitigate the impact. We agree that this is a reasonable approach.

Actuarial methods and assumptions

We have reviewed the actuarial methods and assumptions used for the valuation, and find them to be reasonable and within acceptable standards of practice.

A modified Term Cost method is used to determine the rates for Levels 1 through 5, while the Entry Age Normal method is used for the Indexed Level. The latter has been implemented to account for the increasing nature of the benefit levels. We believe that these methods are appropriate; however, it may be useful to validate the rates for Levels 1 through 5 by computing them using the Entry Age Normal method.

Valuation Report

Overall, we found the report to be accurate and complete with one typographical exception. In the "Development of Funding Requirements" for all groups, item 4(e), "Total Required

Contribution Per Member, Per Month," should have "4(b)*12" in the denominator, not "4(b)/12".

We would also like to make a suggestion: In the "Development of Funding Requirements" for Public Agency Pools Level 1 through 4, there is a brief footnote that states, "Mortality experience and survivor distribution are assumed to be homogeneous across all Public Agency pools and are added together to develop normal costs in order to improve credibility of the data." We think that it would be prudent to modify the footnote to state that this will be explained further in the "Actuarial Funding Method" section. You could then add language to the "Actuarial Funding Method" section along the following lines:

"For Public Agency 1st, 2nd, 3rd and 4th Levels, the Present Value of Benefits for 2006-2009 Deaths for each level are calculated as if all members of all four levels who died from 2006-2009 were members of that particular level."

Independent Valuations

EFI assessed the validity of the calculations by creating two *independent* valuation models to develop liabilities for the eight groups of members.

Current Survivors

Our Survivors Model projects expected cash flows for each benefit recipient based on their benefit level and expected lifetime. These cash flows are discounted to the valuation date using the same assumptions used for the CalPERS valuation. These present values are then compared to the figures provided by CalPERS for each group.

Table 2 below shows the results of the calculations.

The results produced by the PERS staff and by EFI are in very close agreement for all of the Survivors, deviating by at most 7.4% in the case of Indexed Level employees. This difference seems to be caused by the following:

- Liabilities for Indexed Level survivors were computed as of January 1, 2011, and
- Disabled children of Indexed Level survivors were valued using full life annuities, instead of receiving 1 year of benefits.

If we apply those two changes to our valuation system, we calculate a PVB of $11,936,959, 95.4% of the CalPERS number.

Table 2: Comparison of Present Value of Benefits for Survivors

Survivors Present Value of Benefits

Level:	CalPERS	EFI	Ratio	Within Tolerance
1	2,227,779	2,165,301	97.2%	Yes
2	2,084,000	2,023,318	97.1%	Yes
3	24,263,435	23,754,474	97.9%	Yes
4	110,178,839	106,204,360	96.4%	Yes
5	145,432,955	139,392,399	95.8%	Yes
Indexed	12,512,434	11,588,688	92.6%	No
Total	296,699,442	285,128,540	96.1%	Yes

In aggregate, the total present value we determined for the population of 589 survivors was within 3.9% of that calculated by PERS, as shown above.

Current Active Members

We developed a separate Active Model for active members in the Program. This Model was designed to determine the present value of benefits for each member in the same manner as that employed by CalPERS, applying Miscellaneous 2%@55 decrements for Miscellaneous members and 2%@50 Police decrements for Safety members. This is a reasonable approach, however, an alternative would be to use separate decrements for each active participant, depending on which pension plan they belong to. We tested the sensitivity of this by applying the Miscellaneous 2.5%@55 and Safety 3%@50 decrements to all Indexed Level members. This did not produce a material difference in the computed rate; therefore a change in this approach is not warranted at this time.

The present values, accrued liabilities, and normal costs produced by the PERS staff and by EFI are in very close agreement for both the Safety group and the Miscellaneous group. Table 3 below shows the results of the calculations.

Table 3: Comparison of Active Liabilities and Costs for Miscellaneous and Safety

Active Liabilities for Indexed Level

	CalPERS	EFI	Ratio	Within Tolerance
Present Value of Benefits				
Miscellaneous	4,136,576	4,125,940	99.7%	Yes
Safety	5,654,861	5,668,995	100.3%	Yes
Total	9,791,437	9,794,935	100.0%	Yes
Accrued Liability				
Miscellaneous	1,573,496	1,524,328	96.9%	Yes
Safety	2,129,324	2,112,267	99.2%	Yes
Total	3,702,820	3,636,595	98.2%	Yes
Normal Cost				
Miscellaneous	423,012	421,338	99.6%	Yes
Safety	469,162	446,259	95.1%	Yes
Total	892,174	867,597	97.3%	Yes
Normal Cost per member per month				
Miscellaneous	7.92	7.89	99.6%	Yes
Safety	6.42	6.10	95.1%	Yes
Total	7.05	6.86	97.3%	Yes

Required Monthly Premiums

Using the results on an aggregate basis, we then calculated the required monthly premiums for 2011-2012 and compared those results to those computed by CalPERS.

Table 4: Comparison of Present Value of Benefits for Survivors

2011-2012 Required Monthly Premium

	CalPERS			EFI			Ratio	Within
Level:	**Employer**	**Employee**	**Total**	**Employer**	**Employee**	**Total**	**(Total)**	**Tolerance**
State 5th Level Pool	$5.45	$5.45	$10.90	$5.20	$5.20	$10.40	95.4%	Yes
Schools 5th Level Pool	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00	100.0%	Yes
PA 1st Level Pool	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00	100.0%	Yes
PA 2nd Level Pool	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00	100.0%	Yes
PA 3rd Level Pool	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00	100.0%	Yes
PA 4th Level Pool	$3.90	$2.00	$5.90	$3.80	$2.00	$5.80	98.3%	Yes
PA Indexed Level Pool	$3.20	$3.20	$6.40	$2.75	$2.75	$5.50	85.9%	No

Table 4 above shows the results of the calculations. More detailed calculations can be found in the attached appendix.

Reconciliation of Results

For most of the survivors, EFI's calculations were within 5% of those computed by CalPERS; therefore no reconciliation is required for those groups. The same is true for the total present value of benefits and normal costs for all actives.

We believe the difference in liabilities for Indexed Level employees is caused by a difference in methodology between CalPERS and EFI. The spreadsheet provided by CalPERS indicates that the Indexed Level liabilities were calculated as of January 1, 2011, whereas our numbers are calculated as of July 1, 2010. Rolling forward our Indexed Level liability value by half a year puts the Indexed Level liability within 5% of the reported value.

The 2011-2012 required monthly premiums for the non-Indexed Level Pools agree quite closely. However, the required monthly premium for the Public Agency Indexed Level Pool that EFI has computed is 86% of the rate calculated by CalPERS. This difference is primarily due to the differences in survivor liabilities described above. If we calculate the Public Agency Indexed Level Pool present values using the method mentioned above, the total accrued liability and normal cost are both within acceptable tolerances. Details are shown in Table A-7 below.

Appendix – Minimum Funding Requirements

Table A-1: State 5th Level

	CalPERS State 5th Level	EFI State 5th Level
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$133,976,361	$128,600,838
b. Actuarial Value of Assets	$100,321,586	$100,321,586
c. Unfunded Accrued Liability/(Excess Assets) [1(a)-1(b)]	$33,654,775	$28,279,252
2) Development of Normal Cost		
a. Present Value of Benefits for 2006-2009 Deaths	$28,432,145	$28,285,778
b. Number of 2006-2009 Member Months	3,749,364	3,749,364
c. Total per member, per month 2010/2011 Term Insurance Normal Cost	$7.80	$7.80
d. Total per member, per month 2011/2012 Term Insurance Normal Cost [.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10	$7.70	$7.70
3) 2011 Projected Unfunded Liability		
a. 2010 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2011 [1(c)*1.0775]	$36,263,020	$30,470,894
b. Projected Normal Cost Accrual 2010-2011 with interest	$7,923,761	$7,923,761
c. Projected Employer Contributions 2010-2011 with interest	$5,402,920	$5,402,920
d. Projected Employee Contributions 2010-2011 with interest	$5,402,920	$5,402,920
e. Total Projected UAL/(Excess Assets) as of June 30, 2011 [3(a)+3(b)-3(c)-3(d)]	$33,380,942	$27,588,816
4) 2011/2012 Required Contribution		
a. Required Normal Cost per member, per month [2(d)]	$7.70	$7.70
b. Projected Active Members as of 6/30/2011	79,587	79,587
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.0775^1/2]	$7,633,483	$7,633,483
d. Amortization of the UAL/(Excess Assets)	$2,789,413	$2,305,405
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$10.90	$10.40
f. Amortization Period	30-year	30-year
5) 2011/2012 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month [maximum($2,4(e)/2)]	$5.45	$5.20
b. Required Employer Premium per member, per month [maximum($0,4(e)-5(a))]	$5.45	$5.20

Table A-2: School 5th Level

	CalPERS School 5th Level	EFI School 5th Level
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$11,456,594	$11,456,594
b. Actuarial Value of Assets	$53,899,005	$53,899,005
c. Unfunded Accrued Liability/(Excess Assets)	($42,442,411)	($42,442,411)
[1(a)-1(b)]		
2) Development of Normal Cost		
a. Present Value of Benefits for 2006-2009 Deaths	$2,617,842	$2,487,169
b. Number of 2006-2009 Member Months	488,544	488,544
c. Total per member, per month 2010/2011 Term Insurance Normal Cost	$5.00	$5.00
d. Total per member, per month 2011/2012 Term Insurance Normal Cost	$5.10	$5.00
[.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10		
3) 2011 Projected Unfunded Liability		
a. 2010 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2011	($45,731,698)	($45,731,698)
[1(c)*1.0775]		
b. Projected Normal Cost Accrual 2010-2011 with interest	$672,816	$672,816
c. Projected Employer Contributions 2010-2011 with interest	$0	$0
d. Projected Employee Contributions 2010-2011 with interest	$254,184	$254,184
e. Total Projected UAL/(Excess Assets) as of June 30, 2011	($45,313,065)	($45,313,065)
[3(a)+3(b)-3(c)-3(d)]		
4) 2011/2012 Required Contribution		
a. Required Normal Cost per member, per month	$5.10	$5.00
[2(d)]		
b. Projected Active Members as of 6/30/2011	10,203	10,203
c. Required Normal Cost Contribution	$648,169	$635,459
[12*4(a)*4(b)*1.0775^1/2]		
d. Amortization of the UAL/(Excess Assets)	($648,169)	($635,459)
e. Total Required Contribution per member, per month	$0.00	$0.00
[(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10		
f. Amortization Period	N/A	N/A
5) 2011/2012 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$2.00	$2.00
[maximum($2,4(e)/2)]		
b. Required Employer Premium per member, per month	$0.00	$0.00
[maximum($0,4(e)-5(a))]		

Table A-3: Public Agency Level 1

	CalPERS Public Agency Level 1	EFI Public Agency Level 1
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$2,227,779	$2,227,779
b. Actuarial Value of Assets	$30,302,636	$30,302,636
c. Unfunded Accrued Liability/(Excess Assets)	($28,074,857)	($28,074,857)
[1(a)-1(b)]		
2) Development of Normal Cost		
a. Present Value of Benefits for 2006-2009 Deaths	$9,612,330	$9,112,848
b. Number of 2006-2009 Member Months	6,781,704	6,781,704
c. Total per member, per month 2010/2011 Term Insurance Normal Cost	$1.40	$1.40
d. Total per member, per month 2011/2012 Term Insurance Normal Cost	$1.40	$1.40
[.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10		
3) 2011 Projected Unfunded Liability		
a. 2010 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2011	($30,250,658)	($30,250,658)
[1(c)*1.0775]		
b. Projected Normal Cost Accrual 2010-2011 with interest	$146,117	$146,117
c. Projected Employer Contributions 2010-2011 with interest	$0	$0
d. Projected Employee Contributions 2010-2011 with interest	$201,045	$201,045
e. Total Projected UAL/(Excess Assets) as of June 30, 2011	($30,305,587)	($30,305,587)
[3(a)+3(b)-3(c)-3(d)]		
4) 2011/2012 Required Contribution		
a. Required Normal Cost per member, per month	$1.40	$1.40
[2(d)]		
b. Projected Active Members as of 6/30/2011	8,019	8,019
c. Required Normal Cost Contribution	$139,842	$139,842
[12*4(a)*4(b)*1.0775^1/2]		
d. Amortization of the UAL/(Excess Assets)	($139,842)	($139,842)
e. Total Required Contribution per member, per month	$0.00	$0.00
[(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10		
f. Amortization Period	N/A	N/A
5) 2011/2012 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$2.00	$2.00
b. Required Employer Premium per member, per month	$0.00	$0.00
[maximum($0,4(e)-5(a))]		

Table A-4: Public Agency Level 2

	CalPERS Public Agency Level 2	EFI Public Agency Level 2
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$2,084,000	$2,084,000
b. Actuarial Value of Assets	$7,839,589	$7,839,589
c. Unfunded Accrued Liability/(Excess Assets) [1(a)-1(b)]	($5,755,589)	($5,755,589)
2) Development of Normal Cost		
a. Present Value of Benefits for 2006-2009 Deaths	$12,015,412	$11,391,060
b. Number of 2006-2009 Member Months	6,781,704	6,781,704
c. Total per member, per month 2010/2011 Term Insurance Normal Cost	$1.80	$1.80
d. Total per member, per month 2011/2012 Term Insurance Normal Cost [.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10	$1.80	$1.80
3) 2011 Projected Unfunded Liability		
a. 2010 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2011 [1(c)*1.0775]	($6,201,647)	($6,201,647)
b. Projected Normal Cost Accrual 2010-2011 with interest	$97,210	$97,210
c. Projected Employer Contributions 2010-2011 with interest	$0	$0
d. Projected Employee Contributions 2010-2011 with interest	$104,035	$104,035
e. Total Projected UAL/(Excess Assets) as of June 30, 2011 [3(a)+3(b)-3(c)-3(d)]	($6,208,472)	($6,208,472)
4) 2011/2012 Required Contribution		
a. Required Normal Cost per member, per month [2(d)]	$1.80	$1.80
b. Projected Active Members as of 6/30/2011	4,155	4,155
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.0775^1/2]	$93,161	$93,161
d. Amortization of the UAL/(Excess Assets)	($93,161)	($93,161)
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$0.00	$0.00
f. Amortization Period	N/A	N/A
5) 2011/2012 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$2.00	$2.00
b. Required Employer Premium per member, per month [maximum($0,4(e)-5(a))]	$0.00	$0.00

Table A-5: Public Agency Level 3

	CalPERS Public Agency Level 3	EFI Public Agency Level 3
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$24,263,435	$24,263,435
b. Actuarial Value of Assets	$79,897,971	$79,897,971
c. Unfunded Accrued Liability/(Excess Assets) [1(a)-1(b)]	($55,634,536)	($55,634,536)
2) Development of Normal Cost		
a. Present Value of Benefits for 2006-2009 Deaths	$18,690,641	$17,719,427
b. Number of 2006-2009 Member Months	6,781,704	6,781,704
c. Total per member, per month 2010/2011 Term Insurance Normal Cost	$2.70	$2.70
d. Total per member, per month 2011/2012 Term Insurance Normal Cost [.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10	$2.70	$2.70
3) 2011 Projected Unfunded Liability		
a. 2010 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2011 [1(c)*1.0775]	($59,946,212)	($59,946,212)
b. Projected Normal Cost Accrual 2010-2011 with interest	$1,490,809	$1,490,809
c. Projected Employer Contributions 2010-2011 with interest	$0	$0
d. Projected Employee Contributions 2010-2011 with interest	$1,063,633	$1,063,633
e. Total Projected UAL/(Excess Assets) as of June 30, 2011 [3(a)+3(b)-3(c)-3(d)]	($59,519,037)	($59,519,037)
4) 2011/2012 Required Contribution		
a. Required Normal Cost per member, per month [2(d)]	$2.70	$2.70
b. Projected Active Members as of 6/30/2011	42,459	42,459
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.0775^1/2]	$1,427,984	$1,427,984
d. Amortization of the UAL/(Excess Assets)	($1,427,984)	($1,427,984)
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$0.00	$0.00
f. Amortization Period	N/A	N/A
5) 2011/2012 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$2.00	$2.00
b. Required Employer Premium per member, per month [maximum($0,4(e)-5(a))]	$0.00	$0.00

Table A-6: Public Agency Level 4

	CalPERS Public Agency Level 4	EFI Public Agency Level 4
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$110,178,839	$110,178,839
b. Actuarial Value of Assets	$129,072,008	$129,072,008
c. Unfunded Accrued Liability/(Excess Assets) [1(a)-1(b)]	($18,893,169)	($18,893,169)
2) Development of Normal Cost		
a. Present Value of Benefits for 2006-2009 Deaths	$50,731,740	$48,095,587
b. Number of 2006-2009 Member Months	6,781,704	6,781,704
c. Total per member, per month 2010/2011 Term Insurance Normal Cost	$7.40	$7.40
d. Total per member, per month 2011/2012 Term Insurance Normal Cost [.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10	$7.40	$7.30
3) 2011 Projected Unfunded Liability		
a. 2010 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2011 [1(c)*1.0775]	($20,357,390)	($20,357,390)
b. Projected Normal Cost Accrual 2010-2011 with interest	$7,004,078	$7,004,078
c. Projected Employer Contributions 2010-2011 with interest	$3,557,076	$3,557,076
d. Projected Employee Contributions 2010-2011 with interest	$1,824,141	$1,824,141
e. Total Projected UAL/(Excess Assets) as of June 30, 2011 [3(a)+3(b)-3(c)-3(d)]	($18,734,529)	($18,734,529)
4) 2011/2012 Required Contribution		
a. Required Normal Cost per member, per month [2(d)]	$7.40	$7.30
b. Projected Active Members as of 6/30/2011	73,764	73,764
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.0775^1/2]	$6,799,329	$6,707,446
d. Amortization of the UAL/(Excess Assets)	($1,565,514)	($1,565,514)
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$5.90	$5.80
f. Amortization Period	30-year	30-year
5) 2011/2012 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$2.00	$2.00
b. Required Employer Premium per member, per month [maximum($0,4(e)-5(a))]	$3.90	$3.80

Table A-7: Public Agency Indexed Level

Development of Funding Requirements for Public Agency Indexed Level Pool June 30, 2010 Annual Valuation of 1959 Survivor Program	CalPERS Public Agency Indexed Level	EFI Public Agency Indexed Level	* EFI Public Agency Indexed Level
1) Development of Unfunded Liability			
a. Present Value of Future Benefits for Active Members	$9,791,437	$9,794,935	$9,794,935
b. Present Value of Future Benefits for Current Survivors	$12,512,434	$11,588,688	$11,936,959
c. Total Present Value of Future Benefits [1(a)+1(b)]	$22,303,871	$21,383,623	$21,731,894
d. Present Value of Future Normal Costs	$6,088,617	$6,158,340	$6,158,340
e. Entry Age Normal Total Accrued Liability [1(c)-1(d)]	$16,215,254	$15,225,283	$15,573,554
f. Actuarial Value of Assets	$17,838,492	$17,838,492	$17,838,492
g. Unfunded Accrued Liability/(Excess Assets) [1(e)-1(f)]	($1,623,238)	($2,613,209)	($2,264,938)
2) Development of Normal Cost			
a. Required Entry Age Normal Cost	$892,174	$867,647	$867,647
b. Active Members as of June 30, 2010	10,543	10,543	10,543
c. Total per member per month Entry Age Normal Cost [2(a)/2(b)*12], rounded to nearest $0.10	$7.10	$6.90	$6.90
3) 2011 Projected Unfunded Liability			
a. 2010 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2011 [1(g)*1.0775]	($1,749,039)	($2,815,733)	($2,440,471)
b. Projected Normal Cost Accrual 2010-2011 with interest	$973,407	$973,407	$973,407
c. Projected Employer Contributions 2010-2011 with interest	$383,106	$383,106	$383,106
d. Projected Employee Contributions 2010-2011 with interest	$383,106	$383,106	$383,106
e. Total Projected UAL as of June 30, 2011 [3(a)+3(b)-3(c)-3(d)]	($1,541,844)	($2,608,538)	($2,233,277)
4) 2011/2012 Required Contribution			
a. Required Normal Cost per member, per month [2(c)]	$7.10	$6.90	$6.90
b. Projected Active Members as of June 30, 2011	10,668	10,668	10,668
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.0775^1/2]	$943,477	$916,900	$916,900
d. Amortization of the UAL/(Excess Assets)	($128,841)	($217,977)	($186,619)
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$6.40	$5.50	$5.70
f. Amortization Period	30-year	30-year	30-year
5) 2011/2012 Employer and Employee Premiums with Cost Sharing Provision			
a. Required Employee Premium per member, per month [maximum(2,4(e)/2)]	$3.20	$2.75	$2.85
b. Required Employer Premium per member, per month [maximum(0,4(e)-5(a))]	$3.20	$2.75	$2.85
* Caculated as of January 1, 2011 with disabled children's benefits for life.			

The ratio of Normal Cost (entry 2(c), EFI vs. CalPERS) is 97.2%. The ratio of Accrued Liability (entry 1(e), EFI vs. CalPERS) is 93.9% before the adjustments were made, and 96.0% after.

Review of Contracting Public Agencies as of June 30, 2011

Overview

Under Task 4 of Contract 2009-5377, Cheiron, Inc. (Cheiron) has conducted independent actuarial valuations as of June 30, 2011 of a sample of the Pension Plans for Contracting Public Agencies of the California Public Employees' Retirement System (CalPERS). The purpose of these valuations was to validate the actuarial valuations of these plans performed by CalPERS staff actuaries as of the same date, and to identify any potential problems or issues.

As a result of our efforts, we are able to certify that the liabilities and costs computed in the staff valuations as of June 30, 2011 are reasonably accurate and were computed in accordance with generally accepted actuarial principles.

Based on the data, assumptions, and methods employed in the staff valuations, the actuarial liabilities and normal costs independently computed by Cheiron were within 5% of those in the staff valuations in all cases. The total employer contribution rate was within 5% in most cases as well. Exceptions are described below.

Methodology

This Report concerns itself with the computation of liabilities and costs relying on the available member data; prior reports prepared by EFI Actuaries (before its merger with Cheiron) have had the same focus. Based on the project parameters specified by the Board and staff, the issue of the accuracy of the underlying member data has been and continues to be excluded from our analysis.

The appendices at the end of this Report summarize the results of the parallel valuations of the public agency plans and risk pools.

Review of Methods and Assumptions

The actuarial methods and assumptions used in the public agency valuations are within acceptable standards of actuarial practice.

Actuarial assumptions used to compute System liabilities and employer costs include:

- A 7.5% annual rate of investment return, net of all expenses;
- 3.00% payroll growth, used in projecting the payroll over which the unfunded liability is amortized;
- Annual inflation of 2.75%

- Active and retired mortality rates developed based on actual CalPERS experience during the period from 1997 to 2007.

More detailed information concerning the valuation assumptions can be found in the CalPERS Experience Study from 1997 to 2007 issued by CalPERS in 2010. The results of this report were peer reviewed by EFI Actuaries, and also verified by Gabriel Roeder Smith as part of an independent audit of the experience study. Both reviews found the assumptions recommended as part of the study to be reasonable.

CalPERS staff calculated liabilities and contribution rates including the possible impact of benefit limitations under Internal Revenue Code Section 415. The June 30, 2008 valuation that EFI Actuaries audited ignored these benefit limitations. We have made some comments in our Reconciliation of Results about the implementation of these benefit limitations. The effect of this Code section on liabilities and costs is negligible.

Parallel Valuation Results

Individual Plans

Our actuarial model allows us to compare many of our calculations to the figures shown in the CalPERS valuation reports. To assess overall reasonableness of the CalPERS figures, we focused on four specific actuarial calculations:

1. **Total Present Value of Future Payroll** – This is the present value of all pay expected to be paid to currently active members during their working lifetimes within CalPERS. A close match here indicates that the actuarial assumptions were likely to have been programmed and computed correctly.

2. **Total Present Value of Benefits** – This represents the present value of all benefits expected to be paid to all current members after they leave active employment. A close match here also indicates that the actuarial assumptions were likely to have been programmed and computed correctly, and it also indicates that benefit provisions have been properly applied.

3. **Total Actuarial Accrued Liability** – This is the portion of the Present Value of benefits that is allocated to past service (benefits that are deemed to have been earned in the past). A close match here indicates that the actuarial cost method (Entry Age Normal) has been applied properly.

4. **Total Normal Cost** – This represents the present value of benefits deemed to be earned during the current year. A close match here indicates that annual benefit cost is being correctly computed according to actuarial cost method, and that employers are being charged the proper amount (total actuarial cost less employee contributions).

Table 1 below summarizes the comparison of these four calculations derived independently by Cheiron with those reported within the CalPERS valuation reports.

As shown in Table 1, our independent valuation results for the four key measures described above are within 5% for all of the plans within the audit, without exception. The same is true for the two risk pools. Furthermore, results were within 3% for all but one measure relating to one plan. Accordingly, we are able to confidently certify the results of the actuarial valuations as of June 30, 2011.

Table 1: Summary of Comparison of Key Actuarial Calculations

Actuarial Calculation	Proportion of Audited Agencies within 1%	Proportion of Audited Agencies within 3%	Proportion of Audited Agencies within 5%
Total Present Value of Future Payroll	96%	100%	100%
Total Present Value of Benefits	80%	100%	100%
Total Actuarial Accrued Liability	64%	100%	100%
Total Normal Cost	48%	96%	100%

When we compare the total employer contribution rate, the following valuations fell outside of the pre-established 5% tolerance. Reasons for this are described in the Reconciliation of Results.

- City of Long Beach, Safety
- County of Riverside, Safety
- Santa Clara County Central Fire Protection District, Safety

In the above cases, the four key measures described above are within a 2.6% tolerance and the differences in the employer contribution rates are a result of sensitivities rather than material differences. Accordingly, we feel no hesitation in confirming the results of the CalPERS staff valuations for these plans.

These plans are discussed in more detail below in the Reconciliation of Results.

Risk Pools

Many of the public agency plans within CalPERS have been combined into risk pools, primarily based on benefit formula. The computation of cost for a plan within a risk pool is comprised of three components: An amortization of a side fund created at entry into the pool, normal cost, and amortization of the pool's unfunded actuarial accrued liability since pool entry.

The normal cost for a given agency is determined based on the pool at large, with additional surcharges for Class 1 benefits as applicable. Class 1 benefits include cost of living

adjustments (COLAs) above 2%, automatic post-retirement survivor allowances (PRSAs) paid by the employer, and an average final pay period of one year.

To verify the actuarial liabilities and costs for an entire risk pool, a parallel valuation is conducted in the same manner as is done for the non-pooled plans (described above). We conducted parallel valuations for one miscellaneous risk pool (2% at 55, Pool 2) and one safety risk pool (2% at 50, Pool 7). The actuarial liabilities and costs measured by Cheiron were within the 5% of those measured by CalPERS staff for both pools. More detail is provided in the Reconciliation of Results section of this Report.

Table 2: Comparison of Risk Pool Surcharges

	CalPERS Report	Cheiron Calculation	Cheiron Calculation, Calibrated	Ratio of Cheiron Calibrated to CalPERS
Employer Normal Cost Rates for Miscellaneous Pool 2% at 55				
Total (Gross)	8.691%	8.405%	8.691%	100.0%
Net (no Class 1 Benefits)	8.052%	7.724%	7.987%	99.2%
Net, with One Year Final Average Pay*	8.551%	8.207%	8.487%	99.3%
Net, with 3% COLA*	8.980%	8.643%	8.938%	99.5%
Net, with 50% PRSA*	8.874%	8.637%	8.932%	100.6%
Employer Normal Cost Rates for Safety Pool 2% at 50				
Total (Gross)	15.353%	15.633%	15.353%	100.0%
Net (no Class 1 Benefits)	14.641%	14.896%	14.628%	99.9%
Net, with One Year Final Average Pay*	15.483%	15.749%	15.466%	99.9%
Net, with 3% COLA*	16.396%	16.729%	16.429%	100.2%
Net, with 50% PRSA*	16.044%	16.542%	16.246%	101.3%

* CalPERS amount = Net normal cost rate, plus surcharge rate.

The most important calculation for the plans within risk pools is the determination of normal cost, since it comprises the majority of the employer cost. Accordingly, we reviewed normal costs and common surcharges for Class 1 benefits, as shown in the valuation reports for Pools 2 and 7. We verified both the gross normal cost (with all applicable Class 1 benefits) and the net normal cost (with no Class 1 benefits) for each of the selected risk pools.

The employer normal cost is the difference between the total normal cost and employee contributions; accordingly, small changes in the total normal cost result in much larger changes in the net employer normal cost. To compensate for this leveraging, we calibrated all of our normal cost calculations by applying the ratio of CalPERS gross normal cost to Cheiron gross normal cost. A comparison was done based on these calibrated results and, as shown in Table 2, all of the calculations were within a 5% tolerance.

Reconciliation of Results

As shown above, the actuarial liabilities, present values, and total normal costs calculated independently by Cheiron are within 5% of those calculated by CalPERS Actuarial Valuation System (AVS) in all cases. The reasons for the differences in total cost for the plans listed below is the sensitivity of their employer contribution rates to changes in accrued liabilities and total normal costs.

Several of the agencies have funding ratios (Assets / Accrued Liability) as of June 30, 2011 that were very close to 100%, which increases the sensitivity of employer contribution rates to changes in actuarial accrued liability (AAL). For example, a 1% increase in AAL for the City of Long Beach Safety plan as of June 30, 2011 would have increased the amortization rate by over 22%, and the total contribution rate by 8.7% (relative). This sensitivity has a similar effect on our independent cost comparisons, occasionally causing an apparent material difference in employer contribution rates (over 5%) even when the underlying liability computed by Cheiron is very close to that reported by CalPERS.

Table 3: Audited Agencies with Employer Contribution Rates Outside of Tolerances

Ratio of Cheiron Calculation to CalPERS Report					
Agency	**Total Normal Cost**	**Employer Normal Cost**	**Actuarial Accrued Liability (AAL)**	**Amortization of UAAL**	**Employer Contribution Rate**
City of Long Beach (Safety)	101.6%	102.4%	102.6%	158.2%	124.3%
County of Riverside (Safety)	101.5%	102.3%	101.9%	113.3%	105.0%
Santa Clara County Central Fire Protection District (Safety)	101.0%	101.5%	101.9%	109.6%	105.2%

A similar sensitivity occurs with the employer portion of the normal cost. This is especially true when the employer and employee portions of the normal cost are approximately equal, or when the employer portion is lower. For example, the Coachella Valley Water District has employee and employer portions of normal cost that are approximately equal. Therefore, for every 1% change in the total normal cost, the employer portion changes by 2%.

This issue has appeared in the past, and is always prone to cause anomalies within the audit. It is also important to keep in mind that the same forces cause actual plan costs for many agencies to be sensitive to annual gains and losses.

In the course of preparing this Report, a number of minor issues arose that should be considered by the staff of the Actuarial Office.

Benefit Limits under Section 415 of the Internal Revenue Code

While reviewing the CalPERS liability calculations for some Safety members, we found that Industrial Disability, Industrial Death, and Vested Deferred benefits were often less than expected based on member age. Discussions with the CalPERS actuarial office confirmed that this was a result of the application of limits on benefits under Section 415 of the Internal Revenue Code (Section 415 limits).

The CalPERS actuarial office confirmed that the limits were applied correctly to safety members with 15 or more years of service, but not to the pre-retirement death survivor's allowance or to disability retirements before age 62. The CalPERS actuarial office stated that this has been fixed for the June 30, 2012 actuarial valuations.

The CalPERS actuarial office also stated the 415 limit for Vested Deferred benefits was being reduced for commencement prior to the deferral age and would require correction in future valuations.

We did a small sampling of plans and estimated that revising these 415 limits would have a minor impact, increasing Present Value of Benefits and Actuarial Accrued Liabilities by less than 0.2%, and increasing plan cost by less than 0.2% of payroll.

Deferred Domestic Relations Orders

The CalPERS actuarial office provided Cheiron with a test computation for a deferred Domestic Relations Order (DRO) in which the 66 year-old member's 47 year-old former spouse was scheduled to begin receiving a benefit at age 80. The CalPERS actuarial office confirmed the following:

Alternate payees follow the same retirement pattern as the member. However, the retirement pattern is based on entry date, which is a field that is NOT populated for alternate payees so the person "falls" through the valuation until we decrement them out at age 80. We will need to develop a policy on how to handle these cases and then implement the solution in future valuations.

As deferred DROs are a very small subset of total liabilities, we estimate this will have a minor overall impact, but should be fixed nonetheless. Using one Safety plan as an example, we estimate this could increase actuarial accrued liability and the present value of benefits by 0.1%, and could increase cost by about 0.05% of payroll for this group. The impact for each plan will depend on the number of deferred DROs represented in the plan demographics.

Maximum Historical Compensation

Member benefits are computed based on highest average pay over some period of years. In times of low or negative pay increases, and for members with unique salary histories, the highest average pay may have occurred some years in the past, and current pay may be below the highest past average used to compute benefits. In these situations, liabilities based on most recent pay may understate true plan liabilities.

The CalPERS actuarial office provided a data field called "Maximum Historical Comp Amt." In many cases this amount was greater than the average pay being used to calculate plan liabilities. The CalPERS actuarial office confirmed that

The current core (or Actuarial Valuation System (AVS)) does not use the Max Historical Comp Amt. The Max Comp is currently being stored for the ability to be used in future enhancements to AVS.

We estimate that incorporating this amount as a minimum bound for compensation when calculating plan liabilities would have a minor impact. In the case of one sample plan, liabilities could increase by 0.1%, and employer cost could increase by about 0.04% of payroll.

Computation of Normal Cost

The CalPERS actuarial office provided test cases in which the entry age calculated using the Normal Cost Start Date was different than that using the benefit service. Actuarial calculations were performed using the entry age calculated based on the Normal Cost Start Date.

If the normal cost start date reflects periods in which eligibility or vesting service accrued, but not benefit service, the CalPERS actuarial office may want to reconsider using this date in entry age calculations for accounting purposes. GASB 67 states that:

The beginning of the attribution period should be the first period in which the member's service accrues pensions under the benefit terms, notwithstanding vesting or other similar terms.

As such, we believe that the CalPERS actuarial office should consider modifying their entry age calculations to be based on the accumulated benefit service, instead of using the Normal Cost Start Date, if the CalPERS actuarial office desires to avoid using different liability measures for funding versus accounting.

Other Comments

During our most recent audit of risk pools, we made a recommendation pertaining to Class 1 surcharges. We continue to recommend the following steps for future valuations.

- There are two benefit types, Cost of Living Adjustments (COLA) and Post Retirement Survivor Allowances (PRSA), which have been "grouped" for the purpose of pooled plan surcharges. The same surcharge is applied for 3%, 4%, or 5% COLAs. This is appropriate for the actuarial valuation since 3% is assumed to be the maximum (COLA cannot exceed inflation); however, in reality a 4% or 5% COLA is a more valuable benefit than a 3% COLA. Use of a stochastic model for future inflation may be useful to determine an adjustment to these surcharges.

- Likewise, the PRSA surcharge is the same for both the 25% and the 50% survivor benefit allowance. Our understanding is that this is a practical decision made to simplify the administration of the plan.

The consequence of the administration of the PRSA and COLA surcharges discussed above is to spread the additional costs of these benefits throughout the pool. Since the purpose of the surcharges is to adjust the costs for agencies with significantly different benefits, we recommend considering a revision in the methods employed to determine and apply the surcharges.

Appendix 1: Active Demographic Data Comparison

			Average Age		Average Service‡		Average Pay	
Selected Plan	**Plan**	**Formula**	**6/30/2011 Data**	**AVS 6/30/2011**	**6/30/2011 Data**	**AVS 6/30/2011**	**6/30/2011 Data**	**AVS 6/30/2011**
Coachella Valley Water District	Miscellaneous	2.0% @ 55, 2.5% @ 55	43	43	11.8	11.8	70,342	70,342
Colton, City of	Miscellaneous	2.7% @ 55	41	41	9.1	9.7	54,970	54,970
El Dorado Irrigation District	Miscellaneous	2.0% @ 55, 2.7% @ 55	47	47	9.6	9.6	72,624	72,624
Gilroy, City of	Safety	3.0% @ 50, 3.0% @ 55	40	40	10.0	10.1	110,275	110,275
Irvine, City of	Miscellaneous	2.7% @ 55	44	44	9.0	9.2	65,535	65,535
Long Beach, City of	Miscellaneous	2% @ 55, 2.5% @ 55 2.7% @ 55	46	46	11.5	11.7	64,349	64,352
Long Beach, City of	Safety	3% @ 50	41	41	13.9	14.2	104,487	104,487

‡ Average service in Cheiron EFI data is based on benefit service, while the average service in CalPERS data is calculated from the Normal Cost Start Date.

			Average Age		Average Service‡		Average Pay	
Selected Plan	**Plan**	**Formula**	**6/30/2011 Data**	**AVS 6/30/2011**	**6/30/2011 Data**	**AVS 6/30/2011**	**6/30/2011 Data**	**AVS 6/30/2011**
Los Angeles County Office of Education	Miscellaneous	2.5% @ 55	47	47	10.7	11.6	48,729	48,729
Monterey, County of	Miscellaneous	2.0% @ 55	45	45	10.0	10.5	66,294	66,295
North County Transit District	Miscellaneous	2.0% @ 55	50	50	10.5	10.4	56,923	56,923
Oakland, City of	Miscellaneous	2.7% @ 55	48	48	11.5	11.9	75,009	75,009
Rialto, City of	Safety	3.0% @ 50	41	41	12.0	12.2	93,494	93,494
Riverside, County of	Miscellaneous	3% @ 60	43	43	8.7	8.9	53,294	53,294
Riverside, County of	Safety	3% @ 50	39	39	9.4	9.5	79,065	79,065
Sacramento, City of	Miscellaneous	2.0% @ 55	45	45	11.0	11.5	61,387	61,387
San Francisco BART	Miscellaneous	2% @ 55	51	51	14.1	14.5	76,278	76,278
Santa Ana, City of	Safety	3.0% @ 50	43	43	15.8	15.7	112,513	112,513
Santa Clara, County of	Miscellaneous	2.5% @ 55	47	47	11.7	12.2	86,541	86,541

			Average Age		Average Service‡		Average Pay	
Selected Plan	**Plan**	**Formula**	**6/30/2011 Data**	**AVS 6/30/2011**	**6/30/2011 Data**	**AVS 6/30/2011**	**6/30/2011 Data**	**AVS 6/30/2011**
Santa Clara County Central Fire Protection District	Safety	3.0% @ 50	43	43	12.5	14.9	135,259	135,259
Santa Clara County Housing Authority	Miscellaneous	2.0% @ 55	45	45	9.5	10.1	67,861	67,861
Solano, County of	Miscellaneous	2.7% @ 55	47	47	10.1	10.4	70,663	70,663
Yolo, County of	Safety	3.0% @ 50, 3.0% @ 55	39	39	9.0	9.1	69,303	69,303
Yorba Linda, City of	Miscellaneous	2.0% @ 55	44	44	8.2	8.7	68,973	68,973
Pool 2	Miscellaneous	2% @ 55	46	46	8.5	8.8	62,041	62,041
Pool 7	Safety	2% @ 50	39	39	8.7	8.8	67,011	67,011

Appendix 2a: Individual Plan Liability and Cost Comparison – Largest Plans

			Present Value of Benefits		Actuarial Accrued Liability		Total Normal Cost (Employer + Employee)		Employer Cost as a % of Payroll	
Selected Plan	**Plan**	**Formula**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**
Los Angeles County Office of Education	Miscellaneous	2.5% @ 55	845,022,707	853,013,404	703,363,199	709,224,263	21,688,761	22,127,982	13.302%	13.957%
				99.1%		99.2%		98.0%		95.3%
Long Beach, City of	Miscellaneous	2.5% @ 55 2.7% @ 55	2,272,064,109	2,261,592,936	1,979,574,874	1,971,681,766	42,285,744	42,213,316	15.572%	15.324%
				100.5%		100.4%		100.2%		101.6%
Long Beach, City of	Safety	3% @ 50	2,221,691,248	2,174,052,140	1,916,998,115	1,868,031,443	40,663,309	40,020,659	38.332%	30.828%
				102.2%		102.6%		101.6%		124.3%
Monterey, County of	Miscellaneous	2.0% @ 55	1,472,345,654	1,462,823,182	1,179,632,159	1,169,818,464	40,959,343	41,223,156	11.026%	10.926%
				100.7%		100.8%		99.4%		100.9%
Oakland, City of	Miscellaneous	2.7% @ 55	2,270,554,067	2,286,784,755	2,007,978,472	2,025,140,791	40,114,570	40,558,088	26.405%	27.295%
				99.3%		99.2%		98.9%		96.7%
Riverside, County of	Miscellaneous	3% @ 60	5,728,641,965	5,706,172,110	4,472,175,835	4,461,553,672	168,752,193	167,320,797	15.230%	15.001%
				100.4%		100.2%		100.9%		101.5%
Riverside, County of	Safety	3% @ 50	2,717,277,081	2,690,634,139	2,070,018,579	2,032,001,280	80,300,675	79,114,388	24.545%	23.368%
				101.0%		101.9%		101.5%		105.0%
San Francisco BART	Miscellaneous	2% @ 55	1,875,645,801	1,879,254,981	1,656,399,499	1,661,565,547	35,133,685	35,477,685	11.949%	12.269%
				99.8%		99.7%		99.0%		97.4%
Santa Clara County	Miscellaneous	2.5% @ 55	8,407,690,842	8,392,593,076	6,966,984,597	6,930,682,371	210,419,792	215,163,111	15.833%	16.052%
				100.2%		100.5%		97.8%		98.6%
Solano, County of	Miscellaneous	2.7% @ 55	1,316,870,480	1,314,495,709	1,102,414,697	1,100,723,215	31,113,921	31,470,519	16.576%	16.720%
				100.2%		100.2%		98.9%		99.1%

Appendix 2b: Individual Plan Liability and Cost Comparison – Random Plans

			Present Value of Benefits		Actuarial Accrued Liability		Total Normal Cost (Employer + Employee)		Employer Cost as a % of Payroll	
Selected Plan	**Plan**	**Formula**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**
Coachella Valley Water District	Miscellaneous	2.5% @ 55	311,233,973	312,562,828	270,168,733	271,745,467	5,443,063	5,437,746	20.698%	21.018%
				99.6%		99.4%		100.1%		98.5%
Colton, City of	Miscellaneous	2.7% @ 55	119,188,808	118,898,709	103,455,247	103,114,649	2,109,513	2,130,285	14.504%	14.484%
				100.2%		100.3%		99.0%		100.1%
El Dorado Irrigation District	Miscellaneous	2.0% @ 55, 2.7% @ 55	132,788,587	132,591,587	110,331,903	110,172,862	3,191,888	3,224,778	24.832%	24.950%
				100.1%		100.1%		99.0%		99.5%
Gilroy, City of	Safety	3.0% @ 50, 3.0% @ 55	136,522,932	135,353,474	109,084,832	107,654,773	3,462,485	3,485,899	31.450%	30.790%
				100.9%		101.3%		99.3%		102.1%
Irvine, City of	Miscellaneous	2.7% @ 55	303,199,567	305,205,799	243,353,110	245,667,207	8,748,701	8,800,174	23.533%	24.138%
				99.3%		99.1%		99.4%		97.5%
North County Transit District	Miscellaneous	2.0% @ 55	132,026,484	131,760,826	121,340,731	121,006,443	1,576,298	1,591,962	12.043%	11.988%
				100.2%		100.3%		99.0%		100.5%
Rialto, City of	Safety	3.0% @ 50	233,390,151	230,099,034	195,327,295	192,110,279	4,973,883	4,934,866	43.929%	42.168%
				101.4%		101.7%		100.8%		104.2%
Sacramento, City of	Miscellaneous	2.0% @ 55	1,006,441,380	1,007,411,141	815,727,913	819,168,698	26,187,750	26,079,093	13.579%	13.645%
				99.9%		99.6%		100.4%		99.5%
Santa Ana, City of	Safety	3.0% @ 50	995,981,836	986,047,407	869,524,076	859,019,269	18,108,669	18,364,114	30.002%	29.406%
				101.0%		101.2%		98.6%		102.0%

			Present Value of Benefits		Actuarial Accrued Liability		Total Normal Cost (Employer + Employee)		Employer Cost as a % of Payroll	
Selected Plan	**Plan**	**Formula**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**
Santa Clara County Central Fire Protection District	Safety	3.0% @ 50	492,170,378	483,770,652	420,640,625	412,761,049	9,400,914	9,305,774	34.435%	32.743%
				101.7%		101.9%		101.0%		105.2%
Santa Clara County Housing Authority	Miscellaneous	2.0% @ 55	51,768,895	52,460,432	38,147,642	38,572,922	1,812,294	1,757,099	8.406%	8.701%
				98.7%		98.9%		103.1%		96.6%
Yolo, County of	Safety	3.0% @ 50, 3.0% @ 55	184,093,554	182,544,586	137,948,642	136,171,633	5,552,559	5,472,747	27.380%	26.475%
				100.8%		101.3%		101.5%		103.4%
Yorba Linda, City of	Miscellaneous	2.0% @ 55	60,359,979	60,475,329	50,478,476	50,663,748	1,309,543	1,310,964	17.084%	17.263%
				99.8%		99.6%		99.9%		99.0%

Appendix 3: Risk Pool Liability and Cost Comparison

			Present Value of Benefits		Actuarial Accrued Liability		Total Normal Cost (Employer + Employee)		Employer Cost as a % of Payroll	
Selected Pool	**Plan**	**Formula**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**Cheiron AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**	**Cheiron 6/30/2011**	**AVS 6/30/2011**
Risk Pool 2	Miscellaneous	2% @ 55	4,505,736,989	4,531,905,824	3,595,914,292	3,619,835,876	127,231,287	129,104,598	10.507%	10.921%
				99.4%		99.3%		98.5%		96.2%
Risk Pool 7	Safety	2% @ 50	659,497,680	656,225,272	509,176,873	503,491,275	16,990,927	16,809,969	24.359%	23.513%
				100.5%		101.1%		101.1%		103.6%

Review of State and Schools Plans as of June 30, 2012

Overview

Under Task 5 of Contract 2009-5377, Cheiron, Inc. (Cheiron) has conducted independent actuarial valuations as of June 30, 2012 of the CalPERS State and Schools plans. The purpose of these valuations was to validate the actuarial valuations of these plans performed by CalPERS staff actuaries as of the same date, and to identify any potential problems or issues.

Our independent replication of the June 30, 2012 actuarial valuations found no material difference in calculations of present value of future salaries, present value of future benefits, actuarial liability, normal cost rate, and employer contribution rates compared to the amounts calculated by the CalPERS Actuarial Office.

Based on the data, assumptions, and methods employed in the staff valuations, the present value of future salaries, present value of future benefits, actuarial liabilities normal cost rates, and employer contribution rates independently computed by Cheiron were within 5% of those in the staff valuations in all cases except one, which is explained in the Analysis of Results.

This report is limited to the computation of liabilities and costs relying on the available member data; prior reports prepared by EFI Actuaries/Cheiron have had the same focus. Based on the project parameters specified by the Board and staff, the issue of the accuracy of the underlying member data has been and continues to be excluded from our analysis.

The appendices at the end of this report summarize the results of the parallel valuations of the State and Schools plans.

Review of Methods and Assumptions

Actuarial assumptions used to compute System liabilities and employer costs include:

- A 7.5% annual rate of investment return, net of all expenses;
- 3.00% payroll growth, used in projecting the payroll over which the unfunded liability is amortized;
- Annual inflation of 2.75%;
- Active and retired mortality rates developed based on actual CalPERS experience during the period from 1997 to 2007.

More detailed information concerning the valuation assumptions can be found in the CalPERS Experience Study from 1997 to 2007 issued by CalPERS in 2010. The results of this report were peer reviewed by EFI Actuaries, now a division of Cheiron, and also verified by Gabriel Roeder Smith as part of an independent audit of the experience study. Both

reviews found the assumptions recommended as part of the study to be reasonable and in accordance with actuarial standards of practice.

Parallel Valuation Results

When a parallel actuarial valuation is performed as part of an actuarial audit, the auditors' calculations of liabilities and contribution rates are compared with the figures shown in the CalPERS valuation reports. To assess the CalPERS figures, we focused on five specific actuarial calculations:

1. **Present Value of Future Payroll** – This is the present value of all pay expected to be paid to currently active members during their working lifetimes within CalPERS. A close match here indicates that the actuarial assumptions were likely to have been programmed correctly.

2. **Present Value of Benefits** – This represents the present value of all benefits expected to be paid to all current members after they leave active employment. A close match here also indicates that the actuarial assumptions were likely to have been programmed correctly, and it also indicates that benefit provisions have been properly applied.

3. **Actuarial Liability** – This is the portion of the Present Value of benefits that is allocated to past service (benefits that are deemed to have been earned in the past). A close match here indicates that the actuarial cost method (Entry Age Normal) has been applied properly.

4. **Normal Cost** – This represents the present value of benefits deemed to be earned during the current year. A close match here indicates that annual benefit cost is being correctly computed according to actuarial cost method.

5. **Employer Cost** – This represents the required employer contribution rate, including both the Normal Cost and any required amortization of an Unfunded Actuarial Liability. A close match here indicates that employers are being charged the proper amount to fund the plan on an actuarial basis.

Our independent valuation results for the five key measures described above are within 5% for all of the plans within the audit, with the exception of the Police Officers & Firefighters plan, where Cheiron's Present Value of Future Payroll was 5.4% higher than CalPERS. This difference was due to an anomaly in the CalPERS actuarial office's data processing, and is further detailed in the Analysis of Results.

Accordingly, we found no material differences between our calculations and those performed by CalPERS Actuarial Office, and we find the actuarial valuations as of June 30, 2012 to be reasonable.

Tables 1 through 5 below show the present value of future payroll, total and accrued liabilities, total normal cost rates, and employer contribution rates computed independently by CalPERS staff and by Cheiron for each of the State and Schools plans.

Table 1: Comparison of Present Value of Future Payroll ($ Millions)

Plan	PVPay as Computed by PERS	PVPay as Computed by Cheiron	Relative Difference
State Miscellaneous	77,240	75,709	(2.0%)
State Industrial	4,934	4,868	(1.3%)
State Safety	13,646	13,840	1.4%
State Peace Officers & Firefighters	26,448	27,872	5.4%
California Highway Patrol	7,108	7,281	2.4%
Total State	129,376	129,570	0.1%
County Schools Pool	74,584	74,143	(0.6%)

Table 2: Comparison of Present Value of Future Benefits ($ Millions)

Plan	PVFB as Computed by PERS	PVFB as Computed by Cheiron	Relative Difference
State Miscellaneous	94,582	93,677	(1.0%)
State Industrial	3,801	3,885	2.2%
State Safety*	10,671	10,612	(0.6%)
State Peace Officers & Firefighters*	38,007	38,205	0.5%
California Highway Patrol	10,360	10,271	(0.9%)
Total State	157,421	156,650	(0.5%)
County Schools Pool	69,705	69,776	0.1%

* Reflects liability transfer of $288 million to the State POFF from the State Safety Plan.

Table 3: Comparison of Accrued Liability ($ Millions)

Plan	Accrued Liability as Computed by PERS	Accrued Liability as Computed by Cheiron	Relative Difference
State Miscellaneous	83,524	83,009	(0.6%)
State Industrial	2,968	3,072	3.5%
State Safety*	7,827	7,771	(0.7%)
State Peace Officers & Firefighters*	31,336	31,281	(0.2%)
California Highway Patrol	8,659	8,555	(1.2%)
Total State	134,314	133,688	(0.5%)
County Schools Pool	59,439	59,303	(0.2%)

* Reflects liability transfer of $288 million to the State POFF from the State Safety Plan.

Table 4: Comparison of Total Normal Cost Rates (% of Payroll)

Plan	Total Normal Cost as Computed by PERS	Total Normal Cost as Computed by Cheiron	Relative Difference
State Miscellaneous Tier 1	14.91%	14.72%	(1.3%)
State Miscellaneous Tier 2	9.46%	9.74%	3.0%
State Industrial	17.88%	17.60%	(1.6%)
State Safety	22.08%	21.45%	(2.9%)
State Peace Officers & Firefighters	25.89%	26.20%	1.2%
California Highway Patrol	23.23%	23.62%	1.7%
Total State	16.70%	16.56%	(0.8%)
County Schools Pool	14.31%	14.00%	(2.2%)

Table 5: Comparison of Employer Contribution Rates (% of Payroll)

Plan	Employer Contribution Rate as Computed by PERS	Employer Contribution Rate as Computed by Cheiron	Relative Difference
State Miscellaneous Tier 1	21.12%	20.71%	(1.9%)
State Miscellaneous Tier 2	20.99%	20.79%	(1.0%)
State Industrial	15.68%	16.44%	4.8%
State Safety	17.21%	16.44%	(4.5%)
State Peace Officers & Firefighters	30.50%	29.59%	(3.0%)
California Highway Patrol	34.62%	34.23%	(1.1%)
Total State	18.52%	18.11%	(2.2%)
County Schools Pool	11.44%	11.05%	(3.4%)

We note in Table 5 that all of the total employer contribution rates fall within 5% for the audited plans. Accordingly, we feel no hesitation in confirming the results of the CalPERS staff valuations for these plans.

Analysis of Results

As noted on the previous page, the present value of payroll, the total liability for all future benefits, the actuarial liability, the total normal cost, and the employer contribution rate calculated independently by Cheiron is within 5% of those calculated by CalPERS Actuarial Valuation System (AVS) for each of State and Schools plans.

In the course of preparing this Report, a couple minor issues arose that should be considered by the staff of the Actuarial Office.

State Peace Officers and Firefighters Payroll

During the audit process, we use the "log files" provided by CalPERS staff to verify that member counts, payroll, and service are consistent with the data provided by the CalPERS Actuarial Office. While comparing the data supplied by the CalPERS Actuarial Office to the totals in the log files, we observed that the payroll we used for our matching valuation for the State Peace Officers and Firefighters plan was approximately $120 million more than the $2,952 million reported by CalPERS and used in their calculations. As noted above, the issue of the accuracy of the underlying member data has been and continues to be excluded from our analysis, but we felt it worth discussing with the Actuarial Office.

The Actuarial Office confirmed the source of the payroll import error: In some cases payroll was divided by a hundred when no decimal point was present in the annual compensation fields. They have stated that this will be fixed for the June 30, 2013 actuarial valuations. We performed matching valuations with payroll as calculated by Cheiron and with payroll calculated using the same methodology use by CalPERS staff. The liability measures used in this report – present value of future payroll, present value of benefits, actuarial accrued liability, and total normal cost – were all within 5% after correcting the compensation data.

Defective Data Records

The log files the CalPERS Actuarial Office provided Cheiron with also included many lines of data flagged as "defective." The error messages for these records included the following:

- Earliest entry age greater than entry age
- Earliest entry age less than or equal to minimum active age
- Member as too much eligibility service
- Attained age greater than maximum active age
- Member status should be 4
- Earliest entry age less than or equal to one

The Schools data file contained 4,889 such error messages, out of 791,811 total records. Discussions with the CalPERS Actuarial Office confirm that they are aware of these data issues and that correcting these records remains an ongoing process.

Appendix 1: Demographic Data Comparison

	Actives						Retirees	
	Average Age		Average Service[4]		Average Pay		Total Benefits* ($ millions)	
Plan	**PERS**	**Cheiron**	**PERS**	**Cheiron**	**PERS**	**Cheiron**	**PERS**	**Cheiron**
State Miscellaneous Tier 1	48.1	48.1	13.6	12.4	62,139	62,150	4,383.6	4,383.4
State Miscellaneous Tier 2	50.9	50.9	18.8	17.8	55,056	55,046	48.3	48.2
State Industrial	45.9	45.9	9.8	8.5	50,296	50,314	127.3	127.3
State Safety	47.6	47.6	7.9	7.6	75,426	75,437	363.1	369.3
State Peace Officers & Firefighters	42.5	42.5	12.4	11.8	71,560	71,328	1,344.1	1,349.8
California Highway Patrol	39.9	39.9	13.3	13.1	99,626	99,626	416.9	416.8
Schools	47.5	47.5	11.0	6.9	34,113	34,114	2,733.5	2,736.3

4 Average service in Cheiron data is based on benefit service, while the average service in CalPERS data is calculated from the Normal Cost Start Date.

Appendix 2: Plan Liability Comparison ($ Millions)

	Present Value of Future Benefits						Present Value of Future Salaries		
	Active Participants			Inactive Participants					
Plan	**PERS**	**Cheiron**	**Ratio**	**PERS**	**Cheiron**	**Ratio**	**PERS**	**Cheiron**	**Ratio**
State Miscellaneous	43,590	42,222	96.9%	50,992	51,454	100.9%	77,240	75,709	98.0%
State Industrial	1,978	1,994	100.8%	1,823	1,891	103.7%	4,934	4,868	98.7%
State Safety*	6,234	6,104	97.9%	4,438	4,507	101.6%	13,646	13,840	101.4%
State Peace Officers & Firefighters*	19,367	19,495	100.7%	18,640	18,709	100.4%	26,448	27,872	105.4%
California Highway Patrol	4,851	4,817	99.3%	5,509	5,454	99.0%	7,108	7,281	102.4%
Total State	76,020	74,633	98.2%	81,401	82,016	100.8%	129,376	129,570	100.2%
Schools	30,018	30,674	102.2%	39,687	39,102	98.5%	74,584	74,143	99.4%

* Reflects liability transfer of $288 million to the State POFF from the State Safety Plan.

Review of the Judges' Retirement System as of June 30, 2013

Overview

Cheiron has conducted an independent review of the Actuarial Valuation of the Judges' Retirement System (JRS, the System) as of June 30, 2013. Overall, we were able to certify that the liabilities and costs computed in this valuation are reasonable and were computed in accordance with generally accepted actuarial principles and practices. However, Cheiron did discover a problem with the total actuarial liability for active members, terminated members and members entitled to deferred benefits under a Domestic Relations Order (DRO). A discussion of this issue is presented below.

Background

The Judges Retirement System provides pensions and ancillary benefits to California state judges who were elected or appointed before November 9, 1994. Judges elected or appointed on or after that date are covered under Judges Retirement System II (JRS II). JRS and JRS II are separate retirement plans with separate memberships, separate asset pools, and no financial interrelationship.

A judge who has reached age 60 and is credited with 20 or more years of service under the System will be awarded a lifetime pension of 75% of pay in the last judicial office held. Death, disability, and termination benefits are also paid from the System.

The System is financed by employer and employee contributions and the investment return on System assets. Participants contribute 8% of pay. Employer Contributions to the plan are determined using the pay as you go method, with no prefunding of liabilities.

Review of Methods and Assumptions

We have determined that the actuarial methods and assumptions used in the JRS Valuation are within acceptable standards of actuarial practice.

Actuarial assumptions used to compute JRS liabilities and employer costs include:

- A 4.25% annual rate of investment return, net of all expenses;
- Annual salary increases of 3.00%;
- Annual inflation of 2.75%;
- Retirement between the ages of 60 and 80 after 10 years of service;
- Termination rates from 0.3% to 2.5% per year, depending on age and service;
- Active and retired mortality rates developed based on actual CalPERS experience during the period from 1997 to 2011.

More detailed information concerning the valuation assumptions can be found in the 2014 CalPERS Experience Study Report. Cheiron also performed a review of this Experience Study, and evaluated demographic assumptions as part of that review.

The System is nearly unfunded; benefits are paid as they come due, and no significant assets have been accumulated. All new judges now become members in JRS II. Therefore, the active membership in JRS will gradually diminish, and there will be a decreasing payroll over which to fund the cost of benefits. Considering the forgoing, the assumptions listed above are appropriate for this valuation.

Independent Valuation

The JRS Valuation was performed by CalPERS staff using the Actuarial Valuation System (AVS). Cheiron validated the calculations by creating an *independent* actuarial model to develop the valuation results. The only data common to the models was the participant data; the Cheiron model was developed separately, without reference to the one used by staff for the Valuation.

As established in our Proposal of Services, we expect the values of comparable items derived from the two models to differ by less than the percentages shown in the following table.

Table 1: Independent Valuation Tolerances

Calculated Item	Acceptable Tolerance
Number of members - active, retired, inactive	0%
Annual payroll and member contributions	0%
Present value of pay; present value of member contributions	1%
Present value of benefit obligations	5%
Annual normal cost, employer contribution rates	5%

These tolerances are sufficiently stringent to detect material differences between the models. Differences outside of the Acceptable Tolerances listed above would not necessarily cause a failure to certify the valuation, but would result in additional scrutiny and reconciliation to determine the reasons.

Independent Actuarial Valuation of Results

Tables 2 and 3 on page 5, show the principal results of our independent valuations.

As seen in Table 2, there are several areas in which the valuation results were not within the expected tolerance levels. These include the Present Value of Benefits and Actuarial Accrued

Liability for active members, the Present Value of Benefits for inactive members with a deferred benefit (including those members with Domestic Relations Orders (DROs)), the Employer Normal Cost, and the Actuarial Required Contribution (ARC).

Through an analysis of test lives and discussion with CalPERS staff we found the following discrepancies:

- A benefit multiplier of 65% is currently being used for all active members. Members that retire after age 60 with at least 20 years of service should have a 75% benefit multiplier.

- For vested terminated members that are eligible for retirement as of the valuation date, the benefit amount being valued for them is the retirement benefit (65% of pay of the last judicial office held). Their benefit amount should be equal to the termination benefit (3.75% reduced if service is less than 12 years) of pay of last judicial office held multiplied by years of service up to a maximum of 20 years)

- For DROs that have a deferred benefit, the full service of the participant should be used to determine eligibility (start date and deferral period) and the benefit multiplier for the DRO record. Currently the service allocated to the DRO's share of the benefit amount is being used to determine eligibility and the benefit multiplier.

We discussed the issues with CalPERS staff, and our understanding is that the programming errors have been fixed and unlikely to impact future valuations.

In addition, the following discrepancies were found, but have a minimal effect on liabilities:

- Appendix A of the valuation report states that Disability Rates should extend past the point that a member becomes eligible for retirement. CalPERS staff confirmed that this is the intended assumption. However, upon analysis of test lives, the Disability Rates currently being used are set to zero when a member is eligible for retirement.

- In the case where a retiree has elected a form of payment that allows the balance of their accumulated contributions to be paid to a beneficiary at the time of their death, their liabilities should reflect this possible additional lump sum payment. These retirees are currently valued as having a single life annuity with no possibility of a contribution refund at the time of their death.

Table 4 on page 6 shows the revised results CalPERS sent us after fixing their programming errors. The valuation results computed by Cheiron are close to the revised results computed by CalPERS staff, and fall within our valuation tolerances.

Table 2: Independent Valuation Results

	CalPERS JRS Valuation	Cheiron Independent Valuation	Cheiron to PERS Difference	Within Tolerance
1. Present Value of Benefits for Active Members	$ 752,911,105	$ 864,726,241	14.85%	**No**
2. Present Value of Benefits for Inactive Members				
Deferred Vested & DRO	56,824,025	49,334,253	-13.18%	**No**
Receiving Benefits	2,634,501,765	2,675,961,420	1.57%	Yes
Total	$2,691,325,790	$2,725,295,673	1.26%	Yes
3. Total Present Value of Benefits	$3,444,236,895	$3,590,021,914	4.23%	Yes
4. Actuarial Accrued Liability for Active Members	691,984,174	785,210,093	13.47%	**No**
5. Total Actuarial Accrued Liability (4) + (2)	$3,383,309,964	$3,510,505,766	3.76%	Yes
6. Assets	53,819,947	53,819,947	0.00%	Yes
7. Unfunded Actuarial Accrued Liability (UAAL) [(5) – (6)]	$3,329,490,017	$3,456,685,819	3.82%	N/A
8. Amortization of UAAL	$1,856,146,172	1,868,478,821	0.66%	N/A
9. Employer Normal Cost	$ 27,250,393	$ 30,820,772	13.10%	**No**
10. Actuarial Required Contribution (ARC) [(8) + (9)] * 1.0425	$1,884,554,707	$1,980,019,826	5.07%	**No**

Table 3: Demographic Comparison

Number of Members	CalPERS JRS Valuation	Cheiron Independent Valuation	Cheiron to PERS Difference	Within Tolerance
Active	328	328	0.00%	Yes
Retired	1,889	1,889	0.00%	Yes
Inactive	34	34	0.00%	Yes
Salaries and Contributions				
Total Payroll	$ 60,593,543	$ 60,593,543	0.00%	Yes

Table 4: Revised CalPERS Valuation Results

	CalPERS JRS Valuation	Cheiron Independent Valuation	Cheiron to PERS Difference	Within Tolerance
1. Present Value of Benefits for Active Members	$ 856,656,249	$ 864,726,241	0.94%	Yes
2. Present Value of Benefits for Inactive Members				
Deferred Vested & DRO	46,722,001	49,334,253	5.59%	**No**
Receiving Benefits	2,634,501,765	2,675,961,420	1.57%	Yes
Total	$2,681,223,766	$2,725,295,673	1.64%	Yes
3. Total Present Value of Benefits	$3,537,880,015	$3,590,021,914	1.47%	Yes
4. Actuarial Accrued Liability for Active Members	789,256,792	785,210,093	-0.51%	Yes
5. Total Actuarial Accrued Liability (4) + (2)	$3,470,480,558	$3,510,505,766	1.15%	Yes
6. Assets	53,819,947	53,819,947	0.00%	Yes
7. Unfunded Actuarial Accrued Liability (UAAL) [(5) – (6)]	$3,416,660,611	$3,456,685,819	1.17%	N/A
8. Employer Normal Cost	$ 30,074,144	30,820,772	2.48%	Yes

Review of the Judges Retirement System II as of June 30, 2013

Overview

Cheiron has completed an independent review of the Actuarial Valuation of the Judges' Retirement System II (JRS II, the System) as of June 30, 2013. Overall, we were able to certify that the liabilities and costs computed in this valuation are reasonable and were computed in accordance with generally accepted actuarial principles and practices.

The supporting calculations and the above issues are discussed in more detail below.

Background

Judges Retirement System II provides pensions and ancillary benefits to California state judges who were elected or appointed on or after November 9, 1994. Judges elected or appointed prior to that date are covered under Judges Retirement System I (JRS I). JRS I and JRS II are separate retirement plans with separate memberships, separate asset pools, and no financial interrelationship.

A judge who has reached 65 and is credited with 20 or more years of service under the System, or who has reached age 70 with five or more years, will be awarded either a lifetime pension or will be paid the balance of his or her monetary credits. The retiring judge makes the choice. The pension benefit is an annuity for life of 3.75% of highest 12 months' pay per year of service, with a maximum of 75% of pay. The monetary credit balance is the accumulation of 8% of pay in employee contributions and 10% of pay designated as employer contributions from date of election or appointment. Death, disability, and termination benefits are also paid from the System.

Review of Methods and Assumptions

The actuarial methods and assumptions used in the JRS II Valuation are well within acceptable standards of actuarial practice.

Annual valuations of JRS II are completed using the Entry Age Normal Funding Method. The valuation date is June 30, 2013. Contributions are determined for the July 1, 2014 through June 30, 2015 fiscal year.

Actuarial assumptions used to compute System liabilities and normal costs include:

- A 7.00% annual rate of investment return, net of all expenses;
- Annual salary increases of 3.00%;
- Annual inflation of 2.75%;
- Retirement between the ages of 65 and 70 after five years of service;

- Termination rates from 0.225% to 0.9% per year, depending on age and service; and
- Active and retired mortality rates developed based on actual CalPERS experience during the period from 1997 to 2011.

More detailed information concerning the valuation assumptions can be found in the 2013 CalPERS Experience Study Report. Cheiron also performed a review of this Experience Study, and evaluated demographic assumptions as part of that review.

Independent Valuation

The JRS II Actuarial Valuation was performed by CalPERS staff using the Actuarial Valuation System (AVS). Cheiron validated the calculations by creating an *independent* actuarial model to develop the valuation results. The only data common to the models was the participant data; the Cheiron model was developed separately, without reference to the one used by staff for the Valuation.

As established in our Proposal of Services, we expect the values of comparable items derived from the two models to differ by less than the percentages shown in the following table.

Table 1: Independent Valuation Tolerances

Calculated Item	Acceptable Tolerance
Number of members - active, retired, inactive	0%
Annual payroll and member contributions	0%
Present value of pay; present value of member contributions	1%
Present value of benefit obligations	5%
Annual normal cost, employer contribution rates	5%

These tolerances are sufficiently stringent to detect material differences between the models. Differences outside of the Acceptable Tolerances listed above would not necessarily cause a failure to certify the valuation, but would result in additional scrutiny and reconciliation to determine the reasons.

Independent Actuarial Valuation Results

Tables 2 and 3 below show the principal results of the independent valuations.

In Table 2, we see that the liabilities and costs computed by Cheiron are very close to those computed by CalPERS staff.

In Table 3, we see that there are some minor and immaterial differences in the JRS II member data. In the JRS II valuation prepared by CalPERS staff, it is noted that the member data excludes one beneficiary receiving a 36-month pre-retirement death benefit. In addition, there are three inactive members entitled to lump sum payments and two members in pay status who are

due a short period of annuity payments who were not included in the data provided to Cheiron. These data exclusions are within the scope of normal actuarial practice.

From the results shown in Tables 2 and 3, we can verify that the liabilities and costs computed in the CalPERS JRS II valuation are reasonable and were computed in accordance with generally accepted actuarial principles and practices.

Table 2: Independent Valuation Results

	CalPERS JRS II Valuation	Cheiron Independent Valuation	Cheiron to PERS Difference	Within Tolerance
1. Present Value of Benefits for Active Members	$ 1,360,932,398	$ 1,356,590,995	-0.32%	Yes
2. Present Value of Benefits for Inactive Members				
Deferred Vested & DRO	304,312	304,312	0.00%	Yes
Receiving Benefits	58,088,395	59,616,480	2.63%	Yes
Total	$ 58,392,707	$ 59,920,792	2.62%	Yes
3. Total Present Value of Benefits	$ 1,419,325,105	$ 1,416,511,787	-0.20%	Yes
4. Actuarial Accrued Liability for Active Members	778,804,871	775,370,235	-0.44%	Yes
5. Total Actuarial Accrued Liability (4) + (2)	$ 837,197,578	$ 835,291,027	-0.23%	Yes
6. Assets	778,980,041	778,980,041	0.00%	Yes
7. Unfunded Actuarial Accrued Liability (UAAL) [(5) – (6)]	$ 58,217,537	$ 56,310,986	-3.27%	N/A
8. Amortization of UAAL	$ 2,859,916	$ 2,749,986	-3.84%	N/A
9. Total Normal Cost	$ 81,030,096	$ 81,177,432	0.18%	Yes
10. Employee Contribution	$ 20,697,165	$ 19,942,048	-3.65%	Yes
11. Employer Normal Cost	$ 60,332,931	$ 61,235,385	1.50%	Yes
12. Actuarial Required Contribution (ARC) [(8) + (9)] * 1.0425	$ 63,192,847	$ 63,985,371	1.25%	Yes

Table 3: Demographic Comparison

Number of Members	CalPERS JRS Valuation	Cheiron Independent Valuation	Cheiron to PERS Difference	Within Tolerance
Active	1352	1352	0.00%	Yes
Retired	52	50	-3.85%	**No**
Inactive	3	0	-100.00%	**No**
Salaries and Contributions				
Total Payroll	$ 241,987,887	$ 241,987,887	0.00%	Yes
Present value of Payroll	$ 1,888,609,730	$ 1,850,920,726	-2.00%	**No**

Review of the Legislators' Retirement System as of June 30, 2013

Overview

Cheiron has conducted an independent review of the Actuarial Valuation of the Legislators' Retirement System (LRS, the System) as of June 30, 2013. We are able to certify that the liabilities and costs computed in this valuation are reasonable and were computed in accordance with generally accepted actuarial principles.

Based on the assumptions and methods employed in the valuation, the actuarial liabilities and costs independently computed by Cheiron closely matched those in the Valuation prepared by CalPERS.

The supporting calculations are presented in more detail below.

Background

The Legislators' Retirement System provides pensions and ancillary benefits to members of the Legislature elected before November 7, 1990, all Constitutional Officers upon electing to join the System, the Insurance Commissioner, and the Legislative Statutory Officers.

Members of the system who have reached age 60 and are credited with four or more years of service under the System, members who have completed 20 or more years of service under the System and Legislative Statutory Officers who have reached age 55 are eligible for an unreduced service retirement allowance. Members of the Legislature and Legislative Statutory Officers can receive up to two thirds of their highest compensation and Constitutional Officers can receive up to 60% of their highest compensation. Death, disability, and termination benefits are also paid from the System.

Review of Methods and Assumptions

The actuarial methods and assumptions used in the LRS Valuation are well within acceptable standards of actuarial practice.

Annual valuations of LRS are completed using the Entry Age Normal Funding Method. The valuation date is June 30, 2013. Contributions are determined for the July 1, 2014 through June 30, 2015 fiscal year.

Actuarial assumptions used to compute System liabilities and employer costs include:

- A 5.75% annual rate of investment return, net of all expenses;
- Annual salary increases of 3.00%;
- Annual inflation of 2.75%;

- Active and retired mortality rates developed based on actual CalPERS experience during the period from 1997 to 2011.

More detailed information concerning the valuation assumptions can be found in the 2013 CalPERS Experience Study Report. Cheiron also performed a review of this Experience Study, and evaluated demographic assumptions as part of that review.

Independent Valuation

The LRS Valuation was performed by CalPERS staff using the Actuarial Valuation System (AVS). Cheiron validated the calculations by creating an *independent* actuarial model to develop the valuation results. The only data common to the models was the participant data; the Cheiron model was developed separately, without reference to the one used by staff for the Valuation.

As established in our Proposal of Services, we expect the values of comparable items derived from the two models to differ by less than the percentages shown in the following table.

Table1: Independent Valuation Tolerances

Calculated Item	Acceptable Tolerance
Number of members - active, retired, inactive	0%
Annual payroll and member contributions	0%
Present value of pay; present value of member contributions	1%
Present value of benefit obligations	5%
Annual normal cost, employer contribution rates	5%

These tolerances are sufficiently stringent to detect material differences between the models. Differences outside of the Acceptable Tolerances listed above would not necessarily cause a failure to certify the valuation, but would result in additional scrutiny and reconciliation to determine the reasons.

Independent Actuarial Valuation Results

Tables 2 and 3 on the next page show the results of the calculations. We note the fully projected liabilities produced by CalPERS and by Cheiron are in close agreement in total.

As seen in Table 2, there is one area in which the valuation results were not within the acceptable tolerance levels: the Required Employer Contribution. CalPERS and Cheiron's calculations of the UAAL Amortization and Employer Normal Cost are in close agreement. However when

added together to calculate the Required Employer Contribution, these results cause an apparently material difference, though the underlying calculations performed by Cheiron closely match those performed by CalPERS.

The LRS is well funded, with assets in excess of the Actuarial Liability. Because of this level of funding, the net employer contribution, after allowing for assets and employee contributions, is relatively small. Accordingly, small differences in the Actuarial Liability and in the Normal Cost are magnified into large relative changes in the net employer cost. It is because of this dynamic that we are able to say that the valuation results computed by Cheiron are within acceptable tolerances of those computed by CalPERS staff.

Table 2: Independent Valuation Results

	CalPERS LRS Valuation	Cheiron Independent Valuation	Cheiron to PERS Difference	Within Tolerance
1. Present Value of Benefits for Active Members	$ 8,355,520	$ 8,116,130	-2.87%	Yes
2. Present Value of Benefits for Inactive Members				
Deferred Vested & DRO	11,289,580	10,836,926	-4.01%	Yes
Receiving Benefits	99,022,974	99,975,107	0.96%	Yes
Total	$ 110,312,554	$ 110,812,033	0.45%	Yes
3. Total Present Value of Benefits	$ 118,668,074	$ 118,928,163	0.22%	Yes
4. Actuarial Accrued Liability for Active Members	5,493,227	5,343,614	-2.72%	Yes
5. Total Actuarial Accrued Liability (4) + (2)	$ 115,805,781	$ 116,155,647	0.30%	Yes
6. Assets	123,201,262	123,201,262	0.00%	Yes
7. Unfunded Actuarial Accrued Liability (UAAL) [(5) – (6)]	$ (7,395,481)	$ (7,045,615)	-4.73%	N/A
8. Amortization of UAAL	$ (379,917)	$ (361,944)	-4.73%	Yes
9. Total Normal Cost	$ 753,900	$ 777,282	3.10%	Yes
10. Employee Contribution	$ 114,062	$ 114,119	0.05%	Yes
11. Employer Normal Cost	$ 639,838	$ 663,163	3.65%	Yes
10. Required Employer Contribution [(8) + (11)]	$ 259,921	$ 301,219	15.89%	**No**

Table 3: Demographic Comparison

Number of Members	CalPERS LRS Valuation	Cheiron Independent Valuation	Cheiron to PERS Difference	Within Tolerance
Active	11	11	0.00%	Yes
Retired	250	250	0.00%	Yes
Inactive	18	18	0.00%	Yes
Salaries and Contributions				
Total Payroll	$ 1,427,241	$ 1,427,241	0.00%	Yes
Present value of Payroll	$ 5,604,077	$ 5,611,446	0.13%	Yes

Review of the 1959 Survivor Benefit Program as of June 30, 2013

Overview

Cheiron has conducted an independent review of the Actuarial Valuation of the 1959 Survivor Benefit Program (the Plan, the Program) as of June 30, 2013. The scope of this study was a review of the Actuarial Valuation Report (the Valuation, the Report), an evaluation of actuarial methods and assumptions, and verification of the actuarial liabilities and costs calculated by CalPERS Staff.

As a result of our efforts, we are able to attest to the following.

- Overall, we found the Report to be accurate and complete, and fully compliant with generally accepted actuarial principles and with all standards of practice.

- We reviewed the actuarial methods and assumptions used for the Valuation, and find them to be reasonable and within acceptable standards of practice.

- Cheiron assessed the correctness of the valuation calculations by creating an *independent* valuation model to develop liabilities for all members. The resulting liabilities are within acceptable tolerances.

These findings are discussed in more detail below. In addition, we offer a few suggestions for future improvements.

Background

The 1959 Survivor program was designed to provide pre-retirement death benefits to CalPERS members not covered by the Federal Old Age and Survivor Insurance (OASI) program. The benefit is available only to those members not covered by OASI benefits. For CalPERS State and School members, this benefit is provided by State statue to certain groups of employees; public agencies are able to contract with CalPERS for the Program. Members who are eligible for the Program are given a one-time option to elect this benefit. Five numbered benefit levels and an indexed level are available, depending on the employer and the date of hire.

The benefit is a monthly payment to the eligible surviving spouse and children. A spouse is eligible if he or she has care of eligible children or is age 62 (60 for levels 3 or higher) or older. A child is eligible if he or she is under age 22 and not married. Physically disabled children are also eligible until the disability ceases. If there are no children or spouse, dependent parents over age 62 are eligible.

Actuarial assumptions used to compute liabilities and normal costs include:

- A 7.50% annual rate of investment return, net of all expenses;

- CalPERS specific mortality assumptions for surviving spouses; no mortality is assumed for child beneficiaries;

- Miscellaneous 2% @ 55 decrements for Miscellaneous Indexed members; and Police 2% @ 50 decrements for Safety Indexed members.

Current (2014) benefit Levels are shown in Table 1 below.

Table 1: Monthly Benefit Levels Payable under the 1959 Survivor Benefit Program

	Level					
Coverage Tier:	**1**	**2**	**3**	**4**	**5**	**Indexed**
Spouse with two or more children; or three or more eligible children	$ 430	$ 538	$ 840	$ 2,280	$ 1,800	$ 1,979
Spouse with one child; or two eligible children only	$ 360	$ 450	$ 700	$ 1,900	$ 1,500	$ 1,319
One eligible child only; or spouse age 62 or older; or dependent parents	$ 180	$ 225	$ 350	$ 950	$ 750	$ 660

Review of Methods and Assumptions

The actuarial methods and assumptions used in the 1959 Survivor Valuation are well within acceptable standards of actuarial practice.

A modified Term Cost method is used to determine the rates for Levels 1 through 5, while the Entry Age Normal method is used for the Indexed Level. The latter has been implemented to account for the increasing nature of the benefit Levels. We believe that these methods are appropriate; however, it may be useful to validate the rates for Levels 1 through 5 by computing them using the Entry Age Normal method.

Actuarial assumptions used to compute System liabilities and employer costs include:

- A 7.50% annual rate of investment return, net of administrative expenses.

- For Indexed Level members a set of claim costs for active members are developed by CalPERS staff. These costs use average claim experience from the 1959 Survivor Program and are smoothed using a polynomial regression model.

- Miscellaneous 2%@55 decrements are used for Miscellaneous members and 2%@50 Police decrements are used for Safety members in the calculation of active liabilities and normal costs for Indexed Level members.

- Active and retired mortality rates were developed based on actual CalPERS experience during the period from 1997 to 2011.

More detailed information concerning the valuation assumptions can be found in the 2013 CalPERS Experience Study Report. Cheiron also performed a review of this Experience Study, and evaluated demographic assumptions as part of that review.

Independent Valuations

Cheiron validated CalPERS calculations by creating an *independent* actuarial model to develop liabilities for each group of members. The only data common to the models was the participant data; the Cheiron model was developed separately, without reference to the one used by staff for the Valuation.

As established in our Proposal of Services, we expect the values of comparable items derived from the two models to differ by less than the percentages shown in the following table.

Table 2: Independent Valuation Tolerances

Calculated Item	Acceptable Tolerance
Number of members - active, retired, inactive	0%
Annual payroll and member contributions	0%
Present value of pay; present value of member contributions	1%
Present value of benefit obligations	5%
Annual normal cost, employer contribution rates	5%

Current Survivors

Our Survivors Model projects expected cash flows for each benefit recipient based on their benefit Level and expected lifetime. These cash flows are discounted to the valuation date using the same assumptions used for the CalPERS valuation. These present values are then compared to the figures provided by CalPERS for each group.

Table 3 below shows the results of the calculations.

Table 3: Comparison of Present Value of Benefits for Survivors

Survivors Present Value of Benefits				
Level:	**CalPERS**	**Cheiron**	**Ratio**	**Within Tolerance**
1	2,451,490	2,444,047	99.7%	Yes
2	2,413,045	2,329,871	96.6%	Yes
3	27,210,478	27,353,795	100.5%	Yes
4	123,288,733	123,380,036	100.1%	Yes
5	154,326,119	153,734,901	99.6%	Yes
Indexed	13,818,741	13,800,880	99.9%	Yes
Total	**323,508,606**	**323,043,491**	**99.9%**	**Yes**

The results produced by CalPERS staff and by Cheiron are in very close agreement for all of the Survivors. In aggregate, the total present value we determined for the population of 1959 Survivors was within 0.1% of that calculated by CalPERS, as shown above.

Current Active Members

We developed a separate Active Model for active members in the Program. This Model was designed to determine the present value of benefits for each member in the same manner as that employed by CalPERS, applying Miscellaneous 2%@55 decrements for Miscellaneous members and 2%@50 Police decrements for Safety members. This is a reasonable approach; however, an alternative would be to use separate decrements for each active participant, depending on which pension plan they belong to.

The present values, accrued liabilities, and normal costs produced by CalPERS staff and by Cheiron are in very close agreement for both the Safety group and the Miscellaneous group. Table 4 below shows the results of the calculations.

Table 4: Comparison of Active Liabilities and Costs for Miscellaneous and Safety

	Active Liabilities for Indexed Level			
	CalPERS	**Cheiron**	**Ratio**	**Within Tolerance**
Present Value of Benefits				
Miscellaneous	4,307,683	4,314,225	100.2%	Yes
Safety	6,500,392	6,514,984	100.2%	Yes
Total	10,808,075	10,829,209	100.2%	Yes
Accrued Liability				
Miscellaneous	1,700,789	1,666,146	98.0%	Yes
Safety	2,441,710	2,420,033	99.1%	Yes
Total	4,142,499	4,086,179	98.6%	Yes
Normal Cost				
Miscellaneous	416,595	419,799	100.8%	Yes
Safety	535,948	535,121	99.8%	Yes
Total	952,543	954,920	100.2%	Yes
Normal Cost per member per month				
Miscellaneous	8.72	8.79	100.8%	Yes
Safety	7.62	7.61	99.9%	Yes
Total	8.07	8.09	100.2%	Yes

Required Monthly Premiums

Using the results on an aggregate basis, we then calculated the required monthly premiums for 2014-2015 and compared those results to those computed by CalPERS.

Table 5: Comparison of Present Value of Benefits for Survivors

	2014-2015 Required Monthly Premium							
	CalPERS			**Cheiron**			**Ratio**	**Within**
Level:	Employer	Employee	Total	Employer	Employee	Total	**(Total)**	**Tolerance**
State 5th Level Pool	$5.505	$5.55	$11.10	$5.55	$5.55	$11.10	100.0%	Yes
Schools 5th Level Pool	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00	100.0%	Yes
PA 1st Level Pool	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00	100.0%	Yes
PA 2nd Level Pool	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00	100.0%	Yes
PA 3rd Level Pool	$0.00	$2.00	$2.00	$0.00	$2.00	$2.00	100.0%	Yes
PA 4th Level Pool	$5.00	$2.00	$7.00	$5.00	$2.00	$7.00	100.0%	Yes
PA Indexed Level Pool	$3.35	$3.35	$6.70	$3.35	$3.35	$6.70	100.0%	Yes

Table 5 above shows the results of the calculations. More detailed calculations can be found in the attached appendix.

Reconciliation of Results

For all of the survivors, Cheiron's calculations were within 5% of those computed by CalPERS; therefore no reconciliation is required for any group. The same is true for the total present value of benefits and normal costs for all actives.

Appendix – Minimum Funding Requirements

Table A-1: State 5th Level

	CalPERS State 5th Level	Cheiron State 5th Level
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$140,626,666	$140,572,150
b. Market Value of Assets	$102,751,222	$102,751,222
c. Unfunded Accrued Liability/(Excess Assets) [1(a)-1(b)]	$37,875,444	$37,820,928
2) Development of Normal Cost		
a. Present Value of Benefits for 2009-2012 Deaths	$24,136,160	$23,942,343
b. Number of 2009-2012 Member Months	3,737,928	3,737,928
c. Total per member, per month 2013/2014 Term Insurance Normal Cost	$7.40	$7.40
d. Total per member, per month 2014/2015 Term Insurance Normal Cost [.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10	$7.20	$7.20
3) 2014 Projected Unfunded Liability		
a. 2013 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2014 [1(c)*1.075]	$40,716,102	$40,657,497
b. Projected Normal Cost Accrual 2013-2014 with interest	$6,558,345	$6,558,345
c. Projected Employer Contributions 2013-2014 with interest	$4,698,751	$4,698,751
d. Projected Employee Contributions 2013-2014 with interest	$4,698,751	$4,698,751
e. Total Projected UAL/(Excess Assets) as of June 30, 2014 [3(a)+3(b)-3(c)-3(d)]	$37,876,945	$37,818,340
4) 2014/2015 Required Contribution		
a. Required Normal Cost per member, per month [2(d)]	$7.20	$7.20
b. Projected Active Members as of 6/30/2014	70,000	70,000
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.075^1/2]	$6,270,700	$6,270,700
d. Amortization of the UAL/(Excess Assets)	$3,093,190	$3,088,404
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$11.10	$11.10
f. Amortization Period	30-year	30-year
5) 2014/2015 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$5.55	$5.55
b. Required Employer Premium per member, per month [maximum($0,4(e)-5(a))]	$5.55	$5.55

Table A-2: School 5th Level

	CalPERS School 5th Level	Cheiron School 5th Level
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$13,699,453	$13,162,751
b. Market Value of Assets	$61,870,390	$61,870,390
c. Unfunded Accrued Liability/(Excess Assets) [1(a)-1(b)]	($48,170,937)	($48,707,639)
2) Development of Normal Cost		
a. Present Value of Benefits for 2009-2012 Deaths	$2,548,116	$2,512,818
b. Number of 2009-2012 Member Months	488,388	488,388
c. Total per member, per month 2013/2014 Term Insurance Normal Cost	$5.10	$5.10
d. Total per member, per month 2014/2015 Term Insurance Normal Cost [.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10	$5.10	$5.10
3) 2014 Projected Unfunded Liability		
a. 2013 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2014 [1(c)*1.075]	($51,783,757)	($52,360,712)
b. Projected Normal Cost Accrual 2013-2014 with interest	$659,165	$659,165
c. Projected Employer Contributions 2013-2014 with interest	$0	$0
d. Projected Employee Contributions 2013-2014 with interest	$249,385	$249,385
e. Total Projected UAL/(Excess Assets) as of June 30, 2014 [3(a)+3(b)-3(c)-3(d)]	($51,373,977)	($51,950,932)
4) 2014/2015 Required Contribution		
a. Required Normal Cost per member, per month [2(d)]	$5.10	$5.10
b. Projected Active Members as of 6/30/2014	10,100	10,100
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.075^1/2]	$640,880	$640,880
d. Amortization of the UAL/(Excess Assets)	($640,880)	($640,880)
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$0.00	$0.00
f. Amortization Period	N/A	N/A
5) 2014/2015 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$2.00	$2.00
b. Required Employer Premium per member, per month [maximum($0,4(e)-5(a))]	$0.00	$0.00

Table A-3: Public Agency Level 1

	CalPERS Public Agency Level 1	Cheiron Public Agency Level 1
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$2,451,490	$2,444,007
b. Market Value of Assets	$36,668,679	$36,668,679
c. Unfunded Accrued Liability/(Excess Assets) [1(a)-1(b)]	($34,217,189)	($34,224,672)
2) Development of Normal Cost		
a. Present Value of Benefits for 2009-2012 Deaths	$9,664,308	$9,159,980
b. Number of 2009-2012 Member Months	6,584,232	6,584,232
c. Total per member, per month 2013/2014 Term Insurance Normal Cost	$1.40	$1.40
d. Total per member, per month 2014/2015 Term Insurance Normal Cost [.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10	$1.40	$1.40
3) 2014 Projected Unfunded Liability		
a. 2013 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2014 [1(c)*1.075]	($36,783,478)	($36,791,522)
b. Projected Normal Cost Accrual 2013-2014 with interest	$133,334	$133,334
c. Projected Employer Contributions 2013-2014 with interest	$0	$0
d. Projected Employee Contributions 2013-2014 with interest	$183,642	$183,642
e. Total Projected UAL/(Excess Assets) as of June 30, 2014 [3(a)+3(b)-3(c)-3(d)]	($36,833,786)	($36,841,830)
4) 2014/2015 Required Contribution		
a. Required Normal Cost per member, per month [2(d)]	$1.40	$1.40
b. Projected Active Members as of 6/30/2014	7,300	7,300
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.075^1/2]	$127,156	$127,156
d. Amortization of the UAL/(Excess Assets)	($127,156)	($127,156)
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$0.00	$0.00
f. Amortization Period	N/A	N/A
5) 2014/2015 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$2.00	$2.00
b. Required Employer Premium per member, per month [maximum($0,4(e)-5(a))]	$0.00	$0.00

Table A-4: Public Agency Level 2

	CalPERS Public Agency Level 2	Cheiron Public Agency Level 2
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$2,413,045	$2,329,871
b. Market Value of Assets	$9,100,668	$9,100,668
c. Unfunded Accrued Liability/(Excess Assets) [1(a)-1(b)]	($6,687,623)	($6,770,797)
2) Development of Normal Cost		
a. Present Value of Benefits for 2009-2012 Deaths	$12,080,385	$11,513,907
b. Number of 2009-2012 Member Months	6,584,232	6,584,232
c. Total per member, per month 2013/2014 Term Insurance Normal Cost	$1.80	$1.80
d. Total per member, per month 2014/2015 Term Insurance Normal Cost [.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10	$1.80	$1.80
3) 2014 Projected Unfunded Liability		
a. 2013 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2014 [1(c)*1.075]	($7,189,194)	($7,278,606)
b. Projected Normal Cost Accrual 2013-2014 with interest	$89,691	$89,691
c. Projected Employer Contributions 2013-2014 with interest	$0	$0
d. Projected Employee Contributions 2013-2014 with interest	$96,064	$96,064
e. Total Projected UAL/(Excess Assets) as of June 30, 2014 [3(a)+3(b)-3(c)-3(d)]	($7,195,567)	($7,284,979)
4) 2014/2015 Required Contribution		
a. Required Normal Cost per member, per month [2(d)]	$1.80	$1.80
b. Projected Active Members as of 6/30/2014	3,800	3,800
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.075^1/2]	$85,102	$85,102
d. Amortization of the UAL/(Excess Assets)	($85,102)	($85,102)
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$0.00	$0.00
f. Amortization Period	N/A	N/A
5) 2014/2015 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$2.00	$2.00
b. Required Employer Premium per member, per month [maximum($0,4(e)-5(a))]	$0.00	$0.00

Table A-5: Public Agency Level 3

	CalPERS Public Agency Level 3	Cheiron Public Agency Level 3
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$27,210,478	$27,353,795
b. Market Value of Assets	$92,079,207	$92,079,207
c. Unfunded Accrued Liability/(Excess Assets) [1(a)-1(b)]	($64,868,729)	($64,725,412)
2) Development of Normal Cost		
a. Present Value of Benefits for 2009-2012 Deaths	$18,791,710	$17,929,907
b. Number of 2009-2012 Member Months	6,584,232	6,584,232
c. Total per member, per month 2013/2014 Term Insurance Normal Cost	$2.80	$2.80
d. Total per member, per month 2014/2015 Term Insurance Normal Cost [.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10	$2.80	$2.80
3) 2014 Projected Unfunded Liability		
a. 2013 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2014 [1(c)*1.075]	($69,733,884)	($69,579,817)
b. Projected Normal Cost Accrual 2013-2014 with interest	$1,452,163	$1,452,163
c. Projected Employer Contributions 2013-2014 with interest	$0	$0
d. Projected Employee Contributions 2013-2014 with interest	$1,000,077	$1,000,077
e. Total Projected UAL/(Excess Assets) as of June 30, 2014 [3(a)+3(b)-3(c)-3(d)]	($69,281,798)	($69,127,731)
4) 2014/2015 Required Contribution		
a. Required Normal Cost per member, per month [2(d)]	$2.80	$2.80
b. Projected Active Members as of 6/30/2014	39,800	39,800
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.075^1/2]	$1,386,521	$1,386,521
d. Amortization of the UAL/(Excess Assets)	($1,386,521)	($1,386,521)
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$0.00	$0.00
f. Amortization Period	N/A	N/A
5) 2014/2015 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$2.00	$2.00
b. Required Employer Premium per member, per month [maximum($0,4(e)-5(a))]	$0.00	$0.00

Table A-6: Public Agency Level 4

	CalPERS Public Agency Level 4	Cheiron Public Agency Level 4
1) Development of Unfunded Liability		
a. Present Value of Future Survivor Benefits	$123,288,733	$123,380,036
b. Market Value of Assets	$133,865,159	$133,865,159
c. Unfunded Accrued Liability/(Excess Assets) [1(a)-1(b)]	($10,576,426)	($10,485,123)
2) Development of Normal Cost		
a. Present Value of Benefits for 2009-2012 Deaths	$51,006,069	$51,075,988
b. Number of 2009-2012 Member Months	6,584,232	6,584,232
c. Total per member, per month 2013/2014 Term Insurance Normal Cost	$7.70	$7.70
d. Total per member, per month 2014/2015 Term Insurance Normal Cost [.25 * 2(a)/2(b) + .75 * (c)], rounded to nearest $0.10	$7.70	$7.70
3) 2014 Projected Unfunded Liability		
a. 2013 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2014 [1(c)*1.075]	($11,369,658)	($11,271,507)
b. Projected Normal Cost Accrual 2013-2014 with interest	$6,764,336	$6,764,336
c. Projected Employer Contributions 2013-2014 with interest	$3,897,911	$3,897,911
d. Projected Employee Contributions 2013-2014 with interest	$1,694,744	$1,694,744
e. Total Projected UAL/(Excess Assets) as of June 30, 2014 [3(a)+3(b)-3(c)-3(d)]	($10,197,977)	($10,099,826)
4) 2014/2015 Required Contribution		
a. Required Normal Cost per member, per month [2(d)]	$7.70	$7.70
b. Projected Active Members as of 6/30/2014	68,300	68,300
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.075^1/2]	$6,543,301	$6,543,301
d. Amortization of the UAL/(Excess Assets)	($832,810)	($824,794)
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$7.00	$7.00
f. Amortization Period	30-year	30-year
5) 2014/2015 Required Employer and Employee Premiums With Cost Sharing Provision		
a. Required Employee Premium per member, per month	$2.00	$2.00
b. Required Employer Premium per member, per month [maximum($0,4(e)-5(a))]	$5.00	$5.00

Table A-7: Public Agency Indexed Level

	CalPERS Public Agency Indexed Level	Cheiron Public Agency Indexed Level
1) Development of Unfunded Liability		
a. Present Value of Future Benefits for Active Members	$10,808,075	$10,829,209
b. Present Value of Future Benefits for Current Survivors	$13,818,741	$13,800,880
c. Total Present Value of Future Benefits [1(a)+1(b)]	$24,626,816	$24,630,089
d. Present Value of Future Normal Costs	$6,665,576	$7,057,849
e. Entry Age Normal Total Accrued Liability [1(c)-1(d)]	$17,961,240	$17,887,058
f. Market Value of Assets	$20,411,771	$20,411,771
g. Unfunded Accrued Liability/(Excess Assets) [1(e)-1(f)]	($2,450,531)	($2,524,713)
2) Development of Normal Cost		
a. Required Entry Age Normal Cost	$952,543	$954,920
b. Active Members as of June 30, 2013	9,922	9,922
c. Total per member per month Entry Age Normal Cost [2(a)/2(b)*12], rounded to nearest $0.10	$8.00	$8.00
3) 2014 Projected Unfunded Liability		
a. 2013 Unfunded Accrued Liability/(Excess Assets) as of June 30, 2014 [1(g)*1.075]	($2,634,321)	($2,714,066)
b. Projected Normal Cost Accrual 2013-2014 with interest	$1,017,879	$1,017,879
c. Projected Employer Contributions 2013-2014 with interest	$318,992	$318,992
d. Projected Employee Contributions 2013-2014 with interest	$318,992	$318,992
e. Total Projected UAL as of June 30, 2014 [3(a)+3(b)-3(c)-3(d)]	($2,254,426)	($2,334,171)
4) 2014/2015 Required Contribution		
a. Required Normal Cost per member, per month [2(c)]	$8.00	$8.00
b. Projected Active Members as of June 30, 2014	9,800	9,800
c. Required Normal Cost Contribution [12*4(a)*4(b)*1.075^1/2]	$975,442	$975,442
d. Amortization of the UAL/(Excess Assets)	($184,106)	($190,618)
e. Total Required Contribution per member, per month [(4(c)+4(d))/(4(b)*12)], rounded to nearest $0.10	$6.70	$6.70
f. Amortization Period	30-year	30-year
5) 2014/2015 Employer and Employee Premiums with Cost Sharing Provision		
a. Required Employee Premium per member, per month [maximum(2,4(e)/2)]	$3.35	$3.35
b. Required Employer Premium per member, per month [maximum(0,4(e)-5(a))]	$3.35	$3.35