

**California Public Employees'
Retirement System**

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

**Produced by Cheiron
February 24, 2014**

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LETTER OF TRANSMITTAL

February 24, 2014

Board of Administration
California Public Employees' Retirement System
P.O. Box 942701
Sacramento, CA 94229-2701

Dear Trustees:

Under the terms of Contract 2009-5377, we have performed an actuarial audit of the of the California Public Employees' Retirement System (CalPERS) State and Schools plans (the Plans) as of June 30, 2012. The purpose of this audit 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.

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. In this report we identify some areas in which procedures and computations could be improved; however, the impact of such changes on liabilities and costs is 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, the 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 for the purposes described herein and for the use by CalPERS staff in assessing their systems, procedures, and computations. This report is not intended to benefit any third 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.

Board of Administration

February 24, 2014

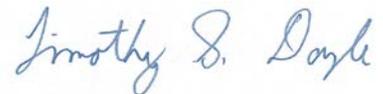
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We appreciate being of service to you, and we look forward to working with you in the future.

Sincerely,
Cheiron



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



Timothy S. Doyle, ASA
Associate Actuary



William R. Hallmark, ASA, FCA, EA, MAAA
Consulting Actuary

Parallel Valuation and Certification of the Actuarial Valuations of CalPERS 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 parallel valuation and certification involves three steps:

- Review of Methods and Assumptions

The demographic actuarial assumptions in use in the June 30, 2012 State and Schools valuations were established by 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.

Therefore, to the best of our knowledge, the actuarial methods and assumptions are in accord with actuarial standards of practice.

- Independent Parallel Valuation

In order to verify the calculations in the state and schools valuations, Cheiron conducted independent, parallel valuations using its own actuarial models. These independent valuations determine 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. This data was neither audited nor independently verified. We performed

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

an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice #23.

- Analysis of Results

In the event that the normal cost, actuarial liability, or the employer contribution rate computed by Cheiron differs by more than 5% from that computed by CalPERS' staff, an investigation is initiated. This proceeds as follows:

1. Determine whether the contribution rate difference is the result of an accumulation of small differences in normal cost and actuarial liability. Frequently, such small differences can be leveraged by plan assets and member contributions to produce a noticeable cost difference between our valuation results and those being audited.

If the other actuarial calculations are close, the investigation can be concluded. If there are material differences in the normal cost or the actuarial liability, then further inquiries are undertaken.

2. Establish that the same member data and plan provisions have been used by Cheiron and by staff;
3. Research methodological differences between the Cheiron and staff approaches to computing liabilities and costs; and
4. Compare individual test life results to uncover subtle differences in approach that may result in material differences in measures of liability and cost.

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:

- **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.
- **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.
- **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.
- **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.
- **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.

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

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

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

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%)

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Schools Plans as of June 30, 2012

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

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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

Plan	Actives				Retirees			
	Average Age		Average Service ¹		Average Pay		Total Benefits* (\$ millions)	
	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

¹ 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)

Plan	Present Value of Future Benefits						Present Value of Future Salaries		
	Active Participants			Inactive Participants			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

