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**State of Washington  
Pension Funding Council  
LEOFF 2 Board**

Actuarial Audit of June 30, 2013 Actuarial Valuation  
and  
2007-2012 Demographic Experience Study

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October 6, 2014

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Department of Retirement Services  
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Executive Director  
LEOFF Plan 2 Retirement Board  
P.O. Box 40918  
Olympia, WA 98504

Re: Actuarial Audit Report

Dear Dave and Steve,

The enclosed report presents the findings and comments resulting from a detailed review of the June 30, 2103 actuarial valuation and 2007-2012 Experience Study performed by the Office of the State Actuary (OSA) for the Pension Funding Council (PFC) and the LEOFF 2 Board. An overview of our major findings is included in the Executive Summary section of the report. More detailed commentary on our review process is included in the latter sections.

All calculations for the actuarial valuation are based on Revised Code of Washington (RCW) and the actuarial assumptions proposed by the OSA based on its experience study for the June 30, 2013 actuarial valuation. As discussed in our report, we believe the package of actuarial assumptions and methods is reasonable (taking into account the experience of Washington State Public Retirement Systems and reasonable expectations). Nevertheless, the emerging costs will vary from those presented in this report to the extent that actual experience differs from that projected by the actuarial assumptions. Future actuarial measurements may differ significantly from the current measurements presented in this report due to factors such as the following:

- Plan experience differing from the actuarial assumptions,
- Future changes in the actuarial assumptions,
- Increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as potential additional contribution requirements due to changes in the plan's funded status), and
- Changes in the plan provisions or accounting standards.

Due to the scope of this assignment, we did not perform an analysis of the potential range of such measurements.

In preparing this report, we relied, without audit, on information (some oral and some in writing) supplied by the OSA's staff. This information includes information supplied to the OSA by the Department of Retirement Systems (DRS) and the Washington State Investment Board (WSIB). This information includes, but is not limited to, statutory provisions, employee data, and financial information. In our examination of these data, we have found them to be reasonably consistent and comparable with data used for other purposes. Since the audit results are dependent on

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the integrity of the data supplied, the results can be expected to differ if the underlying data is incomplete or missing. It should be noted that if any data or other information is inaccurate or incomplete, our calculations may need to be revised.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the Actuarial Standards of Practice promulgated by the Actuarial Standards Board and the applicable Guides to Professional Conduct, amplifying Opinions, and supporting Recommendations of the American Academy of Actuaries.

Milliman's work product was prepared exclusively for the Pension Funding Council and the LEOFF 2 Board for a specific and limited purpose. It is a complex, technical analysis that assumes a high level of knowledge concerning the operations of the Washington State Public Retirement Systems, and uses DRS's census data, which Milliman has not audited. It is not for the use or benefit of any third party for any purpose. Any third party recipient of Milliman's work product who desires professional guidance should not rely upon Milliman's work product, but should engage qualified professionals for advice appropriate to its own specific needs.

The consultants who worked on this assignment are pension actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

We would like to express our appreciation to the OSA's staff for their assistance in supplying the data and information on which this report is based.

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

We respectfully submit the following report, and we look forward to discussing it with you.

Sincerely,



Mark C. Olleman, FSA, EA, MAAA  
Consulting Actuary



Nick J. Collier, ASA, EA, MAAA  
Consulting Actuary



Daniel R. Wade, FSA, EA, MAAA  
Consulting Actuary  
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**Pension Funding Council and LEOFF 2 Board  
Actuarial Audit of 2013 Actuarial Valuation  
and 2007-2012 Demographic Experience Study**

**Table of Contents**

	<b>Page</b>
<b>Certification Letter</b>	
<b>Section 1 Summary of the Findings .....</b>	<b>1</b>
<b>Section 2 Membership Data .....</b>	<b>9</b>
Exhibit 2-1 Member Statistics as of June 30, 2013 .....	10
<b>Section 3 Actuarial Value of Assets .....</b>	<b>19</b>
Exhibit 3-1 Comparison of Actuarial Value of Assets by Plan.....	20
<b>Section 4 Actuarial Liabilities .....</b>	<b>23</b>
Exhibit 4-1 Present Value of Future Benefits by Benefit Type .....	24
Exhibit 4-2 Present Value of Future Benefits by System .....	25
Exhibit 4-3 Comparison of Projected Unit Credit Accrued Liability .....	27
Exhibit 4-4 Present Value of Future Salaries and EANC Rate .....	27
<b>Section 5 Funding .....</b>	<b>31</b>
<b>Section 6 Actuarial Assumptions (Economic).....</b>	<b>43</b>
<b>Section 7 Actuarial Assumptions (Demographic) .....</b>	<b>55</b>
<b>Section 8 Review of Previous Reports and Recommendations from Prior Audit .....</b>	<b>67</b>

# Pension Funding Council and LEOFF 2 Board Actuarial Audit of 2013 Actuarial Valuation and 2007-2012 Demographic Experience Study

## Section 1 Summary of the Findings

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### Purpose and Scope of the Actuarial Audit

This actuarial audit reviews the June 30, 2013 actuarial valuation and the 2007-2012 Demographic Experience Study performed by the Office of the State Actuary (OSA). The purpose of this audit is to verify that the results of the valuation are accurate and that the assumptions the valuation is based upon are reasonable. The following tasks were performed in this audit:

- Evaluation of the data used in the valuation
- Full independent replication of the key valuation results
- Evaluation of calculations made for the Experience Study and reasonableness of the assumptions used in the valuation
- Analysis of valuation results and reconciliation of material differences (if any)
- Analysis of the written work product

### Audit Conclusion

#### Overall

The results of this audit are very positive. Specifically, we want to highlight the following:

- **Strong Contributions toward Funding.** Washington State has funding that is superior to that of most statewide systems. The use of the aggregate actuarial cost method, along with relatively short amortization periods for the Plans 1 limit the contributions deferred to future generations in comparison to what is done in most other states.
- **Reasonable Assumptions:** We believe that all of the recommended assumptions used to value liabilities are reasonable. The recommended use of Scale BB for projecting future mortality improvements puts the state ahead of most other states when it comes to anticipating the impact of mortality improvement.
- **Accurate Calculations:** Our independent calculations matched OSA's closely in all material aspects of the valuation.

#### Experience Study

Based upon our review of the Experience Study for the 2007-2012 period, we found the package of recommended assumptions is reasonable and appropriate. We have some comments for OSA, the Pension Funding Council (PFC), and the LEOFF 2 Board to consider in the future. We are not proposing any changes be reflected in the 2013 actuarial valuation.

## Actuarial Valuation

Based upon our review of the June 30, 2013 actuarial valuation, we found the actuarial work performed by OSA was reasonable, appropriate, and accurate. We matched the assets, liabilities and contribution rates calculated by OSA closely.

We have made suggestions regarding the written communication in the actuarial valuation report, particularly with respect to the explanation of the funding calculations, which are quite complex for the Washington State Public Retirement Systems. We also have changes to be considered for the next valuation.

## Statement of Key Findings

### Membership Data

We performed tests on both the raw data supplied by the Department of Retirement Systems (DRS) and the processed data used by the OSA in the June 30, 2013 actuarial valuation. We feel that there is an excellent match between the data supplied by DRS and the data used by OSA. Based on this review, we feel the individual member data used is complete. A summary is shown in the chart below:

All Plans in Aggregate			
	OSA	Milliman	Ratio OSA/Milliman
<b>Active Members</b>			
Total Number	291,345	291,345	100.0%
Total Salaries (millions)	\$ 16,525	\$ 16,525	100.0%
Average Age	47.7	47.7	100.0%
Average Service	12.4	12.4	100.0%
Average Projected Compensation	\$ 56,710	\$ 56,715	100.0%
<b>Retirees and Survivors</b>			
Total Number	150,145	150,140	100.0%
Average Monthly Pension	\$ 1,803	\$ 1,800	100.2%
Number of New Service Retirees	9,474	9,490	99.8%
Avg Monthly Pension for New Svc Retirees	\$ 1,792	\$ 1,786	100.4%
<b>Terminated Members</b>			
Total Number Vested	53,356	53,361	100.0%
Total Number Non-Vested	118,332	118,333	100.0%

### Actuarial Value of Assets

We have reviewed the calculations for the actuarial value of assets used for each plan in the June 30, 2013 valuation. We found the calculations to be reasonable and the methodology to be appropriate and in compliance with Actuarial Standards of Practice. The actuarial value of assets is discussed in more detail in Section 3 of this report

## Statement of Key Findings

### Actuarial Liabilities

We independently calculated the Present Value of Benefits, Normal Cost, and Actuarial Accrued Liability under the Projected Unit Credit method for all systems. We found that all significant benefit provisions were accounted for in an accurate manner, the actuarial assumptions and methods are being applied as reported, and that our total liabilities matched those calculated by OSA closely. This was true both in aggregate and by individual plan.

A summary of the results for each system is shown in the chart below. Further breakdowns are shown in Section 4.

	OSA	Milliman	Ratio OSA/Milliman
<b>Present Value All Future Benefits (in \$Millions)</b>			
PERS 1	\$ 13,012.2	\$ 12,957.2	100.4%
PERS 2/3	33,403.9	33,192.7	100.6%
TRS 1	9,490.9	9,532.3	99.6%
TRS 2/3	12,025.1	12,063.1	99.7%
SERS 2/3	4,494.9	4,495.5	100.0%
PSERS 2	595.3	590.8	100.8%
LEOFF 1	4,420.3	4,430.4	99.8%
LEOFF 2	10,313.8	10,295.7	100.2%
WSPRS	1,131.8	1,129.8	100.2%
<b>Total PVB</b>	<b>\$ 88,888.2</b>	<b>\$ 88,687.5</b>	<b>100.2%</b>

### Funding

We reviewed the funding methods and their application. We find them reasonable and consistent with the Actuarial Standards of Practice and the objectives stated in RCW 41.45.010. Based on the Systems' funding methods and assumptions, we believe the employer contribution rates for each membership class are appropriately calculated.

## Statement of Key Findings

### Funding (continued)

When we used the liabilities, present value of future salaries, and actuarial assets calculated by OSA, we matched OSA's contribution rate calculations exactly. When we used the liabilities, present value of future salaries, and actuarial assets calculated by Milliman, the results were close to OSA's calculated contribution rates as shown below.

	OSA	Milliman	Difference OSA - Milliman
<b>Employer Contribution Rates (Percent of Member Pay)</b>			
PERS 1	5.18%	5.12%	0.06%
PERS 2/3	7.11%	7.04%	0.07%
TRS 1	6.91%	7.02%	-0.11%
TRS 2/3	7.56%	7.70%	-0.14%
SERS 2/3	7.70%	7.69%	0.01%
PSERS 2	6.89%	6.88%	0.01%
WSPRS	8.79%	8.43%	0.36%
LEOFF 2*	5.31%	5.31%	0.00%

\* Based on a potential LEOFF 2 contribution rate calculation structure of 100% of EANC and the employers' 30% share.

The largest difference was observed for WSPRS. We reviewed this calculation and concluded that this difference was just the accumulation of some small differences and that it is reasonable.

We have a recommended change for future valuations in the calculation of the entry age for use in the Entry Age Normal Cost (EANC) calculation under the Entry Age actuarial cost method. This recommended change to the Entry Age Normal Cost has an impact on the minimum contribution rates, which only apply for the LEOFF Plan 2 for the June 2013 valuation, but could have a small impact on the other Plans in future valuations.

Funding is discussed in more detail in Section 5.



## Statement of Key Findings

### Actuarial Assumptions (Economic)

We reviewed the economic assumptions used in the valuation and found them to be reasonable. The economic assumptions used were adopted based on the OSA's 2013 Report on Financial Condition and Economic Experience Study completed in August 2013. While a full audit of that report is beyond the scope of our assignment, we feel an actuarial audit would be incomplete without a review of the important economic assumptions used in the actuarial valuation.

We have the following comments regarding the economic assumptions:

- Our analysis supports the expected rate of return of 7.50% recommended by the OSA. While the current assumption of 7.80% used for non-LEOFF 2 plans is also reasonable, we believe that 7.50% is a more realistic assumption and recommend that the investment return assumption continue to decrease. 7.50% (or lower) is consistent with the recommendations we are currently making to our retained clients.
- It should be noted that there are recent revisions to Actuarial Standard of Practice No. 27 (ASOP No. 27) that will be effective for the June 30, 2015 valuation and later. These revisions will impact how an actuary determines a reasonable assumption. In particular, the current standard allows for the selection of an assumption that falls within the best-estimate range, whereas the new standard narrows this to be considered reasonable only if it has no significant bias (i.e., it is neither significantly optimistic nor pessimistic). The standard does allow for a provision for adverse deviation. Ultimately, we believe that an assumption that was on the high end of the best-estimate range under the current standard may not be reasonable under the new standard. This could impact the selection of the economic assumptions and should be considered by the OSA at the time of the 2015 actuarial valuation.
- The inflation assumption of 3.00% is reasonable, as is the real wage growth assumption of 0.75% for productivity. The general salary increase assumption of 3.75% is the sum of these two assumptions.

## Statement of Key Findings

### Actuarial Assumptions (Economic) (continued)

- As prescribed, OSA assumes annual growth in active membership varying by plan from 0.80% to 0.95. Most public sector pension plans assume no future growth in system membership. A growth assumption greater than 0% is not allowed under current GASB standards for accounting and financial disclosure. While a zero growth assumption is not required for contribution rate calculation purposes, we believe that zero growth is the best assumption, as discussed at the end of Section 6 of this report. Please note that this assumption only impacts the amortization of the Plan 1 Unfunded Actuarial Accrued Liability (UAAL) over 10 years. The small membership growth assumption over the 10-year amortization period has a modest impact on the calculated contribution rates.

Economic assumptions are discussed in more detail in Section 6.

### Actuarial Assumptions (Demographic)

We performed an audit of the calculations for the 2007-2012 Demographic Experience Study for the Washington State Public Retirement Systems. Based on this analysis, we reviewed the demographic assumptions used in the valuation and found them to be reasonable. We are making a few comments to consider for the next Experience Study, as shown at the end of this section, and discussed further in Section 7.

### Review of Previous Reports and Recommendations from Prior Audit

Because the final 2007-2012 Experience Study and 2013 Actuarial Valuation reports have not been completed at this time, we base the comments in Section 8 on the previous reports. Overall, we found OSA's reports to be very thorough. We have made a few comments for consideration for the upcoming reports that may enhance an outside reader's understanding. All of these comments are related to additional disclosure, and, if implemented, none would have an impact on the contribution rates.

We have also reviewed the comments from the prior actuarial audit and reported on the incorporation of those comments. Most of the recommendations were implemented. Of those that have not yet been implemented, we do not consider any of them to be material.

## Recommendations and Other Considerations

We are not recommending any changes to the current actuarial valuation or experience study reports. We have provided some recommendations for OSA, PFC, and the LEOFF 2 Board to consider in the future, as listed below and discussed in further detail in the body of this report.

### Recommended Changes to the 2013 Valuation

None

### Recommended Changes for Future Valuations with a Material Financial Impact

None

### Recommended Changes for Future Valuations and Experience Studies with a Non-Material Financial Impact

We recommend that the following changes be considered. The recommendations are listed in rough descending order of potential magnitude.

- **Calculation of Entry Age (see end of Section 4).** For the next valuation, we recommend Entry Age be calculated using service rounded to the nearest year.
- **Salary Used in Plan 1 Amortization (see end of Section 5).** Exclude merit increases from the projection of the first year salary used in the Plan 1 amortization calculation.
- **Weighting of Entry Age Normal Cost (EANC) (see end of Section 4).** Revise the weighting of the EANC rate for Plans 2 and 3 to be based on the current membership.
- **Medical Benefits for Future Disabilities (see end of Section 8).** Revise the calculation of medical benefits for future disabilities to reflect projected increases in medical costs that occur after retirement.
- **Non-Duty Disability Benefit in Year Before Retirement Eligibility for LEOFF 2 (see end of Section 4).** Revise the calculation of the end-of-year portion of the age 49 non-duty disability benefit.
- **OPEB Costs for Future Disabled Members after Medicare Eligibility (see end of Section 7):** Review the treatment of projected pre-Medicare benefits at ages 65 and later for future disabilities.
- **Recommendations from Prior Audit (see end of Section 8):** Most recommendations from the prior audit were addressed, but a few have not yet been addressed. Those not addressed had no material financial impact.

**Recommended Changes for Future Valuations and  
Experience Studies with  
No Direct Financial Impact**

We recommend that OSA consider the following actions for future valuations and the experience studies they are based on:

- **Mortality Analysis by Benefit Amount (see Mortality sub-heading in Section 7).** Analyze retired mortality rates by benefit amount for future experience studies and factor that analysis into the recommended assumption.
- **Immediate vs Deferred Retirement for Disabilities with 30 Years of Service (see Rates of Disability sub-heading in Section 7).** Review the assumption for whether a PERS, TRS and SERS member with 30 years of service that is less than age 55 takes an immediate disability retirement or a deferred service retirement.
- **Consider excluding people eligible for early retirement from termination analysis (see Rates of Termination sub-heading in Section 7).** Consider excluding people eligible for early retirement from the termination analysis at the time of the next experience study.
- **Consider adding Portability Assumption (see Other Assumptions sub-heading in Section 7).** No assumption is currently made to reflect this. It is our understanding that OSA will research this for the 2014 valuation. This only impacts those who are covered by other pension plans at first-class cities in the state of Washington.
- **Additional Information in Report (see Comments Regarding OSA's Reports in Section 8).** Provide additional disclosure information in reports, particularly regarding the funding of the systems.

# Pension Funding Council and LEOFF 2 Board Actuarial Audit of 2013 Actuarial Valuation and 2007-2012 Demographic Experience Study

## Section 2 Membership Data

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### Audit Conclusion



We performed tests on both the raw data supplied by the Department of Retirement Systems (DRS) and the processed data used by the Office of the State Actuary (OSA) in the June 30, 2013 actuarial valuation. We found that the data used by OSA was consistent with the data supplied by DRS.

We also reviewed the data used by the OSA for the demographic experience study for reasonableness and consistency, although we did not do a full audit.

Based on this review, we feel the individual member data used in both projects is appropriate and complete.

### Comments

Overall, the data process appears to be thorough and accurate. We would add the following comments:

- Raw Data: OSA provided us with the same files that were given to them by DRS for use in the actuarial valuation.

**Completeness:** The data contained all the necessary fields to perform the actuarial valuation.

**Quality:** Although we did not audit the data at the source, we performed some independent checks to confirm the overall reasonableness of the data. We compared the total retiree and beneficiary benefit amounts with the actual benefit payments made, as reported in the asset statements.

We also compared the total active member compensation on the DRS data with the estimated active payroll for 2012-2013. The actual member contribution amounts in the asset statements provided by DRS were divided by the applicable contribution rates for the prior year for each plan. This results in an estimated payroll for each plan. Based on this analysis, we found the compensation data to be reasonable.

**Comments  
(continued)**

- Parallel Data Processing: We performed independent edits on the raw data provided by DRS and then compared our results with the valuation data used by OSA, as summarized in the preliminary participant data summary on the OSA’s website. We found our results to be consistent.

Our results do not match exactly. This is understandable, as some adjustments were made to annualize salary for those with less than one year of service during the valuation period and other adjustments were made for a few data elements outside of the expected range. Overall, each key data component matched well within an acceptable level and we believe the individual member data used by the OSA was appropriate for valuation purposes.

A summary of the data for each plan is shown in Exhibit 2-1. In all cases, the summarized totals for our edited data matched those for OSA’s valuation data closely. The “Milliman” column reflects the DRS data after adjustments by Milliman. The “OSA” column reflects the actual data used in the OSA’s valuation as summarized in the preliminary participant data summary on the OSA’s website.

**Exhibit 2-1  
Member Statistics as of June 30, 2013**

All Plans	OSA	Milliman	Ratio OSA/Milliman
<b>Active Members</b>			
Total Number	291,345	291,345	100.0%
Total Salaries (millions)	\$ 16,525	\$ 16,525	100.0%
Average Age	47.7	47.7	100.0%
Average Service	12.4	12.4	100.0%
Average Projected Compensation	\$ 56,710	\$ 56,715	100.0%
<b>Retirees and Survivors</b>			
Total Number	150,145	150,140	100.0%
Average Monthly Pension	\$ 1,803	\$ 1,800	100.2%
Number of New Service Retirees	9,474	9,490	99.8%
Avg Monthly Pension for New Svc Retirees	\$ 1,792	\$ 1,786	100.4%
<b>Terminated Members</b>			
Total Number Vested	53,356	53,361	100.0%
Total Number Non-Vested	118,332	118,333	100.0%

**Exhibit 2-1 (continued)**  
**Member Statistics as of June 30, 2013**

<b>PERS 1</b>			
	<b>OSA</b>	<b>Milliman</b>	<b>Ratio OSA/Milliman</b>
<b>Active Members</b>			
Total Number	5,653	5,653	100.0%
Total Salaries (millions)	\$ 318	\$ 318	100.0%
Average Age	62.2	62.2	100.0%
Average Service	24.5	24.5	100.0%
Average Projected Compensation	\$ 56,224	\$ 56,212	100.0%
<b>Retirees and Survivors</b>			
Total Number	51,860	51,860	100.0%
Average Monthly Pension	\$ 1,892	\$ 1,885	100.4%
Number of New Service Retirees	1,209	1,216	99.4%
Avg Monthly Pension for New Svc Retirees	\$ 2,350	\$ 2,338	100.5%
<b>Terminated Members</b>			
Total Number Vested	1,384	1,384	100.0%
Total Number Non-Vested	3,810	3,810	100.0%

<b>PERS 2</b>			
	<b>OSA</b>	<b>Milliman</b>	<b>Ratio OSA/Milliman</b>
<b>Active Members</b>			
Total Number	115,751	115,751	100.0%
Total Salaries (millions)	\$ 6,759	\$ 6,760	100.0%
Average Age	48.4	48.4	100.0%
Average Service	12.6	12.6	100.0%
Average Projected Compensation	\$ 58,388	\$ 58,398	100.0%
<b>Retirees and Survivors</b>			
Total Number	31,329	31,329	100.0%
Average Monthly Pension	\$ 1,256	\$ 1,255	100.1%
Number of New Service Retirees	3,782	3,785	99.9%
Avg Monthly Pension for New Svc Retirees	\$ 1,731	\$ 1,729	100.1%
<b>Terminated Members</b>			
Total Number Vested	25,383	25,383	100.0%
Total Number Non-Vested	97,381	97,382	100.0%

**Exhibit 2-1 (continued)  
Member Statistics as of June 30, 2013**

<b>PERS 3</b>			
	<b>OSA</b>	<b>Milliman</b>	<b>Ratio OSA/Milliman</b>
<b>Active Members</b>			
Total Number	29,302	29,302	100.0%
Total Salaries (millions)	\$ 1,581	\$ 1,581	100.0%
Average Age	43.6	43.6	100.0%
Average Service	8.7	8.7	100.0%
Average Projected Compensation	\$ 53,948	\$ 53,956	100.0%
<b>Retirees and Survivors</b>			
Total Number	2,139	2,139	100.0%
Average Monthly Pension	\$ 723	\$ 722	100.1%
Number of New Service Retirees	375	376	99.7%
Avg Monthly Pension for New Svc Retirees	\$ 896	\$ 890	100.7%
<b>Terminated Members</b>			
Total Number Vested	4,280	4,280	100.0%
Total Number Non-Vested	N/A	N/A	100.0%

<b>TRS 1</b>			
	<b>OSA</b>	<b>Milliman</b>	<b>Ratio OSA/Milliman</b>
<b>Active Members</b>			
Total Number	2,393	2,393	100.0%
Total Salaries (millions)	\$ 183	\$ 183	100.0%
Average Age	63.0	63.0	100.0%
Average Service	30.1	30.1	100.0%
Average Projected Compensation	\$ 76,549	\$ 76,522	100.0%
<b>Retirees and Survivors</b>			
Total Number	35,912	35,912	100.0%
Average Monthly Pension	\$ 2,060	\$ 2,057	100.1%
Number of New Service Retirees	717	718	99.9%
Avg Monthly Pension for New Svc Retirees	\$ 2,973	\$ 2,969	100.1%
<b>Terminated Members</b>			
Total Number Vested	391	391	100.0%
Total Number Non-Vested	453	453	100.0%



**Exhibit 2-1 (continued)**  
**Member Statistics as of June 30, 2013**

TRS 2			
	OSA	Milliman	Ratio OSA/Milliman
<b>Active Members</b>			
Total Number	12,071	12,071	100.0%
Total Salaries (millions)	\$ 740	\$ 740	100.0%
Average Age	44.5	44.5	100.0%
Average Service	10.1	10.1	100.0%
Average Projected Compensation	\$ 61,320	\$ 61,317	100.0%
<b>Retirees and Survivors</b>			
Total Number	3,445	3,445	100.0%
Average Monthly Pension	\$ 1,612	\$ 1,612	100.0%
Number of New Service Retirees	409	408	100.2%
Avg Monthly Pension for New Svc Retirees	\$ 2,014	\$ 2,013	100.0%
<b>Terminated Members</b>			
Total Number Vested	2,330	2,330	100.0%
Total Number Non-Vested	4,812	4,812	100.0%

TRS 3			
	OSA	Milliman	Ratio OSA/Milliman
<b>Active Members</b>			
Total Number	51,471	51,471	100.0%
Total Salaries (millions)	\$ 3,483	\$ 3,482	100.0%
Average Age	46.1	46.1	100.0%
Average Service	13.7	13.7	100.0%
Average Projected Compensation	\$ 67,664	\$ 67,656	100.0%
<b>Retirees and Survivors</b>			
Total Number	4,863	4,863	100.0%
Average Monthly Pension	\$ 903	\$ 903	100.0%
Number of New Service Retirees	1,028	1,034	99.4%
Avg Monthly Pension for New Svc Retirees	\$ 1,098	\$ 1,091	100.6%
<b>Terminated Members</b>			
Total Number Vested	7,102	7,102	100.0%
Total Number Non-Vested	N/A	N/A	100.0%

**Exhibit 2-1 (continued)  
Member Statistics as of June 30, 2013**

<b>SERS 2</b>			
	<b>OSA</b>	<b>Milliman</b>	<b>Ratio OSA/Milliman</b>
<b>Active Members</b>			
Total Number	21,760	21,760	100.0%
Total Salaries (millions)	\$ 623	\$ 623	100.0%
Average Age	51.1	51.1	100.0%
Average Service	10.8	10.8	100.0%
Average Projected Compensation	\$ 28,620	\$ 28,630	100.0%
<b>Retirees and Survivors</b>			
Total Number	5,084	5,084	100.0%
Average Monthly Pension	\$ 780	\$ 780	100.0%
Number of New Service Retirees	669	668	100.1%
Avg Monthly Pension for New Svc Retirees	\$ 942	\$ 942	100.0%
<b>Terminated Members</b>			
Total Number Vested	5,190	5,190	100.0%
Total Number Non-Vested	8,861	8,861	100.0%

<b>SERS 3</b>			
	<b>OSA</b>	<b>Milliman</b>	<b>Ratio OSA/Milliman</b>
<b>Active Members</b>			
Total Number	30,535	30,535	100.0%
Total Salaries (millions)	\$ 892	\$ 892	100.0%
Average Age	50.6	50.6	100.0%
Average Service	10.7	10.7	100.0%
Average Projected Compensation	\$ 29,195	\$ 29,197	100.0%
<b>Retirees and Survivors</b>			
Total Number	3,995	3,995	100.0%
Average Monthly Pension	\$ 410	\$ 410	100.0%
Number of New Service Retirees	770	774	99.5%
Avg Monthly Pension for New Svc Retirees	\$ 466	\$ 463	100.6%
<b>Terminated Members</b>			
Total Number Vested	6,398	6,398	100.0%
Total Number Non-Vested	N/A	N/A	100.0%

**Exhibit 2-1 (continued)**  
**Member Statistics as of June 30, 2013**

<b>PSERS 2</b>			
	<b>OSA</b>	<b>Milliman</b>	<b>Ratio OSA/Milliman</b>
<b>Active Members</b>			
Total Number	4,513	4,513	100.0%
Total Salaries (millions)	\$ 253	\$ 253	100.0%
Average Age	40.4	40.4	100.0%
Average Service	4.8	4.8	100.0%
Average Projected Compensation	\$ 56,075	\$ 56,084	100.0%
<b>Retirees and Survivors</b>			
Total Number	43	43	100.0%
Average Monthly Pension	\$ 358	\$ 358	100.0%
Number of New Service Retirees	16	16	100.0%
Avg Monthly Pension for New Svc Retirees	\$ 511	\$ 511	100.0%
<b>Terminated Members</b>			
Total Number Vested	119	119	100.0%
Total Number Non-Vested	1,383	1,383	100.0%

<b>LEOFF 1</b>			
	<b>OSA</b>	<b>Milliman</b>	<b>Ratio OSA/Milliman</b>
<b>Active Members</b>			
Total Number	143	143	100.0%
Total Salaries (millions)	\$ 15	\$ 15	100.0%
Average Age	61.9	61.9	100.0%
Average Service	38.2	38.2	100.0%
Average Projected Compensation	\$ 103,362	\$ 103,362	100.0%
<b>Retirees and Survivors</b>			
Total Number	7,729	7,729	100.0%
Average Monthly Pension	\$ 3,841	\$ 3,841	100.0%
Number of New Service Retirees	42	42	100.0%
Avg Monthly Pension for New Svc Retirees	\$ 7,106	\$ 7,106	100.0%
<b>Terminated Members</b>			
Total Number Vested	1	1	100.0%
Total Number Non-Vested	35	35	100.0%

**Exhibit 2-1 (continued)  
Member Statistics as of June 30, 2013**

<b>LEOFF 2</b>			
	<b>OSA</b>	<b>Milliman</b>	<b>Ratio OSA/Milliman</b>
<b>Active Members</b>			
Total Number	16,687	16,687	100.0%
Total Salaries (millions)	\$ 1,597	\$ 1,597	100.0%
Average Age	43.5	43.5	100.0%
Average Service	14.6	14.6	100.0%
Average Projected Compensation	\$ 95,694	\$ 95,708	100.0%
<b>Retirees and Survivors</b>			
Total Number	2,782	2,782	100.0%
Average Monthly Pension	\$ 3,151	\$ 3,151	100.0%
Number of New Service Retirees	402	403	99.8%
Avg Monthly Pension for New Svc Retirees	\$ 4,091	\$ 4,082	100.2%
<b>Terminated Members</b>			
Total Number Vested	698	698	100.0%
Total Number Non-Vested	1,565	1,565	100.0%

<b>WSPRS 1</b>			
	<b>OSA</b>	<b>Milliman</b>	<b>Ratio OSA/Milliman</b>
<b>Active Members</b>			
Total Number	657	657	100.0%
Total Salaries (millions)	\$ 54	\$ 54	100.0%
Average Age	45.6	45.6	100.0%
Average Service	18.9	18.9	100.0%
Average Projected Compensation	\$ 81,465	\$ 81,433	100.0%
<b>Retirees and Survivors</b>			
Total Number	964	959	100.5%
Average Monthly Pension	\$ 3,881	\$ 3,875	100.2%
Number of New Service Retirees	55	50	110.0%
Avg Monthly Pension for New Svc Retirees	\$ 4,194	\$ 4,105	102.2%
<b>Terminated Members</b>			
Total Number Vested	70	75	93.3%
Total Number Non-Vested	18	18	100.0%

Exhibit 2-1 (continued)  
Member Statistics as of June 30, 2013

WSPRS 2			
	OSA	Milliman	Ratio OSA/Milliman
<b>Active Members</b>			
Total Number	409	409	100.0%
Total Salaries (millions)	\$ 27	\$ 27	100.0%
Average Age	32.5	32.6	99.7%
Average Service	5.7	5.7	100.0%
Average Projected Compensation	\$ 65,058	\$ 65,060	100.0%
<b>Retirees and Survivors</b>			
Total Number	-	-	100.0%
Average Monthly Pension	\$ -	\$ -	100.0%
Number of New Service Retirees	-	-	100.0%
Avg Monthly Pension for New Svc Retirees	\$ -	\$ -	100.0%
<b>Terminated Members</b>			
Total Number Vested	10	10	100.0%
Total Number Non-Vested	14	14	100.0%

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# Pension Funding Council and LEOFF 2 Board Actuarial Audit of 2013 Actuarial Valuation and 2007-2012 Demographic Experience Study

## Section 3 Actuarial Value of Assets

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### Audit Conclusion



We have reviewed the calculations for the actuarial value of assets used for each plan in the June 30, 2013 valuation. We found the calculations to be reasonable and the methodology to be appropriate and in compliance with Actuarial Standards of Practice.

### Comments

The method used to determine the actuarial value of assets smoothes investment gains and losses by reflecting a portion of the difference between the actual market value of assets and the expected market value for every fiscal year. For each year and each plan, a base for smoothed recognition over time is established equal to that difference.

The larger the deviation from expectation, the longer the recognition period for that base, with a level dollar amount recognized for each year of that period. For the largest deviations (more than 7% above or below the assumption), the gains or losses are recognized over eight years, whereas when the actual return is within 1% of the assumption, the gain or loss is recognized immediately. Additionally, a "corridor" is applied to make sure that the smoothed actuarial value of assets stays within 30% of the market value of assets.

Although it is unusual to recognize investment gains and losses over different periods, we believe it is a reasonable approach since the maximum smoothing period is reasonable and the method allows the actuarial value of assets to converge to market more rapidly if gains and losses are small.

We independently calculated the actuarial value of assets for each plan based on financial information provided by the Department of Retirement Systems (DRS) and the Washington State Investment Board (WSIB). DRS and WSIB both provide market values of assets by plan. Note that there are small differences between the values provided by DRS and WSIB. Per our conversation with OSA, the DRS values are used for the market value of assets. The WSIB data is only used to determine the monthly cash flows (contributions minus benefit payments) needed to calculate the expected value of assets.

**Comments  
(continued)**

We used the information from DRS, WSIB, along with the outstanding gain/loss bases as published in the 2012 Actuarial Valuation Report. With this information and the asset methodology, our independent calculations were within 0.1% of the OSA's calculation for every plan.

Please see the following exhibit for a comparison.

**Exhibit 3-1  
Comparison of Actuarial Value of Assets by Plan**

AVA (millions)				
	OSA	Milliman	Ratio OSA/Milliman	
<b>PERS</b>				
Plan 1	\$ 8,053	\$ 8,052	100.0%	
Plan 2/3 (DB)	\$ 24,335	\$ 24,333	100.0%	
<b>TRS</b>				
Plan 1	\$ 6,717	\$ 6,716	100.0%	
Plan 2/3 (DB)	\$ 8,406	\$ 8,405	100.0%	
<b>SERS</b>				
Plan 2/3 (DB)	\$ 3,335	\$ 3,335	100.0%	
<b>PSERS</b>				
Plan 2	\$ 224	\$ 224	100.0%	
<b>LEOFF</b>				
Plan 1	\$ 5,516	\$ 5,516	100.0%	
Plan 2	\$ 7,862	\$ 7,862	100.0%	
<b>WSPRS</b>				
Plan 1 & 2	\$ 1,009	\$ 1,010	99.9%	

As discussed above, OSA uses an asset smoothing method to reduce volatility. A five-year smoothing method is the most commonly used method among large public retirement systems. OSA uses a variable length of smoothing period, with eight years as the longest possible period. We believe the use of an asset smoothing method is appropriate, and we generally recommend this to our clients, particularly in systems where contribution rates change annually or biennially.



## Comments (continued)

When a smoothing method is used, the actuarial value of assets will deviate from the market value of assets. Many public retirement systems apply a corridor so that the actuarial value of assets is not allowed to deviate from the market value by more than a certain percentage. The potential downside of using a corridor is that it can cause significant contribution rate volatility when the assets are outside the corridor. OSA applies a corridor of 30%.

Typically, the longer the recognition period, the more important it is seen to have a corridor. We believe that the eight-year smoothing period, coupled with the application of the corridor, is in compliance with ASOP No. 44, the actuarial standard of practice for the selection and use of asset valuation methods for pension valuations.

The Conference of Consulting Actuaries (CCA) has drafted a white paper entitled *Actuarial Funding Policies and Practices for Public Pension Plans* which includes guidelines for asset smoothing methodologies. This paper was drafted in part as a response to the void left by the fact that the soon to be applicable statements of the Governmental Accounting Standards Board (GASB) no longer specify the parameters for an Annual Required Contribution (ARC). The CCA was comprised of a group of public plan actuaries from the major firms in public plan practice who met more than 24 times over two years.

OSA's method of smoothing with recognition periods eight years or less, along with a 30% corridor, falls in the "Acceptable Practices" category under these draft guidelines (categories described below for reference). OSA's method is almost inside of the CCA "Model Practices" category. That could be achieved with a smoothing period of five years or fewer with a 50% corridor or a smoothing period of seven years or fewer with a 40% corridor. Note that the "Model Practices" are not intended to be "best practices," but are the ones considered to be most consistent with the Level Cost Allocation Model. Therefore, this is not a recommendation to change, just an observation.

OSA's method is consistent with all of the CCA specific policy objectives and considerations for an asset smoothing method. Its consistency with the primary objectives is shown by the following:

- All components of the asset method are specified: return subject to smoothing, smoothing period, corridor, and method of recognizing deferred amounts.
- It is unbiased compared to market value.
- It does not selectively reset to market when market value is greater than actuarial value.

**Comments  
(continued)**

- Realized and unrealized gains and losses are treated the same.
- It is consistent with the Actuarial Standard of Practice No. 44 concept of being likely to return to market in a reasonable period and likely to stay within a reasonable range of market value.

We feel that the OSA's method is reasonable and consistent with the policy objectives of the State which are described in RCW 41.45.010 as being "to provide a dependable and systematic process for funding the benefits provided to members and retirees" of the Washington State Retirement Systems.

For reference, the categories in the CCA guidelines are shown below.

Categories Under CCA Guidelines	
Model Practices	Those practices most consistent with the Level Cost Allocation Model (LCAM).
Acceptable Practices	Generally those which, while not consistent with the LCAM, are well established in practice and typically do not require additional analysis.
Acceptable Practices with Conditions	May be acceptable in some circumstances either to reflect different policy objectives or on the basis of additional analysis.
Non-Recommended Practices	Systems using these practices should acknowledge the policy concerns identified in the CCA Guidelines or acknowledge they reflect different policy objectives.
Unacceptable Practices	No description provided by CCA, but implication is that these should not be used.

# Pension Funding Council and LEOFF 2 Board Actuarial Audit of 2013 Actuarial Valuation and 2007-2012 Demographic Experience Study

## Section 4 Actuarial Liabilities

---

### Audit Conclusion



We independently calculated the present value of future benefits and future salaries and the entry age normal costs for the Washington State Public Retirement Systems. We found that all significant benefit provisions were accounted for in an accurate manner and the actuarial assumptions and methods are being applied correctly. Our total liabilities closely matched those calculated by OSA. This was true both in aggregate and by System.

Note that there will always be differences in the calculated liabilities when different software is used by different actuaries; however, the results should not deviate significantly. The level of consistency we found in this audit provides a high level of assurance that the results of the valuation accurately reflect the liabilities of the Washington State Public Retirement Systems based on the plan provisions, assumptions, methods, and census and financial data.

We have a few recommendations to be considered for future valuations at the end of this section.

### Comments

We incorporated the following information into our valuation system:

- **Data** – We used the data provided by DRS. As discussed in Section 2, we confirmed that this data was consistent with the valuation data used by OSA.
- **Assumptions and Methods** – We used the assumptions and methods recommended by OSA for the June 30, 2013 actuarial valuation. This was supplemented by discussions between OSA and Milliman on the technical application of these methods.
- **Benefit Provisions** – We obtained this information from the Revised Code of Washington and various member handbooks.

**Comments  
(continued)**

We then performed an independent parallel valuation as of June 30, 2013. Based on this valuation, we completed a detailed comparison of the Present Value of Future Benefits (PVFB) computed in our independent valuation and the amounts calculated by OSA. Exhibit 4-1 shows a summary of this analysis broken down by benefit type. Exhibit 4-2 shows a summary of this analysis broken down by System. The results were reasonable, and our calculated PVFB values match closely with those calculated by OSA.

**Exhibit 4-1  
Present Value of Future Benefits by Benefit Type**

(in \$Millions)	All Systems in Aggregate		
	OSA	Milliman	O / M Ratio
<b>Present Value All Future Benefits</b>			
Retirement	\$46,939.4	\$46,649.7	100.6%
Termination	1,865.5	1,889.7	98.7%
Death	896.8	908.7	98.7%
Disability	<u>517.2</u>	<u>514.4</u>	<u>100.5%</u>
<b>Total Actives</b>	<b>\$50,218.9</b>	<b>\$49,962.5</b>	<b>100.5%</b>
Terminated Vested	\$3,614.0	\$3,596.5	100.5%
Terminated Not Vested	<u>269.7</u>	<u>269.8</u>	<u>100.0%</u>
<b>Total Inactive, not in Payment</b>	<b>\$3,883.7</b>	<b>\$3,866.4</b>	<b>100.4%</b>
Retired	\$30,456.6	\$30,515.3	99.8%
Disabled	2,310.2	2,316.0	99.7%
Survivor	1,946.0	1,954.4	99.6%
LOP Liability	<u>72.8</u>	<u>72.9</u>	<u>99.9%</u>
<b>Total Annuitants</b>	<b>\$34,785.6</b>	<b>\$34,858.6</b>	<b>99.8%</b>
<b>Total Members</b>	<b>\$88,888.2</b>	<b>\$88,687.5</b>	<b>100.2%</b>

**Exhibit 4-2  
Present Value of Future Benefits by System**

	OSA	Milliman	Ratio OSA/Milliman
<b>Present Value All Future Benefits (in \$Millions)</b>			
<b>PERS 1</b>			
Active Members	\$ 1,641.1	\$ 1,608.5	102.0%
Inactive Members	<u>11,371.1</u>	<u>11,348.7</u>	<u>100.2%</u>
Total	\$ 13,012.2	\$ 12,957.2	100.4%
<b>PERS 2/3</b>			
Active Members	\$ 25,015.1	\$ 24,787.6	100.9%
Inactive Members	<u>8,388.8</u>	<u>8,405.1</u>	<u>99.8%</u>
Total	\$ 33,403.9	\$ 33,192.7	100.6%
<b>TRS 1</b>			
Active Members	\$ 979.4	\$ 992.8	98.6%
Inactive Members	<u>8,511.5</u>	<u>8,539.5</u>	<u>99.7%</u>
Total	\$ 9,490.9	\$ 9,532.3	99.6%
<b>TRS 2/3</b>			
Active Members	\$ 9,689.2	\$ 9,707.6	99.8%
Inactive Members	<u>2,335.9</u>	<u>2,355.5</u>	<u>99.2%</u>
Total	\$ 12,025.1	\$ 12,063.1	99.7%

Comments  
(continued)

Exhibit 4-2 (continued)  
Present Value of Future Benefits by System

	OSA	Milliman	Ratio OSA/Milliman
<b>Present Value All Future Benefits (in \$Millions)</b>			
<b>SERS 2/3</b>			
Active Members	\$ 3,227.8	\$ 3,223.1	100.1%
Inactive Members	<u>1,267.1</u>	<u>1,272.4</u>	<u>99.6%</u>
Total	\$ 4,494.9	\$ 4,495.5	100.0%
<b>PSERS 2</b>			
Active Members	\$ 580.6	\$ 576.1	100.8%
Inactive Members	<u>14.7</u>	<u>14.7</u>	<u>100.1%</u>
Total	\$ 595.3	\$ 590.8	100.8%
<b>LEOFF 1</b>			
Active Members	\$ 165.8	\$ 163.7	101.3%
Inactive Members	<u>4,254.5</u>	<u>4,266.7</u>	<u>99.7%</u>
Total	\$ 4,420.3	\$ 4,430.4	99.8%
<b>LEOFF 2</b>			
Active Members	\$ 8,451.4	\$ 8,434.9	100.2%
Inactive Members	<u>1,862.4</u>	<u>1,860.8</u>	<u>100.1%</u>
Total	\$ 10,313.8	\$ 10,295.7	100.2%
<b>WSPRS</b>			
Active Members	\$ 468.4	\$ 468.2	100.0%
Inactive Members	<u>663.3</u>	<u>661.5</u>	<u>100.3%</u>
Total	\$ 1,131.8	\$ 1,129.8	100.2%

**Comments  
(continued)**

We also looked at the Projected Unit Credit Accrued Liability (PUC AL). PUC AL is used by OSA to measure the funded ratios and is described in Section 5. Exhibit 4.3 shows the audit had a good match of PUC AL. The June 30, 2013 actuarial valuation is the last valuation in which OSA plans to use PUC AL to measure the funded ratio. Next year OSA plans to use Entry Age Accrued Liability consistent with the revised accounting standards GASB No. 67 and GASB No. 68.

**Exhibit 4-3  
Comparison of Projected Unit Credit Accrued Liability**

	OSA	Milliman	Ratio OSA/Milliman
<b>Projected Unit Credit Accrued Liability (PUC AL) (in \$Millions)</b>			
PERS 1	\$ 12,884.3	\$ 12,614.8	102.1%
PERS 2/3	23,797.8	23,733.7	100.3%
TRS 1	9,448.7	9,431.7	100.2%
TRS 2/3	8,016.4	7,942.1	100.9%
SERS 2/3	3,272.7	3,272.5	100.0%
PSERS 2	180.3	182.1	99.0%
LEOFF 1	4,409.5	4,384.1	100.6%
LEOFF 2	6,859.3	6,841.6	100.3%
WSPRS	959.0	954.2	100.5%
<b>Total PUC AL</b>	<b>\$ 69,828.1</b>	<b>\$ 69,356.8</b>	<b>100.7%</b>

Lastly, we looked at both the present value of future salaries and the entry age normal cost (EANC) rates, which are used in the determination of the minimum contribution rates.

**Exhibit 4-4  
Present Value of Future Salaries and EANC Rate**

(in \$Millions)	All Systems in Aggregate		
	OSA	Milliman	O / M Ratio
Present Value of Future Salaries	\$148,623.8	\$146,966.0	101.1%
Entry Age Normal Cost Rate	10.18%	10.20%	99.8%

## Recommendations

We have two recommendations for the next actuarial valuation.

**Calculation of Entry Age.** For the next valuation, we recommend Entry Age be calculated using service rounded to the nearest year. This will only impact calculations of the EANC rate. The EANC rate is used in two places: (1) the LEOFF 2 contribution rate is currently based on 100% of EANC, and (2) the minimum contribution rates for the other system are set equal to 80% or 70% of the EANC rate. Since the minimum contribution rates do not apply in the June 30, 2013 actuarial valuation, this method change would have no impact for non-LEOFF 2 plans.

The method change would be expected to decrease the LEOFF 2 EANC by 2% to 3% of the total (e.g., if the EANC rate was 10.00%, it would expect to decrease by 0.20% to 0.30%). Therefore, we do not see this as cause for concern, since the impact of this method change on the EANC rate would be small and the current method is conservative.

Currently Entry Age is being calculated as current age minus truncated (rounded down) service. We recommend this calculation be changed so that Entry Age is calculated as current age minus service rounded to the nearest year. This will result in lower entry ages for some members.

**Weighting of EANC.** We believe the EANC rate for Plans 2 and 3 should be based on the current membership instead of an assumption of 67% for Plan 2 and 33% for Plan 3. This will have no impact on any contribution rate calculation in the June 30, 2013 actuarial valuation, but may have a small impact on future valuations. This only applies to Systems with both Plans 2 and 3 and only impacts the minimum contribution rate based on EANC. Therefore it will only impact the minimum contribution rates for PERS 2/3, TRS 2/3 and SERS 2/3, none of which apply in the June 30, 2013 valuation.

RCW 41.45.155 and RCW 41.45.158 state separately for each System that: "The minimum contribution rate for the plans 2 and 3 employer (or employee) normal cost shall equal the total contribution rate required to fund eighty percent of the plans 2 and 3 employer (or employee) normal cost as calculated under the entry age normal cost method." The RCW does not state how the normal cost should be weighted between Plans 2 and 3. Currently OSA's calculations weight the normal cost by 67% for Plan 2 EANC and 33% for Plan 3 EANC for all Systems. However, the percent of combined Plan 2/3 salary currently coming from Plan 2 is about 81% for PERS 2, 17% for TRS 2 and 41% for SERS 2. The 67% assumption is intended to reflect new entrants.



## Recommendations (continued)

Based on current membership, this assumption should at least be reviewed. In addition, we believe it makes the most sense to base the calculation on the current membership since it is the best representation of current year costs. The RCW does not state the calculation should be based on new entrants and if it did, the current membership would be a reasonable proxy for new entrants and would not rely on periodic reevaluation.

### **Non-Duty Disability Benefit in Year Before Retirement**

**Eligibility for LEOFF 2.** Future disabilities are assumed to occur in the middle of the year. The valuation system used by OSA takes the average of the benefit at the beginning of the year and the end of the year to determine the benefit amount at the middle of the year. In one case, non-duty disability for LEOFF 2, the projected non-duty disability benefits for age 50 and above are \$0 for a member eligible for service retirement in the future. Since OSA assumes no non-duty disability occurs after retirement eligibility, this is not an issue, except at age 49.5 where the non-duty disability benefit is the average of the projected age 49 non-duty disability benefit and the age 50 benefit, which is \$0. This results in an understatement for this benefit at age 49.5. Once again, the potential financial impact of this is extremely small, but we recommend an adjustment be made for this in future valuations.

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**Pension Funding Council and LEOFF 2 Board  
Actuarial Audit of 2013 Actuarial Valuation  
and 2007-2012 Demographic Experience Study**

**Section 5 Funding**

**Audit Conclusion**



**Comments**

We reviewed the funding methods and their application. We find them reasonable and consistent with the Actuarial Standards of Practice and the objectives stated in RCW 41.45.010. Based on the Systems' funding methods and assumptions, we believe the employer contribution rates for each membership class are appropriately calculated.

When we used the liabilities, present value of future salaries, and actuarial assets calculated by OSA, we matched OSA's contribution rate calculations exactly. When we used the liabilities, present value of future salaries, and actuarial assets calculated by Milliman, the results were close to OSA's calculated contribution rates as shown below.

	OSA	Milliman	Difference OSA - Milliman
<b>Employer Contribution Rates (Percent of Member Pay)</b>			
PERS 1	5.18%	5.12%	0.06%
PERS 2/3	7.11%	7.04%	0.07%
TRS 1	6.91%	7.02%	-0.11%
TRS 2/3	7.56%	7.70%	-0.14%
SERS 2/3	7.70%	7.69%	0.01%
PSERS 2	6.89%	6.88%	0.01%
WSPRS	8.79%	8.43%	0.36%
LEOFF 2*	5.31%	5.31%	0.00%

*\* Based on a potential LEOFF 2 contribution rate structure of 100% of EANC and the employers' 30% share.*

**Comments  
(continued)**

The largest difference in contribution rates was WSPRS at 0.36% of pay. This is not an unreasonable result for an audit. However, as shown below, this provides an example of how very small and reasonable differences in liability calculations can lead to larger differences in contribution calculations if all the technical differences happen to push the contribution rate in the same direction. In this case, several different factors all caused the rate calculated by Milliman to be smaller. There was a 0.2% difference in the Present Value of Future Benefits, a 0.1% difference in Actuarial Value of Assets and a 0.7% difference in the Present Value of Future Salaries. Although the differences were all very reasonable, they all contributed to make an Employer Normal Cost that was 0.22% of pay larger for OSA. In addition, the 7.19% maximum member contribution rate had an effect [RCW 41.45.0631]. Since OSA's employer normal cost of 7.33% exceeded this by 0.14%, those 0.14% of contributions are shifted to the employer, whereas under Milliman's calculations, there was no shift. The combined result was a calculated difference of 0.36% of pay.

	OSA	Milliman	Comparison OSA to Milliman
<b>WSPRS Contribution Rate Calculation (in \$Millions)</b>			<u>Ratios</u>
a. Present Value All Future Benefits	1,131.8	1,129.8	100.2%
b. Actuarial Value of Assets	-1,009.4	-1,010.1	99.9%
c. Balance for Improved Survivor Benefits	-9.8	-9.8	100.0%
d. Present Value Future Contributions	112.6	109.9	102.5%
e. Present Value of Future Salaries	767.8	773.1	99.3%
			<u>Differences</u>
f. Member Normal Cost = 50% of d / e	7.33%	7.11%	0.22%
g. Member Rate (7.19% Maximum) (Maximum described in RCW 41.45.0631)	7.19%	7.11%	0.08%
h. Employer Normal Cost = 50% of d / e	7.33%	7.11%	0.22%
i. Increase due to 7.19% Member Max.	0.14%	0.00%	0.14%
j. Rate to Amortize Survivor Benefits	1.32%	1.32%	0.00%
k. Employer Contribution Rate	8.79%	8.43%	0.36%

The remainder of this section describes in detail why we believe the funding policies used to calculate contribution rates are reasonable and consistent with the objectives described in the RCW.

## Policy Objectives

The contribution rate calculations for the Washington State retirement systems are complex. Much of this complexity is due to efforts to conform with articulated policy objectives. RCW 41.45.010 states that it is the intent of the legislature to provide a dependable and systematic process for funding the benefits provided to members and retirees of the State's retirement systems and sets out five specific goals:

1. To fully fund the Plans 2 and 3 as provided by law;
2. To fully amortize LEOFF Plan 1 costs not later than June 30, 2024;
3. To fully amortize the unfunded actuarial accrued liability for PERS and TRS Plans 1 within a rolling 10-year period, using methods and assumptions that balance needs for increased benefit security, decreased contribution rate volatility, and affordability of pension contribution rates;
4. To establish long-term employer contribution rates which will remain a relatively predictable proportion of the future state budgets; and
5. To fund, to the extent feasible, all benefits for plan 2 and 3 members over the working lives of those members so that the cost of those benefits are paid by the taxpayers who receive the benefit of those members' service.

Although not specifically stated in RCW 41.45.010, the funding policies also achieve the following goals:

1. The same employer contribution rate is maintained for all members in the same class regardless of Plan. For example: employers make the same contribution for all TRS members regardless of whether they are in Plan 1, 2 or 3.
2. Funding risk is shared by both employers and members. In Plan 2, both employer and member contribution rates vary based on plan experience. In Plan 3, members take the risk associated with their contributions since they are deposited in the defined contribution plan.

## Actuarial Cost Methods

The funding policies of the Washington State Retirement Systems are based on two actuarial cost methods: the Aggregate cost method and the Entry Age cost method. The Funded Ratios are measured based on a third cost method, the Projected Unit Credit cost method. The following text describes these methods.

## Purpose of a Cost Method and Normal Cost

The purpose of any actuarial cost method is to allocate the cost of future benefits to specific time periods, typically during a member's projected working career. This is clearly stated in *Pension Mathematics for Actuaries*, A.W. Anderson, second edition, 1990, p. 5.

"The painful lesson which has been learned over and over again in the last century by various types of employers – first private employers, and later public employers – is that the cost of a pension plan must be recognized during the *working lifetimes* of the employees who are ultimately going to receive pensions, preferably by actually funding amounts sufficient to provide completely for each employee's life annuity at the time of retirement." The text goes on to state on p. 6: "This is where actuaries come into the picture, ... The actuary can ... assign to each fiscal year a portion of the present value of future benefit payments in such a way as generally to accrue costs over the working lifetimes of employees. Any scheme for making such an assignment of costs is called an *actuarial cost method* – which we shall henceforth refer to simply as a "cost method."

The cost assigned to a specific year is called the Normal Cost.

## Aggregate Cost Method

Under the Aggregate cost method, the Normal Cost rate is equal to the level percentage of pay necessary to fund the difference between the present value of all future benefits for current members (PVFB) and the actuarial value of assets (AVA). The difference between PVFB and AVA is funded by future contributions. Each year, the Normal Cost spreads all required future contributions evenly over the present value of future salaries for current members. When actual experience is better or worse than expected experience, the Normal Cost in subsequent years will go down or up, respectively. The contribution calculated by the Aggregate cost method is therefore equal to the Aggregate Normal Cost.

Note that this method does not result in a calculation of the liability independent of assets and therefore does not provide a meaningful "Funded Ratio." OSA currently addresses this by use of the Projected Unit Credit (PUC) actuarial cost method. PUC is used to calculate the Funded Ratio and is used for GASB accounting and financial reporting. It is not used for the contribution rate calculations.

Plans 2 and 3 employer and member contribution rates are primarily set using the Aggregate cost method.

## Entry Age Actuarial Cost Method

The Entry Age cost method is the most common method used by public plans. The goal of the Entry Age method is the theoretical allocation of projected benefit costs as a level percent of pay over the members' entire working lifetimes. The Entry Age Normal Cost (EANC) is the theoretical level percent of pay which, if contributed from the members' dates of hire to their dates of projected retirement, would exactly fund their benefits if all experience exactly matched the actuarial assumptions. Actual experience better or worse than expected will not change the EANC. The EANC is not anticipated to increase or decrease from year to year. Experience better or worse than expected creates a positive or negative Unfunded Actuarial Accrued Liability (UAAL), which is funded separately from the EANC. Therefore, Systems using the Entry Age cost method have two components to their calculated costs: (1) the EANC, which is meant to be a level % of pay, and (2) the UAAL amortization contribution, which is the balancing item that makes sure all future benefits are financed if future experience follows the assumptions, and contributions are made according to schedule.

For the purposes of the Washington State plans, the Entry Age method is only used to set minimum contribution rates based on the EANC. This is a logical use of EANC and should increase contribution stability since it represents the theoretical level percentage of pay contribution required to fund benefits if future experience follows the actuarial assumptions. Specifically, RCW sets minimum contribution rates as follows:

- PERS, TRS, SERS and PSERS Plan 2/3 employers and Plan 2 members have a minimum contribution rate based on sharing 80% of EANC except for PSERS members. [RCW 41.45.155 and RCW 41.45.158]
- WSPRS employers and members have a minimum contribution rate based on sharing 70% of EANC [RCW 41.45.0631].
- The LEOFF Plan 2 Board has established a policy that considers contribution rates equal to both 90% and 100% of the EANC and has recently established contribution rates based on 100% of the EANC.

### **Projected Unit Credit (PUC) Cost Method**

Under the Projected Unit Credit (PUC) cost method, the projected retirement benefit is calculated including both projected salary increases and service, similar to the PVFB under the Aggregate method. The accrued liability is then allocated based on the ratio of the current service as of the valuation date to all projected service. The PUC Normal Cost is equal to the present value of benefits allocated to the current year.

The Entry Age method is the most commonly used method by public plans because it produces normal costs which are expected to be a level percent of pay from year to year for a specific employee. In contrast, the PUC method, which is the mandated method for financial reporting for US private plans, produces normal costs which are expected to increase from year to year for a specific employee. This generally results in smaller accrued liabilities under the PUC than are calculated under the Entry Age method.

OSA is currently using the PUC method to calculate funded ratios, but is planning to start using the Entry Age method next year consistent with the change in the new Governmental Accounting Standards Board (GASB) Statements No. 67 and 68.

### **Plans 2 and 3 Funding Policy**

In general, the Plans 2 and 3 funding policies for PERS, TRS, SERS, PSERS and WSPRS are based on the Aggregate Cost method and work as described below. Note that where the following text makes references to “Plans 2 and 3” the references should be substituted with “Plans 1 and 2” for WSPRS. Also, please note that PSERS has no Plan 3. RCW 41.45 describes the actuarial funding of state retirement systems. The primary references for Plans 1, 2 and 3 funding are [RCW 41.45.060 Basic State and Employer Contribution Rates], [RCW 41.45.061 Required Contribution Rates for Plan 2 Members] and [RCW 41.45.0631 Washington State Patrol Retirement System].

1. First, the remaining Plans 2 and 3 “past liability balances,” which are financed entirely by employer contributions, are determined. Currently for PERS, TRS and SERS, these are due to gain sharing, and for WSPRS these are due to distributions under RCW 43.43.270(2) for survivors of members who became disabled under RCW 43.43.040(2) prior to July 1, 2006. The remaining past liability balances are determined by taking the prior year’s balance, adding interest, and subtracting employer contributions based on the corresponding supplemental employer percent of pay contribution rates: PERS 0.11%, TRS 0.77%, SERS 1.00% and WSPRS 1.32%.



**Plans 2 and 3  
Funding Policy  
(continued)**

2. The Plans 2 and 3 Present Value of Future Contributions shared by employers and members is calculated as:

$$\begin{array}{r}
 \text{minus} \quad \text{Present Value All Future Benefits} \\
 \text{minus} \quad \text{Actuarial Value of Assets} \\
 \text{minus} \quad \text{Past Liability Balance} \\
 \hline
 \text{Present Value of Future Contributions}
 \end{array}$$

3. The Plans 2 and 3 Aggregate Normal Cost Rate is determined by spreading the present value of future contributions shared by employers and members over the present value of future Plans 2 and 3 member salaries. The calculation takes into account that Plan 3 members do not contribute to the defined benefit plans.
4. Plans 2 and 3 minimum employer and member contribution rates are applied based on the EANC. The minimum rate for PERS, TRS, SERS and PSERS is 80% of EANC except for PSERS members who do not have a minimum. The minimum rate for WSPRS is 70% of EANC. LEOFF 2 contributions are currently based on 100% of the EANC, which works like a minimum since it is currently larger than the Aggregate Normal Cost Rate.
5. Plans 2 maximum member contribution rates are applied to TRS [RCW 41.45.061] and WSPRS [RCW 41.45.0631]. This results in the Plan 2 member contribution rates.
6. The Plans 2 and 3 employer rates are increased by the supplemental contributions rates used to finance past liability balances. As described above these are: PERS 0.11%, TRS 0.77%, SERS 1.00% and WSPRS 1.32%.
7. Plans 2 and 3 employer rates are also increased to account for any maximums applied to member contribution rates resulting in the final Plans 2 and 3 employer contribution rates.

**LEOFF 2 Funding  
Policy**

The LEOFF 2 funding policy follows the same general pattern as the other Plans 2 and 3 with fewer details. As stated above, LEOFF 2 contributions are currently based on 100% of the EANC, which works like a minimum since it is currently larger than the Aggregate Normal Cost Rate. The total contribution is paid 50% by employees, 30% by employers, and 20% by the State [RCW 41.26.725]. In addition, RCW 41.26.720 states that the actuary shall “utilize the aggregate actuarial cost method, or other recognized actuarial cost method based on a level percentage of payroll.” Since (a) 100% of EANC is the theoretical contribution that will finance benefits if paid as a level percent of pay over the members’ full working careers, and (b) 100% of EANC is larger than the Aggregate Normal Cost, the method currently employed is consistent with the RCW.

**LEOFF 2 Funding Policy (continued)**

The current LEOFF 2 funding policy might be interpreted as: paying the greater of 100% of EANC or the Aggregate Normal Cost. This works well to establish a stable contribution rate (100% EANC) while ensuring liabilities are financed over a responsible period (Aggregate Normal Cost). However, the current funding policy does not address how stable contribution rates will be maintained if the Plan's funding ratio continues to increase. Specifically, the Board may wish to proactively consider: (a) If the funding ratio continues to increase, at what point should action be taken. (b) What would that action be. For instance, two potential actions consistent with stable contribution rates would be to de-risk retiree liability, or to adopt more conservative assumptions.

**Plans 1 Funding Policy (PERS, TRS, SERS and PSERS)**

PERS and TRS Plans 1 are both closed to new members. The PERS and TRS Plans 1 funding policies have been designed to produce equal total contribution rates for PERS and TRS employers regardless of whether their employees are in Plans 1, 2 or 3, and to share the responsibility of PERS Plan 1 benefits with SERS and PSERS employers. It works as follows.

1. All PERS and TRS Plan 1 members have fixed contribution rates equal to 6.00% of pay.
2. The remaining balances for any liability from Plan 1 benefit improvements effective after June 30, 2009 are determined. These liabilities are financed based on rates that were calculated to amortize them over a fixed 10-year period using combined Plans 1, 2 and 3 salaries. The remaining balances are determined by taking the prior year's balance, adding interest, and subtracting employer contributions based on the corresponding employer percent of pay contribution rates: PERS 0.14% and TRS 0.15%.
3. The Present Value of Future Normal Costs (PVFNC) is determined. The Plan 1 funding policy defines this to be the present value of future contributions made by Plan 1 employees plus the present value of future employer contributions made as a percent of Plan 1 member pay based on the Plans 2 and 3 employer contribution rates calculated above. This must be taken into account to keep the contribution rates equal for Plans 1, 2 and 3.
4. The Plan 1 UAAL is calculated as:

	Present Value All Future Benefits
minus	PVFNC
minus	Actuarial Value of Assets
minus	<u>Balance Post 2009 Improvements</u>
	Unfunded Actuarial Accrued Liability

**Plans 1 Funding Policy (PERS, TRS, SERS and PSERS) (continued)**

5. The Unfunded Actuarial Accrued Liability Rate (UAAL Rate) is calculated as the percent of Plans 1, 2, and 3 member pay to amortize the Plan 1 UAAL over 10 years as a level percentage of projected payroll. This is based on a rolling 10-year period which means every year the UAAL is amortized over a new 10-year period. This helps to keep rates stable while amortizing a material portion of the remaining UAAL each year.
6. Minimum contribution rates of 3.50% of pay for PERS 1 UAAL and 5.75% of pay for TRS 1 UAAL are applied. When combined with the rolling 10-year period, these will help to get the UAAL for the Plans 1 completely financed over a reasonable period instead of indefinitely re-amortizing it over 10 years.

**Conference of Consulting Actuaries Draft White Paper**

The Conference of Consulting Actuaries has issued a draft white paper titled *Actuarial Funding Policies and Practices for Public Pension Plans*. The white paper was composed by a group of public plan actuaries from the major consulting firms that work with public plans and was the result of an extensive series of meetings which lasted for over two years. The white paper focuses on a Level Cost Allocation Model (LCAM) and provides detailed analysis for classifying each of the three major components of LCAM funding policies: (a) cost methods, (b) asset methods and (c) amortization methods. The classification system uses the following terms:

Categories Under CCA Guidelines	
Model Practices	Those practices most consistent with the Level Cost Allocation Model (LCAM).
Acceptable Practices	Generally those which, while not consistent with the LCAM, are well established in practice and typically do not require additional analysis.
Acceptable Practices with Conditions	May be acceptable in some circumstances either to reflect different policy objectives or on the basis of additional analysis.
Non-Recommended Practices	Systems using these practices should acknowledge the policy concerns identified in the CCA Guidelines or acknowledge they reflect different policy objectives.
Unacceptable Practices	No description provided by CCA, but implication is that these should not be used.

We will make reference to the draft Conference of Consulting Actuaries white paper in our discussion below.

## Evaluation of Funding Policy

As stated earlier, we believe the funding policies are consistent with Actuarial Standards of Practice and with the intended policy objectives. Additional specific comments follow below.

The Aggregate cost method is used as the foundation for the funding policies. The Aggregate cost method is classified as “Acceptable” by the Conference of Consulting Actuaries (CCA) Draft White Paper, is well established in practice, and is consistent with the objectives in that document.

The Aggregate cost method is specifically designed to fully fund all future benefits for current members (that are not financed by accumulated assets) over the remaining projected working lifetimes of those members. This represents excellent “demographic matching,” which is to say benefits are funded over the working lifetimes of the members receiving them. It is also excellent at avoiding “agency risk” issues, which means use of the Aggregate method makes it very difficult to push the cost of benefits for current members onto future generations.

The Aggregate method is also consistent with the policy objectives identified in RCW 41.45.010, which is particularly evidenced by how well the fifth policy objective is satisfied: to fund, to the extent feasible, all benefits for Plan 2 and 3 members over the working lives of those members so that the cost of those benefits are paid by the taxpayers who receive the benefit of those members' service.

The Aggregate method's primary shortcoming is that it passes all gains and losses through to the Normal Cost, which pays for them over the comparatively short, although very responsible, period of the active members' projected remaining working lifetimes. The downside of this is that it can decrease the stability of short-term costs. This shortcoming is addressed in the funding policy by smoothing asset gains and losses over as much as eight years, as well as by applying the minimum contribution rates. Eight-year asset smoothing is longer than five years, which is the most common length of asset smoothing. The comparatively longer asset smoothing period helps partially offset the comparatively shorter financing period for gains and losses under the Aggregate cost method. The minimum contribution rates equal to 70% or 80% of the EANC help avoid temporary large decreases in contributions due to good investment experience at the peak of a market cycle.

## Evaluation of Funding Policy (continued)

The Plans 1 policy of contributing at a level which finances the Unfunded Actuarial Accrued Liability (UAAL) over a rolling 10-year period based on the pay of Plans 1, 2 and 3 is a rough equivalent of the Aggregate Cost Method. The 10-year rolling period bears a very general similarity to financing UAAL over the members' projected remaining working lifetimes. When the minimum contribution rates of 3.50% for PERS 1 and 5.75% for TRS are added, the policy also has an element that will help to get the UAAL for the Plans 1 completely financed over a reasonable period instead of indefinitely re-amortizing it over a rolling 10-year period. The funding policy is very consistent with the third policy objective listed in RCW 41.45.010, which is to fully amortize the UAAL for PERS and TRS Plans 1 within a rolling 10-year period, using methods and assumptions that balance needs for increased benefit security, decreased contribution rate volatility, and affordability of pension contribution rates.

As stated above the 100% of EANC currently contributed for LEOFF 2, which is larger than the Aggregate Normal Cost, is consistent with the RCW and shares the advantages discussed for the other Plans 2 and 3. Paying 100% of EANC also avoids making contributions which are less than the expected long-term cost of benefits. Short-term rate stability is increased since rates will not fluctuate every year due to gains and losses, particularly investment gains and losses, being reflected in the Aggregate Normal Cost. Some margin is provided for adverse experience since the rates are higher than the Aggregate Normal Cost. A contribution policy of 100% EANC does require consistent monitoring. However, this monitoring occurs automatically under the policy as long as the contribution is not allowed to be less than the Aggregate Normal Cost.

## Recommendation

We have one small recommended change to the methodology currently used in the funding policy calculations. The starting salary that the rolling 10-year amortization of the Plan 1 UAAL is based on has been projected from the prior year with both general wage increases and increases for promotion and seniority, sometimes referred to as merit and longevity. We believe it would be preferable to exclude salary increases for promotion and seniority since those individual member effects are not expected to increase the total plan payroll. We recommend this be reflected next year.

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# Pension Funding Council and LEOFF 2 Board Actuarial Audit of 2013 Actuarial Valuation and 2007-2012 Demographic Experience Study

## Section 6 Actuarial Assumptions (Economic)

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### Audit Conclusion



We reviewed the economic assumptions used in the valuation and found them to be reasonable. The economic assumptions used were adopted based on the OSA's 2013 Report on Financial Condition and Economic Experience Study completed in August 2013. While a full audit of that report is beyond the scope of our assignment, we feel an actuarial audit would be incomplete without a review of the important economic assumptions used in the actuarial valuation.

We have the following comments regarding the economic assumptions:

- Our analysis supports the expected rate of return of 7.50% recommended by the Office of the State Actuary. While the current assumption of 7.80% used for non-LEOFF 2 plans is also reasonable, we believe that 7.50% is a more realistic assumption and recommend that the investment return assumption continue to decrease. 7.50% (or lower) is consistent with the recommendations we are currently making to our retained clients.
- It should be noted that there are recent revisions to Actuarial Standard of Practice No. 27 (ASOP No. 27) that will be effective for the June 30, 2015 valuation and later. These revisions will impact how an actuary determines a reasonable assumption. In particular, the current standard allows for the selection of an assumption that falls within the best-estimate range, whereas the new standard narrows and considers this to be reasonable only if it has no significant bias (i.e., it is neither significantly optimistic nor pessimistic). The standard does allow for a provision for adverse deviation. Ultimately, we believe that an assumption that was on the high end of the best-estimate range under the current standard may not be reasonable under the new standard. This could impact the selection of the economic assumptions and should be considered by the OSA at the time of the 2015 actuarial valuation.
- The inflation assumption of 3.00% is reasonable, as is the real wage growth assumption of 0.75% for productivity. The general salary increase assumption of 3.75% is the sum of these two assumptions.



## Audit Conclusion (continued)

- As prescribed, OSA assumes annual growth in active membership varying by plan from 0.80% to 0.95%. Most public sector pension plans assume no future growth in system membership. A growth assumption greater than 0% is not allowed under current GASB standards for accounting and financial disclosure. While a zero growth assumption is not required for contribution rate calculation purposes, we believe that zero growth is the best assumption. Please note that this assumption only impacts the amortization of the Plan 1 UAAL over 10 years. The small membership growth assumption over the rolling 10-year amortization period has a modest impact on the calculated contribution rates.

## Comments

The purpose of the actuarial valuation is to analyze the resources needed to meet the current and future obligations of the system. To provide a reasonable estimate of the long-term funded status of the system, the actuarial valuation must be predicated on methods and assumptions that will estimate the future obligations of the system in a reasonable manner.

An actuarial valuation uses various methods and two different types of assumptions: economic and demographic. Economic assumptions are related to the general economy and its long-term impact on the system, or to the operation of the system itself. Demographic assumptions are based on the emergence of the specific experience of the system's members.

## Actuarial Standard of Practice No. 27: Selection of Economic Assumptions

The Actuarial Standards Board has adopted Actuarial Standard of Practice (ASOP) No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*. This standard provides guidance to actuaries giving advice on selecting economic assumptions for measuring obligations under defined benefit plans, such as the Washington State Public Retirement Systems.

As no one knows with precision what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes. These estimates are based on a mixture of past experience, future expectations, and professional judgment. The actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. Both the current and the new Standard explicitly advise the actuary not to give undue weight to recent experience.



**Actuarial Standard  
of Practice No. 27:  
Selection of  
Economic  
Assumptions  
(continued)**

Recognizing that there is not one “right answer,” the current Standard calls for the actuary to develop a best-estimate range for each economic assumption, and then recommend a specific point within that range. Each economic assumption should individually satisfy the Standard.

After completing the selection process, the actuary should review the set of economic assumptions for consistency. For example, this suggests the actuary should use the same inflation component in each of the economic assumptions selected.

An actuary’s best-estimate range with respect to a particular measurement of pension obligations may change from time to time due to changing conditions or emerging plan experiences. Even if assumptions are not changed, we believe that the actuary should be satisfied that each of the economic assumptions selected for a particular measurement complies with Actuarial Standard of Practice No. 27, unless that assumption has been prescribed by someone with the authority to do so.

**Economic  
Assumptions**

Based on the information and economic environment present as of the date of the OSA analysis, we believe the economic assumptions recommended by the OSA in the June 30, 2013 actuarial valuation are reasonable. In our opinion, the inflation, wage growth, and the investment return recommendations were reasonable and in line with what we have been recommending to our other clients. Note that non-LEOFF 2 systems are using an investment return assumption that is 0.30% higher than recommended by OSA, with the rate scheduled to decrease by 0.10% in the future. The current economic assumptions are as follows:

<b>Assumption</b>	<b>Rate</b>
Price Inflation	3.00%
Real Wage Growth or Productivity	<u>0.75%</u>
Total Wage Growth	3.75%
Total Investment Return	
OSA Recommendation	7.50%
Used by LEOFF 2	7.50%
Used by other systems	7.80%
Membership Growth	0.80% - 0.95%

## Economic Assumptions (continued)

The liabilities and normal cost are directly impacted by these important assumptions. The most critical assumption in determining the present value of benefits is the total investment return assumption.

In our opinion, the current package of economic assumptions is reasonable. The following portion of this report discusses four of the key economic assumptions (inflation, wage growth, investment return, and membership growth).

### Inflation

**Use in the Valuation:** Inflation, as referred to here, means price inflation. The inflation assumption has an indirect impact on the results of the actuarial valuation through the development of the assumptions for investment returns, general wage increases, payroll increase, and the cost-of-living adjustments for retirees and survivors.

**Historical Perspective:** The data for inflation shown below is based on the national Consumer Price Index, US City Average, All Urban Consumers (CPI-U) as published by the Bureau of Labor Statistics. These statistics are nationwide averages, and do not reflect the history of Washington state. However, we believe that future long-term inflation in this state will track that of the nation as a whole.

There are numerous ways to review historical data, with significantly differing results.

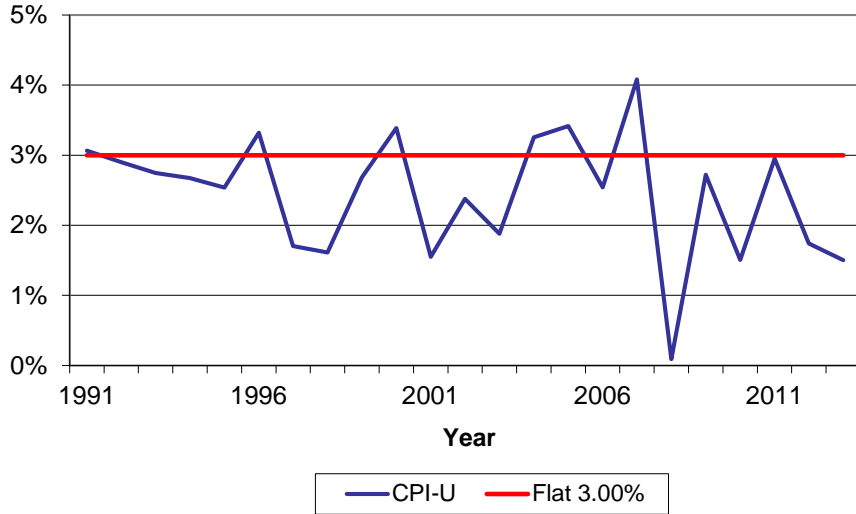
The table below shows the compounded annual inflation rate for the last five 10-year periods, and for the 75-year period ended in December 2012, the final calendar year prior to the selection of assumptions. For the 87 year period ended in December 2012 the average inflation is 3.0%, the same as the actuarial assumption. Eighty-seven years goes back to the first year provided in the Ibbotson Indices.

Decade	CPI Increase
2003-2012	2.4%
1993-2002	2.5%
1983-1992	3.8%
1973-1982	8.7%
1963-1972	3.4%
<b>Prior 75 Years</b>	
1938-2012	3.8%

**Inflation  
(continued)**

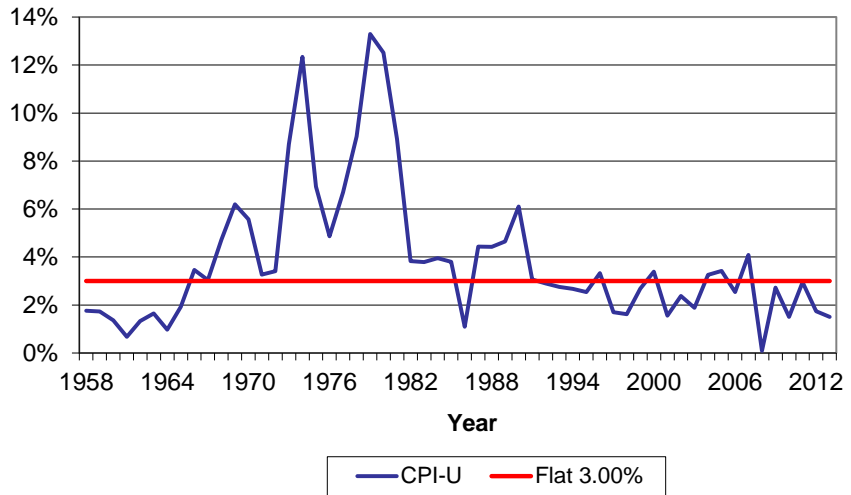
The following graphs show historical national CPI increases after 1990. Note that the actual CPI increases have been less than 3% for most of the past 22 years.

**Historical CPI-U**



Before that time, high inflation was more common and inflation exceeded the current assumption 41 times in the past century, sometimes by significant margins.

**Historical CPI-U**



## Inflation (continued)

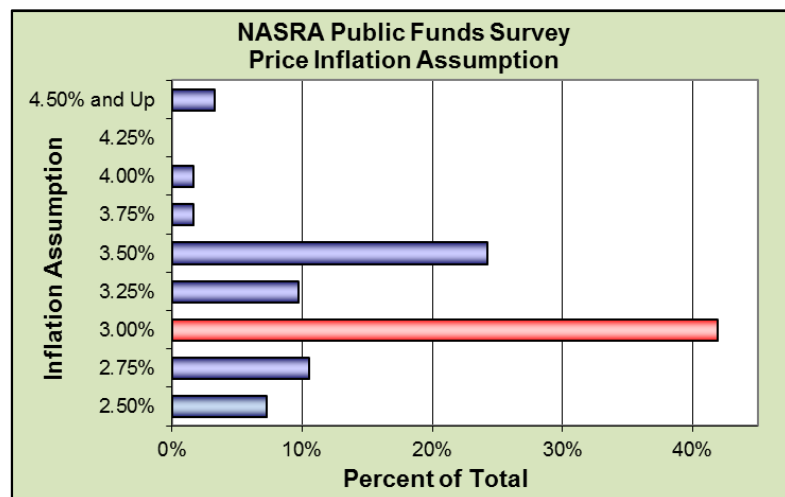
**Forecasts of Inflation:** Since the U.S. Treasury started issuing inflation-indexed bonds (TIPS), it is possible to determine the approximate rate of future inflation anticipated by the financial markets over a given period by comparing the yields on inflation indexed bonds with traditional fixed government bonds. As of August 2013, the time of the OSA's analysis, market prices suggested investors expected inflation to be about 2.20% over the next thirty years. As of July 2014, this measure has increased to about 2.35%.

Although most investment consultants and economists forecast lower inflation, they are generally looking at a shorter time horizon than is appropriate for a pension valuation. To consider a longer time frame, we looked at the expected increase in the CPI by the Office of the Chief Actuary for the Social Security Administration. In the 2013 Trustees Report, the projected average annual increase in the CPI over the next 75 years under the intermediate cost assumptions was 2.80%. The low-cost, high-cost range was stated as 1.80% to 3.80%.

In its 2013 Capital Markets White Paper, the Washington State Investment Board recommended an inflation assumption of 2.70%.

**Peer System Comparison:** Although assumptions should not be set based on what other systems are doing, it is informative to see how the Washington State Public Retirement Systems compare.

According to the 2013 *Public Fund Survey* (a survey of approximately 100 statewide systems), the average inflation assumption for statewide systems has been steadily declining. As of the most recent study, the average rate is 3.17%, the median was 3.00%, and 3.00% was the most common. The following chart shows the distribution.



**Inflation  
(continued)**

**Reasonable (Best Estimate) Range:** We believe that a range for inflation between 2.00% and 3.50% is reasonable for an actuarial valuation of a retirement system. The current assumption falls well within that range.

Consumer Price Inflation	
Current Assumption	3.00%
Best-Estimate Range	2.00% - 3.50%

**Investment Return**

**Use in the Valuation:** The investment return assumption is one of the primary determinants in the calculation of the expected cost of the benefits of the Washington State Public Retirement Systems, providing a discount of the estimated future benefit payments to reflect the time value of money. This assumption has a direct impact on the calculations of actuarial accrued liabilities, normal cost, and member and employer contribution rates.

The discount rate is the rate used to discount projected future benefit payments into a single actuarial net present value. The traditional actuarial approach used in the public sector sets the discount rate equal to the expected investment return. Under current standards set by the GASB, the terms “discount rate” and “investment return assumption” are used interchangeably and that rate “should be based on an estimated long-term investment yield on the investments that are expected to be used to finance the payment of benefits, with consideration given to the nature and mix of current and expected plan investments.”<sup>1</sup>

It should be noted that GASB has recently revised the accounting and financial reporting for pension plans. While GASB has made many fundamental changes, the discount rate will still be based on the “long-term expected rate of return,” provided that the plan is not expected to be depleted of assets. Further, GASB’s provisions only apply to accounting and are not intended to impact a system’s funding.

The current net investment return assumption is 7.50% for LEOFF Plan 2 and 7.80% for the other systems, moving down to 7.70% in the future. The recommendation of the Office of the State Actuary was 7.50%.

<sup>1</sup> Governmental Accounting Standards Board (GASB) Statement No. 27, paragraph 10.c, and GASB Statement No. 45, paragraph 13.c.

## Investment Return (continued)

**Method to Determine Best-Estimate Range for Investment Return:** The following chart sets out the target asset allocation as of June 30, 2013.

Asset Class	2013 Target Asset Allocation
Global Equity	37%
Private Equity	25%
Fixed Income	20%
Real Estate	13%
Tangible Assets	<u>5%</u>
Total	100%

We used a model to project future returns based on Milliman's capital market assumptions as of June 30, 2013, the target asset allocation, and assumed annual rebalancing. We divided the Global Equity category into component pieces of domestic equities, developed foreign equities, and emerging market equities based on their respective weights as of March 31, 2014 based per WSIB's latest available quarterly report. Based on Milliman's capital market assumptions, WSIB's allocation, and a 30-year time horizon we calculated 25<sup>th</sup> and 75<sup>th</sup> percentile returns of 5.9% and 9.3%, respectively, and a 50<sup>th</sup> percentile return of 7.57% net of investment expenses, which is close to the 7.50% OSA recommendation. All calculated averages are median geometric means averages, rather than arithmetic means.

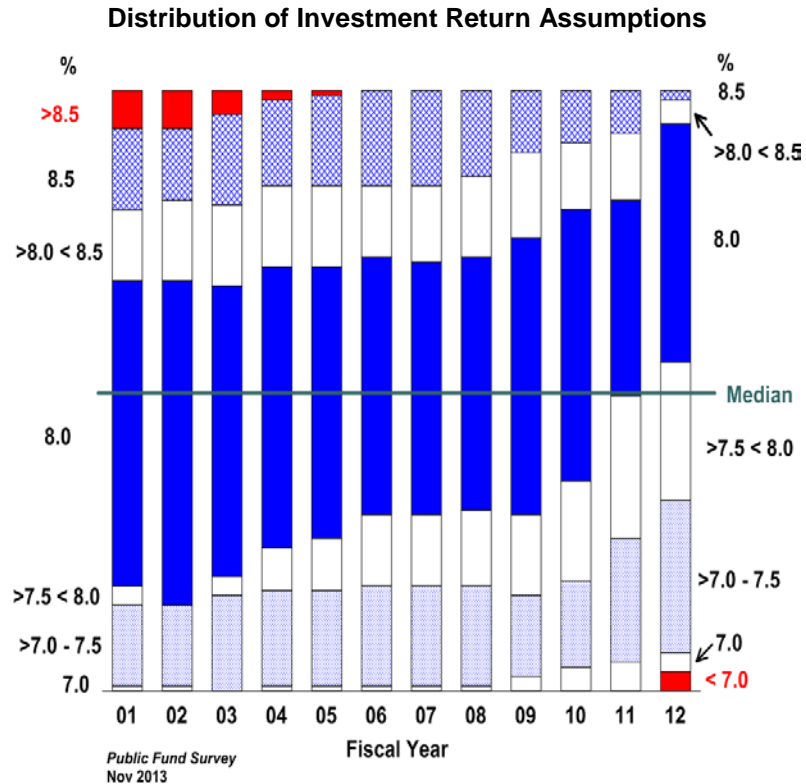
The 25<sup>th</sup> and 75<sup>th</sup> percentiles of 5.9% and 9.3% become our best-estimate range because 50% of the outcomes are expected to fall within this range and it is the narrowest symmetric range with 50% of the probable outcomes.

Therefore, we can say that based on our model the 30-year average annual investment return is just as likely to be within the range from 5.9% to 9.3% as not.

Note that different investment professionals have different capital market assumptions. The Office of the State Actuary used the capital market assumptions from the Washington State Investment Board's 2013 Capital Markets White Paper, in which the WSIB considered assumptions from numerous consultants and investment advisors. Based on this information, the OSA's simulated future investment returns over 50 years were 7.40%. This is generally consistent with the 7.57% median calculated using Milliman's capital market assumptions.

## Peer System Comparison

According to the *Public Fund Survey*, the average investment return assumption for statewide systems has been slowly declining. As of the most recent study the median assumption is 7.75%. The following chart illustrates the decline in investment return assumptions since the inception of the *Survey* in FY 2001.



**Gain-Sharing:** In the past, members have received gain-sharing benefits. While the legislature recently repealed gain-sharing provisions, it is our understanding that there is current litigation that the Washington State Supreme Court will consider that could affect the changes made by the legislature.

If earnings are used for gain-sharing benefits rather than funding the base pension benefits when actual investment returns exceed the actuarial assumption, these earnings will not be available to make up the difference when earnings are less than assumed. Ultimately, this will result in a decrease in the actual investment returns available to pay the base benefits.

If there is a change in gain-sharing provisions, we recommend that the assumptions be reviewed and any revised provisions be reflected, either through a lower net investment return assumption or the calculation of an explicit additional liability for projected gain-sharing payments.

**Conclusion:** We find the OSA's recommendation for a 7.50% investment return assumption to be reasonable.

## General Wage Growth

**Use in the Valuation:** Estimates of future salaries are based on two types of assumptions. Rates of increase in the general wage level of the membership are directly related to inflation, while individual salary increases due to promotion and longevity (also referred to as the merit scale) occur even in the absence of inflation. This section will address the general wage growth assumption (price inflation plus increases related to productivity and competitive wage pressures). The merit scale is discussed in the following section of this report (demographic assumptions).

The current wage growth assumption is 0.75% above the price inflation rate, or 3.75% per year. Note that the 3.75% includes increases in wages due to productivity and competitive wage pressures as discussed below.

**Historical Perspective:** We have used statistics from the Social Security Administration on the National Average Wage back to 1951. For years prior to 1951, we studied the Total Private Nonagricultural Wages as published in *Historical Statistics of the U.S., Colonial Times to 1970*.

There are numerous ways to review this data. For consistency with our observations of other indices, the table below shows the compounded annual rates of wage growth for various 10-year periods, and for the 75-year period ended in 2012.

Decade	Nominal Wage Growth	CPI Increase	Real Wage Growth
2003-2012	2.8%	2.4%	0.4%
1993-2002	3.8%	2.5%	1.3%
1983-1992	4.7%	3.8%	0.9%
1973-1982	7.4%	8.7%	-1.3%
1963-1972	5.2%	3.4%	1.8%
<b>Prior 75 Years</b>			
1938-2012	5.1%	3.8%	1.3%

The excess of wage growth over price inflation represents the increase in the standard of living, also called the real wage inflation rate.

**Forecasts for Future Wage Growth:** Real wage growth has been projected by the Office of the Chief Actuary of the Social Security Administration. In the 2013 Trustees Report, the long-term annual increase in the National Average Wage is estimated to be 1.1% higher than the Social Security intermediate inflation assumption of 2.8% per year. The range of the assumed real wage growth in the 2013 Trustees Report was from 0.5% to 1.7% per year.



**General Wage Growth (continued)**

**Best-Estimate Range:** We believe that a range between 0.00% and 1.25% is reasonable for the actuarial valuation. We believe that the current estimate of 0.75% is a reasonable estimate. Note that over the last 50 years, real wage inflation has averaged 0.60% per year.

Real Wage Inflation	
Current Assumption	0.75%
Reasonable Range	0.00% - 1.25%

**Growth in System Membership**

The UAAL for Plan 1 is amortized over a rolling 10-year period as a level percentage of payroll in determining contribution rates as a percentage of pay. The current payroll increase assumption is equal to the general wage growth assumption of 3.75% and an allowance for future growth in system active membership.

It is our general recommendation to set the growth in system active membership assumption equal to zero. Most public sector pension plans assume no future growth in system active membership. This is required by current GASB standards for accounting and financial disclosure. While a zero growth assumption is not required for funding purposes, we believe that zero growth is the best assumption.

The analysis done by the OSA is based on population projections by the Office of Financial Management with a small upward adjustment based on historical increases in the retirement systems relative to the general population growth in the state of Washington. Long-term history in our state has shown system membership growth greater than that of the state's population, but we are not sure that this will continue into the future. Budgetary pressures and increased productivity may result in lower increases in the system membership and recent history has followed that pattern.

While the analysis by the OSA is reasonable, we feel that it is preferable not to anticipate future membership growth, as doing so pushes more costs to the future based on the assumption of increased payroll. Please note that this assumption only impacts the amortization of the Plan 1 UAAL. The small membership growth assumption over the rolling 10-year amortization period has a modest impact on the rates.

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# Pension Funding Council and LEOFF 2 Board Actuarial Audit of 2013 Actuarial Valuation and 2007-2012 Demographic Experience Study

## Section 7 Actuarial Assumptions (Demographic)

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### Audit Conclusion



We performed an audit of the calculations for the 2007-2012 Demographic Experience Study for the Washington State Public Retirement Systems. Based on this analysis, we reviewed the demographic assumptions used in the valuation and found them to be reasonable. We are making a few comments to consider for the next Experience Study.

### Comments

Studies of demographic experience involve a detailed comparison of actual and expected experience. If the actual experience differs significantly from the overall expected results, or if the actual pattern does not follow the expected pattern, new assumptions are considered. Recommended revisions normally are not an exact representation of the experience during the observation period. Judgment is required to predict future experience from past trends and current evidence, including a determination of the amount of weight to assign to the most recent experience.

### Actuarial Standard of Practice No. 35: Selection of Demographic Assumptions

Actuarial Standard of Practice No. 35 (ASOP 35) governs the selection of demographic and other noneconomic assumptions for measuring pension obligations. ASOP 35 states that the actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment. The actuary should select reasonable demographic assumptions in light of the particular characteristics of the defined benefit plan that is the subject of the measurement. A reasonable assumption is one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains or losses over the measurement period.

### Actual-to-Expected Ratio

In performing an Experience Study, an actuary will compare the actual results of the study with those the assumptions would have predicted. This comparison is called the “Actual-to-Expected” (A/E) ratio. If, for example, the A/E ratio for service retirement is 120%, this would indicate that the actual number of service retirements exceeded the number expected by the assumptions by 20%.

## Mortality

One of the most significant of the demographic assumptions is mortality. The OSA studied the probability of death at each age for healthy (non-disabled) members, including active members, retirees, and survivors. The mortality for disabled members was studied separately.

The OSA recommended that the same mortality table be used for actives as for healthy retirees. While separate tables could be used, as actives do tend to have lower mortality than retirees, the active mortality assumption is not a particularly significant assumption and may not warrant a separate table.

The OSA's recommendations for this assumption can be split into two fundamental pieces. The first piece is the "base table," measuring the probability of people alive at the valuation date living another year. The other piece is the improvement scale. Because there is a pattern of increased longevity, the OSA is recommending that its calculations incorporate this pattern of improvement by using "generational" mortality. Someone who is 60 years old 25 years from now (35 years old today) can reasonably be expected to have a higher probability of living to age 61 than a current 60-year-old.

Previously, the OSA did not use a generational mortality table, but did estimate the impact of future improvement by using longer "static year" projections for the newer plans. The static year projections were chosen to provide results equivalent to the corresponding generational table.

### Base Table Development

The approach used for developing the base table is to use RP-2000 Combined Healthy Mortality, project it to 2006, the middle of the period used to develop the base table assumptions, then make age adjustments to match the experience in the study period. For example, if an age adjustment of -1 is used, then someone who is 60 years old is assigned the probability of living to the next year that matches someone age 59 in the standard table. This is similar to the approach we typically use.

We believe that the recommended assumptions are reasonable; however, consideration should be given to changing certain aspects of the methodology for selecting the base tables at the time of the next experience study.

## Mortality (continued)

**Differences by Benefit Amount:** Our analysis of public retirement systems has typically shown that retirees with above-average benefit amounts tend to live longer than those with below-average benefit amounts. This means that if the assumptions are accurately predicting the number of deaths, they may be overstating the release of liability expected when retirees die, which is what impacts the valuation.

We discussed this issue with the OSA and as a result, the OSA did an analysis on the PERS population by isolating the actual-to-expected deaths for those with annual retirement benefits less than \$20,000 versus those with benefits higher than \$20,000. Using the recommended tables for the 2001 – 2012 period, the OSA found that those with the lower benefits had an A/E ratio of 107%, while those with the higher benefits had a ratio of 87%. This confirms that those with higher benefits are living longer than the current assumption. It is our understanding that the OSA does intend to study benefit-weighted mortality at the time of its next experience study, and we endorse that methodology.

**Death-Weighted Actual-to-Expected Calculations:** In its analysis, the OSA calculated its A/E ratios by attaching more weight to ages with higher actual deaths. This resulted in higher calculated ratios than one would get by simply taking the total actual deaths and dividing by the number of deaths implied by the assumptions. Note that if the benefit-weighted mortality calculations are implemented, use of the death-weighted approach would be discontinued.

**Inclusion of Active Members, Terminated Vested Members, and Survivors:** In its analysis, the OSA combined active members, terminated vested members, and survivor beneficiaries along with the non-disabled retirees. On the whole, those groups had lower actual-to-expected ratios than the healthy retirees. It is not uncommon for active employees to experience lower mortality than retirees. This methodology resulted in lower ratios than there would have been if only healthy retirees had been studied, which partially offsets the impact of the death-weighting mentioned above. Once again, note that if benefit-weighted mortality calculations are implemented, concerns regarding including active members would be irrelevant as active members do not currently receive pension benefits.

## Mortality (continued)

### Mortality Improvement Scale

It is generally recognized that people are living longer. The OSA is recommending the use of 100% of Scale BB to project anticipated future improvements (decreases) in mortality. We believe this is a reasonable assumption.

100% of Scale BB will replace the current assumption which is 50% of Scale AA. The OSA is also recommending that the scale be applied generationally, using different assumptions for today's retirees than will be used for retirees in the future. Scale BB was originally released by the Society of Actuaries (SOA) in 2012. It is the most recent table of mortality improvement to be released by the SOA in more than draft form. The SOA's February 2014 report on mortality improvement states that Scale BB was developed using Social Security Administration data from 1950 to 2007, and was tested to be consistent with two large public plans. Information on CalPERS website shows that Scale BB projects less improvement than CalPERS experience from 1997 through 2011.

Milliman independently received year-by-year death rates from the Social Security Administration (SSA) for 1900 to 2009. The SSA confirmed that these death rates were calculated as follows: Data from the National Center for Health Statistics (NCHS) was used for ages below 65 in 1900-2009 and also for ages 65 and over in years prior to 1968. Final Medicare data on deaths and enrollments was used for ages 65 and over for years 1968 through 2009. This is also documented on pages 79-80 of the 2013 SSA Trustees report. We used this data along with Scales AA and BB to produce the two graphs included in this report. We limited the graphs in this report to ages 60 to 95 because those are the most important ages for mortality in terms of pension liability.

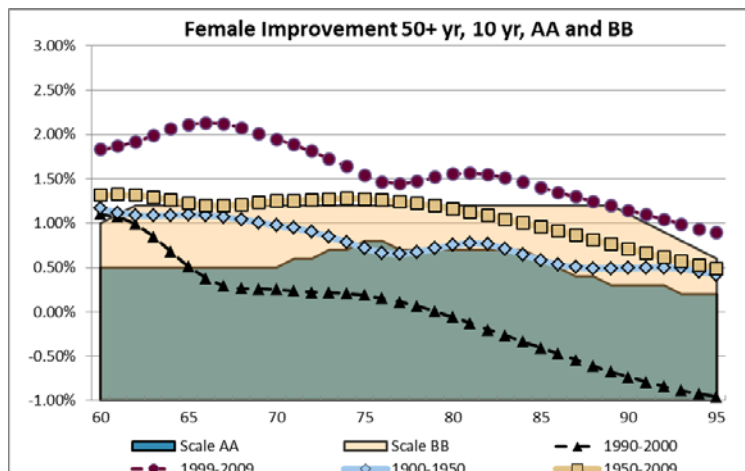
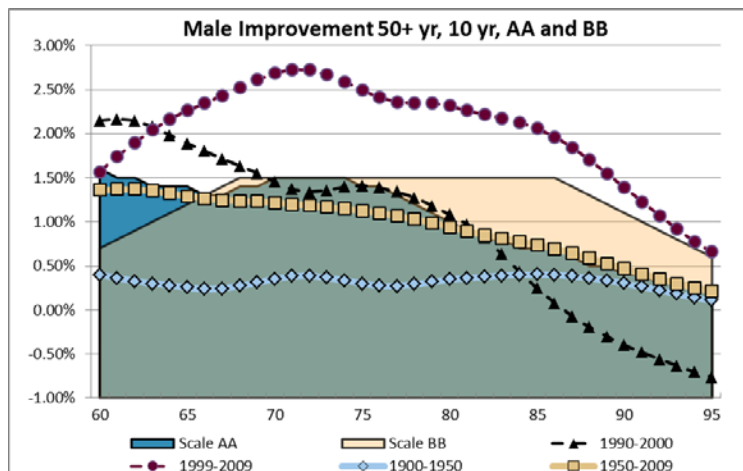
The graphs compare three pairs of series:

- 100% of Standard Projection Scales AA and BB
- Long-term averages of mortality improvement (50+ years) for 1900 to 1950 and 1950 to 2009.
- Recent 10-year averages of mortality improvement for 1990 to 2000 and 1999 to 2009.

## Mortality (continued)

Our observations are:

- The current assumption, 50% of Scale AA, is consistently lower (shows less improvement in longevity) than actual experience over the most recent 59 years (1950 – 2009) and the last 10 years (1999 – 2009) for both males and females.
- Scale BB is higher (greater improvement in longevity) than the average experience of males over the last 59 years and generally close to the average experience of females.
- Scale BB is lower than the average experience of both males and females over the most recent 10-year period (1999 – 2009) and higher than the average experience of both males and females over the 10-year period of the 1990s (1990 – 2000).
- The wide divergence in mortality improvement between the 10 years of the 1990s and the most recent 10-year period emphasizes that it is difficult to accurately project trends in mortality improvement over short periods of time.
- There has consistently been improvement in mortality over the long term.





## Mortality (continued)

We looked at the mortality improvement assumptions being used by other neighboring retirement systems. Compared to Washington's current assumption of 50% of Scale AA:

- Full Scale AA is being applied generationally in: Oregon, Idaho, Seattle, Tacoma and Utah.
- Full Scale BB is being applied generationally in Wyoming.
- A variety of differing static mortality assumptions which are difficult to compare are being used by CalPERS, CalSTRS, Montana PERS, Montana TRS and Colorado.

With a change to the recommended Scale BB projection, Washington, along with Wyoming, would have the strongest projected improvement in mortality (i.e., the greatest expected increases in future life expectancies).

Private sector plans generally use IRS mandated static projections for both plan funding and accounting purposes.

In summary, It is generally accepted that mortality will continue to improve. No one knows how rapidly mortality will improve. There are many reasonable assumptions. We believe that OSA's recommendation of 100% of Scale BB is reasonable.

## Merit and Longevity Salary Increases

The OSA studied the individual salary increases due to promotion and longevity – the merit component of salaries. These increases are in addition to the assumed increases due to general wage inflation (price inflation plus productivity and competitive wage pressure increases) discussed in the previous section. We believe the current assumption is reasonable.

The method varies merit increases based on each member's length of service. Members earlier in their careers (i.e., low levels of service) are expected to receive larger percentage increases than those later in their careers. We agree that service is the most significant factor in expected future merit increases, and this is the approach we generally recommend. Different scales are determined for different membership classes.

There are a variety of techniques used by actuaries to determine the merit component of salary increases. Data can be gathered regarding past pay increases, but subjectivity is involved in the determination of what is across-the-board productivity and what is merit.



## Merit and Longevity Salary Increases (continued)

OSA gathered pay data from 1984 – 2009. The last few years were excluded, because they were believed to be unusual for pay increases. OSA studied all pay for people actively employed at the beginning and end of each valuation period. OSA summed all pay amounts for the entire time period studied to get total pay growth by years of service.

OSA assumed that cumulative pay growth attributable to merit matched the previous assumption for the cumulative growth. OSA used this to determine the implied productivity component of pay increases, which was then separated from the actual pay increases. An adjustment was made for LEOFF, because it was believed that the previous merit salary assumption was too high for this group, based on the fact that the implied productivity growth seemed too low.

Milliman's typical approach is to look at total increases by individual member on a year-by-year basis. The productivity component of the pay increases is estimated based on the increase in the average salary for the membership class over the year. Backing out the CPI and productivity provides an estimate of the merit increases for each individual and these can be used to determine historical merit increases.

We believe that the shape of the merit salary increase curve is supported by the historical data and that the resulting recommendations are reasonable.

## Rates of Service Retirement

Separate tables for retirement assumptions by age are used for each membership class. For most classes of membership, separate assumptions are made for males and females. Assumptions for Plans 2 and 3 are combined, but separate assumptions are made for Plans 1. Combined assumptions were used for all of WSPRS.

No assumptions were studied with this experience study for those hired after May 1, 2013 with the new early retirement factors because the study period did not have any experience under the new factors.

We reviewed all of the recommendations made by OSA and found them all to be reasonable. We do have some observations.

For PERS, TRS, and SERS Plans 2 and 3, data from the 2008-2012 period was excluded, because it was considered unusual due to the Great Recession. Therefore, the data considered did not change from the previous period for these groups. Despite this, changes were made to the assumptions. The recommended changes do seem reasonable based on the data from 1995-2006 that was used. Recent data was used for Plans 1 and LEOFF Plan 2.

## Rates of Service Retirement (continued)

We do have some concerns about disregarding that much data. It is likely true that actual retirements were fewer in the period due to the recession, particularly for Plan 3 members who saw their defined contribution (DC) account balances fall, making them less financially able to retire. To the extent that is the case, the next period may have more retirements than the long-term future trend, as the people who temporarily postponed retirement due to the recession become older and have their DC account balances recover. At the time of the next experience study, it will be important to consider this if the 2013-2018 data is included, but the 2007-2012 continues to be excluded.

Our preferred method is to consider the period of the previous study and the current study, but to give less weight to a period if it is believed to be unusual rather than disregarding it altogether.

## Rates of Disability

We reviewed all of the calculations and recommendations made by OSA for rates of disability and found them to be reasonable. For LEOFF 2, the benefit structure changed in 2005, so only data after that date was used. For most plans, data back to 1995 was considered.

In addition to the disability rates, assumptions are made for what proportion of the disabilities are duty-related. For LEOFF 2, there is also an assumption for the percentage of duty disabilities that are catastrophic. Each of these types of disabilities has a different benefit. We suggested a change to the information provided by OSA regarding catastrophic disabilities and OSA reflected that change. We believe that the rates for total disabilities and the proportions for different types of disabilities are reasonable.

There is one specific aspect of the disability rates that we recommend OSA review for future valuations. The reduction factors applied to PERS, TRS and SERS members who take a disability retirement can result in a much lower benefit than if the member retired at 65. However, members with 30 years of service can retire at age 55 and later with a much smaller reduction. Therefore, it may be beneficial for members with 30 years of service but who are younger than age 55 to defer their retirement until age 55 instead of taking an immediate disability retirement. OSA currently assumes all these members will take an immediate disability retirement. We recommend that OSA review this either with the next valuation or experience study.

## Rates of Termination (Withdrawal of Contributions and Vested Termination)

We reviewed all of the calculations and recommendations made by OSA for rates of termination of employment and found them to be reasonable. We agree with the methodology of using tables based on length of service. We find this to be the strongest predictor of the likelihood of terminating employment. Data from 1995 – 2010 was used. The reason for ending in 2010 is so people who are rehired soon after terminating employment are excluded from the calculations. We believe this is a reasonable approach.

It is interesting to note that PERS Plan 3 tends to have higher rates of termination than Plan 2. This makes intuitive sense, as those members more likely to stay with their employer would be more inclined to choose the plan with the greater defined benefit component, which is Plan 2.

Note that for the study of termination rates, OSA included those who are eligible for early retirement. Those people were also included in the analysis for the retirement decrement. When applying the decrements in the actuarial valuation, only the retirement decrement assumptions are used for these members. This methodology may result in lower termination rates than would be seen if these people were excluded from the termination analysis. This will only impact people with enough service to retire and the termination rates are low for people with service that high. We recommend that consideration be given to excluding people eligible for early retirement from the termination analysis at the time of the next experience study.

## Other Assumptions

We reviewed the calculations and recommendations for the following assumptions and found them to be reasonable. We provide additional commentary for some of the items.

**Average Final Compensation Load:** Members in PERS 1, TRS 1, and WSPRS 1 are eligible for payments that can increase Average Final Compensation. OSA received data from DRS regarding those payments and developed a load based on that information.

LEOFF 1 members are not entitled to those same payments. However, OSA found that Average Final Compensation does tend to be higher than would be predicted by the compensation in years prior to retirement. For this reason, OSA developed a load this year. This assumption is new with this experience study. DRS did not have data separating extra pay elements, so the load had to be estimated by comparing Average Final Compensation to what could be predicted by data in previous pay periods.

## Other Assumptions (continued)

**Age Difference with Spouse at Retirement Date:** Used to assign ages for future retirees. Studied by system, but found little difference by system. OSA recommended a change for male spouses of female retirees.

**Military Service Credit Load:** Only impacts Plans 1 of PERS and WSPRS.

**Portion Taking Annuities versus Withdrawal of Contributions upon Termination:** Increases with years of service. Varies by membership class and plan.

**Dependent Children of LEOFF 1 Retirees:** Only impacts some dependent children of future LEOFF 1 disabled retirees and surviving spouses.

**Certain Period:** If a retired member dies before the total pension payments received exceed the value of the accumulated contributions, the difference is paid to the beneficiary or estate. OSA approximates the value of this by estimating a “certain period,” where the member is effectively assumed to be guaranteed to receive payments for a certain number of years.

**Percent Male / Female:** Used to estimate proportion of each sex when data not available. Note that data is available for all but a few people out of several hundred thousand records.

**Percent Duty Death:** Since benefits vary by the type of death, an assumption is needed for which deaths are duty-related.

**Percent of Average Final Compensation Paid for Total Disability Benefit:** Applies for LOEFF 2 Plan only. Adjustments are sometimes necessary because of limits after reflecting benefits from Social Security.

**Maximum/Minimum/Default Salaries and Ages:** Applied for outliers and those with little service. Because benefits are limited by IRC 401(a)(17), the maximum salary does not impact benefit levels. Different approaches are taken for different membership classes, but all calculations are accurate and recommendations are reasonable. Many of the new recommendations for defaults will not be implemented until the 2014 valuation.

**WSPRS Disabled Life Expectancy:** Used to help estimate value of a benefit for the surviving spouses of deceased WSPRS disability retirees.

## Other Assumptions (continued)

**Terminated Vested Indexed Benefit:** Only applies for those in Plans 3 who delay retirement if they terminate employment and have 20+ years of service.

**TRS Salary Bonus:** There are two new programs that enable teachers to get bonuses that are included in pensionable pay. Expected to have a slightly increasing proportion of teachers receiving these benefits. Has a small impact on TRS salary projections and does not impact other membership classes.

**Portability:** Chapter 41.54 of the RCW allows for “portability” of benefits with the city employee retiree systems for Seattle, Tacoma, and Spokane. No assumption is currently made to reflect this. It is our understanding that OSA will research this for the 2014 valuation.

**OPEB Costs for Future Disabled Members after Medicare Eligibility:** For active employees assumed to become disabled in the future, some of the medical benefits do not reflect the decreased premiums once the member reaches Medicare eligibility at age 65. It is our understanding that OSA will review this issue at the time of the upcoming OPEB experience study. The total value of this benefit is extremely small, so any potential change would not have a material impact.

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# Pension Funding Council and LEOFF 2 Board Actuarial Audit of 2013 Actuarial Valuation and 2007-2012 Demographic Experience Study

## Section 8 Review of Previous Reports and Recommendations from Prior Audit

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### Audit Conclusion



Because the final 2007-2012 Experience Study and 2013 Actuarial Valuation reports have not been completed at this time, we base the comments in this section on the previous reports. Overall, we found OSA's reports to be very thorough. We have made a few comments for consideration for the upcoming reports that may enhance an outside reader's understanding. All of these comments are related to additional disclosure, and, if implemented, none would have an impact on the contribution rates.

We have also reviewed the comments from the prior actuarial audit and reported on the incorporation of those comments. Most of the recommendations were implemented. Of those that were not implemented, we do not consider any of them to be material.

### Comments Regarding OSA's Reports

In our opinion, OSA's valuation report satisfies Actuarial Standard of Practice No. 41 dealing with actuarial communications.

We also believe that OSA's reports reviewing the economic assumptions and studying the actuarial experience satisfy the relevant actuarial standards.

We offer the following comments on the 2012 Actuarial Valuation Report:

- We feel that the text on page 15 could be expanded to provide further explanation of the tables that follow on pages 16 and 17. Much of the explanation for those tables is found on page 53 of the report with the Actuarial Cost Methods section of the appendices. At a minimum, page 15 should reference that section of the appendices. OSA may find some of our description of the funding policies in Section 5 of this report useful. The State's funding policies, due to their complex nature, are difficult to summarize and explain. We would be glad to work together with OSA to add detail to the valuation report that would clarify the description of the funding policies and the related citations to the RCW. We have also included specific suggestions for changes to text and labels below.



**Comments  
Regarding OSA's  
Reports  
(continued)**

- On page 15, it is stated that the minimum contribution rates are a percent of normal cost calculated under the Entry Age Normal funding method. We think it should be clear that the percentage is 90% for LEOFF, 70% for WSPRS, and 80% for the other membership classes. If maintained in its current form, we suggest the text be re-written as suggested later in this section.
- In pages 15-17, the term “normal cost” is used to indicate multiple things, and in some cases seems to be used to refer to contribution rates that were not equal to any specific normal cost rate because they include amounts to amortize past liability balances at fixed rates and minimum contribution rates, based on some percentage of the Entry Age Normal Cost. This could potentially be confusing to the reader.
- The first sentence of the text on page 15 and item 3 on page 16 use the term “normal cost” to refer to the employee and employer contribution rates for Plan 2/3. We suggest the text on page 15 be rewritten to use the phrase “employee contribution rates for Plans 2 and the employer contribution rates for all Plans” instead of the “normal cost rates.” Combined with the comment above this would change the text on page 15 to:

“The tables on the following two pages show the development of the employee contribution rates for Plans 2 and the employer contribution rates for all plans. Consistent with the current funding policy, these contribution rates include minimum contribution rates to provide stable and adequate contribution rates over time. The minimum contribution rates (before adjustment for rates to amortize past liability balances) are 90% of the Entry Age Normal Cost (EANC) for LEOFF 2, 70% of the EANC for WSPRS [RCW 41.45.0631], and 80% of the EANC for all other employer and employee classes except for PSERS members [RCW 41.45.155 and RCW 41.45.158].”

We suggest the heading for Section 3 on page 16 be changed from “Normal Cost Rates Adopted for 2013 – 15” to “Plans 2 and 3 Contribution Rates Adopted for 2013 – 15.”

We suggest the heading at the top of page 16 be changed from “Development of Normal Cost Rates” to “Development of Plan 2 and 3 Contribution Rates.”



**Comments  
Regarding OSA's  
Reports  
(continued)**

- The term normal cost rate is used for the normal cost under the aggregate actuarial cost method (lines 1.k. and 2.k. on page 16). We believe that lines 1.k. and 2.k. should explicitly refer to the Normal Cost under the Aggregate actuarial cost method and suggest they be labeled “Employee Aggregate Normal Cost Rate” and “Employer Aggregate Normal Cost Rate.”
- Line a. in the chart on the top of page 15 uses the phrase “Total Normal Cost” when we believe it is actually the sum of the “Plan 2/3 Employer Contribution” rate above and the member contribution rate. We think the chart would be clearer, as shown in the following example, using only PERS.

	PERS	
	Plan 1	Plan 2
a. Employer Rate calculated for Plan 2/3	4.94%	4.94%
b. Plan 1 UAAL Rate	4.21%	4.21%
c. Total Employer Contribution Rate (a + b)	9.15%	9.15%
Employee Contribution Rate	6.00%	4.83%
Total Plan Contribution Rate	15.15%	13.98%

- On page 16, it appears that 2.d. is equal to (1.g + 1.h.) x 1.k. We believe that the label should reflect that.
- On page 17, we are not sure of the meaning of line g. Note that it has no impact on the calculation as it is listed as N/A for PERS and TRS, and zero for LEOFF.
- On page 17, we believe that the PERS Plan 1 column, line j. is the present value of projected salaries over the next 10 years and includes all three PERS plans, plus PSERS and SERS. Similarly, the TRS Plan 1 column includes all TRS plans, and the LEOFF Plan 1 column includes both LEOFF plans. This is done in accordance with the funding policy, but the footnote for this item could help clarify what is listed.
- On page 39, the LEOFF 1 Funding Method Changes are not described.
- On page 40, the “Correction Change” for WSPRS is not described.

## Comments Regarding OSA's Reports (continued)

- On page 53, we think it should be made clear that all employers pay the sum of the Plan 1 UAAL amortization and the employer share of the Plan 2/3 Normal Cost. As mentioned previously, we think it would be helpful if much of the explanation on this page were moved to pages 15-17 where the calculations are made. Also, as previously stated we believe OSA may find some of our description of the funding policies in Section 5 of this report useful. Again, we would be glad to work together with OSA to add detail to the valuation report that would clarify the description of the funding policies and the related citations to the RCW.
- On page 68 and 70, it might be clearer to have a footnote to indicate that for LEOFF 1 the offsets are applied to the RP-2000 Healthy Combined Mortality Table, whereas for all other systems, the disabled mortality is based on the RP-2000 Disabled Mortality Table.

## Recommendations from Prior Audit

### Recommendations Addressed

- The prior auditor suggested that the OSA consider disclosing funded ratios using the Entry Age Normal (EAN) Actuarial Cost method instead of the Projected Unit Credit (PUC) method. OSA elected to use PUC for one more valuation. It is our understanding that this will change with implementation of GASB Statements No. 67 and No. 68, which mandate the use of EAN.
- OSA now uses a full year rather than 364/365ths of a year in the calculation of the actuarial value of assets.
- As is soon to be required for GASB 67 and 68, OSA changed the EAN calculation to be a level percentage of pay throughout each employee's career, rather than over each decrement. It is our understanding that this was changed for the 2012 actuarial valuation.
- The entry age calculation is now based on the date that the employee entered the current plan. It is our understanding that OSA made this change for PSERS in the 2011 actuarial valuation and for the other plans in the 2012 actuarial valuation.
- OSA changed its description of how survivors selecting annuities under LEOFF Plan 1 and WSPRS Plan 1 are valued.
- A correction was made for the refund benefit for duty death for certain WSPRS 2 and LEOFF 2 members. It is our understanding that OSA made this change in the 2012 actuarial valuation.
- OSA removed a COLA adjustment for a survivor benefit for WSPRS disabled members with the 2012 actuarial valuation.

## Recommendations from Prior Audit (continued)

- OSA changed the early retirement reduction factors for WSPRS 2 non-duty death to be based on age and service rather than just age.
- Some changes regarding the valuation of OPEB were made. These are benefits paid to the surviving spouses and children of LEOFF 2 and WSPRS members who die in the line of duty, along with the families of LEOFF 2 members with catastrophic disabilities.
  - It is now noted in the summary of assumptions that 85% of future disabled members and 100% of currently disabled members have spouses.
  - The probability of death for an active employee is now based on the age and sex of the employee.
  - Liabilities for surviving children are now valued.
  - It is our understanding that OSA is planning a review of OPEB assumptions in the next two years.
  - The description of the benefits has been expanded in the actuarial valuation report.
- OSA expanded its disclosures of methods and assumptions in the 2012 actuarial valuation report based on suggestions from the prior actuarial audit report.

## Recommendations Not Addressed

We do not believe that any of these items have a material impact on the actuarial valuation.

- The prior auditor had a comment related to the fact that there were small discrepancies between the end of year market values of assets provided by DRS and WSIB. As mentioned in the Actuarial Value of Assets Section of this report, these discrepancies continue. Per our conversation with OSA, the DRS values are used for the market value of assets required for the calculation of the actuarial value of assets.
- The prior auditor had a recommendation which would impact projected benefits for survivors of those who die while employed electing an annuity when the lump sum alternative is more valuable. The potential effect of this recommendation was considered immaterial.

## Recommendations from Prior Audit (continued)

- One OPEB-related recommendation was not made. This item is not material to the overall valuation of the system-wide benefits.
  - For active employees assumed to become disabled in the future, medical benefits are only increased for healthcare trend (sometimes referred to as healthcare inflation) up to the time of the disability. In other words, once the benefit payments are assumed to begin, they are projected to remain level, with no additional trend-related increases.