



# *Experience Study Report Overview*

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*State Actuary*



**Office of the State Actuary**

*"Securing tomorrow's pensions today."*

*July 23, 2008*

# Today's Presentation

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- Quick review of experience study presentation from June
- Help prepare you for decisions at today's meeting



# *What Is An Experience Study?*

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- Review of current assumptions
  - How do they compare with actual experience?
  - Do they need to change?
- Assumptions help us estimate
  - When benefits are paid
  - How much is paid
  - How long they're paid



## *Why Do We Perform Them?*

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- Things change
- Ensure assumptions remain reasonable
  - Reasonable assumptions contribute to reasonable funding
- Important part of systematic actuarial funding
- Risk management



## *How Do We Perform Them?*

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- They're data driven
  - Over 20 years of experience in some cases
- They also involve professional judgment
  - Past not always the best predictor of future
- Because they involve professional judgment and expertise
  - You hire an actuary to perform study and make recommendations
  - You hire an outside actuary to review reasonableness



## *Recommended Assumptions Fall Under Two Categories*

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- Updates to current assumptions using standard past practices
- New policy decisions
  - Projected mortality improvements
  - General salary increase assumption



# Summary Of Updates To Current Assumptions

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## ■ Mortality

- Changes to reflect lower mortality rates since last study
- Update the current tables to the valuation date (not beyond)
- Increases short-term costs

## ■ Retirement

- Changes to reflect later retirement
- Decreases short-term costs

## ■ Termination

- Changes to reflect fewer workers staying to retirement
- Decreases short-term costs



## *Summary Of Updates To Current Assumptions (Continued)*

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- Disability
  - No changes required
- Salary increases
  - Lower “service based” salary increase assumption
  - Decreases short-term costs
- Miscellaneous assumptions
  - Changes to current assumptions
  - Most assumptions have very small impacts
  - Increases short-term costs
- Supporting data provided in Attachments A-F



## *New Policy Decisions*

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- Project mortality tables beyond the valuation date
  - To reflect longer life spans in the future
- Lower the general salary increase assumption



## *People Are Living Longer*

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- Life expectancy has increased about two years per decade since 1960

Year	Life Expectancy
1900	47.3
1920	54.1
1940	62.9
1960	69.7
1980	73.7
2000	77.0

*U.S. Census Bureau; all races,  
all genders.*



## How Much Improvement Do We See?

- 41 of 59 age groupings show mortality improvement
- Improvement averages about 58 percent of Scale AA
  - Scale AA provided by the Society of Actuaries
  - Annual improvement rates
- See Attachment A for additional information

System	Average Improvement	Average Scale AA	Improvement as a % of Scale AA
PERS	0.6%	1.0%	57%
TRS	0.5%	1.1%	45%
SERS		Not Enough Data	
WSP		Not Enough Data	
LEOFF 1	2.6%	1.4%	172%
<b>Weighted Average</b>	<b>0.6%</b>	<b>1.0%</b>	<b>58%</b>



## *Recommended Projection Scale*

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- 50 percent of Scale AA
- Applied to all plans
- Consistent with decades of observed mortality improvement at the national level
- Also, consistent with observed mortality improvement in our plans
- Use of 50 instead of 100 percent of Scale AA recognizes that future improvement may slow down
- Reduces long-term financing costs if mortality improvements continue
  - Pay now or pay more later



## General Salary Increases Are Lower Than Assumed

System	Assumed General Salary Increase	Observed General Salary Increase*
PERS	4.5%	3.9%
TRS	4.5%	3.8%
SERS	4.5%	3.3%
LEOFF	4.5%	3.9%
WSPRS	4.5%	4.2%

*All rates are annual increases.*

*\* Estimated over experience study period (1984-2006).*



## *Recommended General Salary Increase Assumption*

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- Lower current assumption from 4.5 percent to 4.25 percent
- Applied to all plans
- Current assumption is a poor fit with actual salary experience over the last 20+ years
- Lower inflation is not the only reason
  - Current assumption is 3.5 percent inflation plus 1 percent for other salary growth
- The other salary growth assumption is too high
- May require a statutory change to apply next biennium
- Otherwise, next review in 2009



## *General Salary Increase Assumption*

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- Why change it now?
  - Assures assumptions for total salary growth are reasonable and consistent
  - I've recommended an update to the "service-based" salary increase assumptions for each system
  - That assumption combined with the general salary increase assumption predict total salary growth
  - If one assumption is off, the total is off
- Why not lower the general salary assumption even more?
  - Future salary growth is uncertain and could vary from past experience



## *General Salary Increase Assumption (Continued)*

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- Will we have inconsistent economic assumptions?
  - The answer is no
  - Inflation is a “building block” for the nominal rate of investment return and general salary increase assumptions
  - My recommendation is to lower the 1 percent salary increase assumption that applies beyond the 3.5 percent inflation assumption
- Should we study the general salary and “service based” increase assumptions at the same time in the future?
  - Yes, this would improve both the process in the future and the consistency of the salary assumptions
  - A law change would clarify future process



## *Additional References*

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- Supporting experience study data
  - Attachments A-F
- June presentation
- Staff at OSA
- Full experience study report and AVR available in September



## *Decisions For Today's Meeting*

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- Update the current assumptions as recommended?
- New policy decisions
  - Project longer life spans as recommended?
  - Lower the general salary increase assumption from 4.5 percent to 4.25 percent?
- Adopt contribution rates from the latest actuarial valuation report?
  - Adopt variable contribution rates?
  - Adopt "fixed" contribution rates?
- Risk management





**State of Washington  
Law Enforcement Officers'  
and Firefighters' Plan 2**

**BARTEL**  
ASSOCIATES, LLC

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**Audit of June 30, 2007 Actuarial Valuations and  
2001-2006 Experience Study**

July 20, 2008

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July 20, 2008

Law Enforcement Officers' & Firefighters' Plan 2 Retirement Board  
P.O. Box 40918  
Olympia, Washington 98504-0918

Chairman Fox and Members of the Board:

Enclosed is our Report for the Audit of the June 30, 2007 Actuarial Valuations and 2001-2006 experience study. We have appreciated the opportunity to conduct this audit and to work with the Law Enforcement Officers' & Firefighters' Plan 2 Retirement Board.

Should there be any questions regarding the content of the report, do not hesitate to contact us.

The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Sincerely,



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# SECTION 1

## SUMMARY

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Bartel Associates was retained by the Law Enforcement Officers' & Firefighters' Plan 2 Retirement Board to conduct the year 2008 concurrent biennial audit of the 2001-2006 experience study and actuarial valuation prepared by the Office of the State Actuary (OSA) and used for contribution rate setting purposes.

### **Review Process**

The audit of the 2001-2006 experience study encompassed the following areas:

1. Member data
2. Formulas and methodologies
3. Resulting assumptions

Our review included checks of data for general reasonability, checks of formulas and methodologies for consistency with actuarial theory and standards, and testing of final assumptions for general reasonability.

The audit of the contribution rates encompassed the following areas:

1. Member data
2. Valuation software
3. Actuarial value of assets
4. Contribution rate formulas and calculations

Our review included checks of data for general reasonability, parallel processing to check data edits and actuarial liability and present value calculations, and checks of worksheets used to calculate final contribution rates. In addition, we reviewed formulas and methods for compliance with actuarial theory and standards and for consistency with the statutes and Board policies.

### **Results of Actuarial Audit**

We agree that the new demographic assumptions based on the 2001-2006 experience study are appropriate for use until the next 6-year experience study. OSA's recommended Set 1. assumptions include a change to incorporate a projection of future mortality improvement in

## **SECTION 1**

### **SUMMARY**

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assumed mortality rates. They also include a recommendation to reduce the general pay increase assumption by .25%. We agree that these recommendations are reasonable.

Our data testing found the data procedures and the data itself to be reasonable and our parallel testing of liability determinations produced results comparable to those produced by OSA for the four contribution rate sets brought before the Board. Formulas and methods used were reasonable in the aggregate. We agree that these formulas and methodologies are in keeping with statutory requirements and Board policies.

#### **Contribution Rates**

Four sets of contribution rates are being brought before the Board as follows:

Set 1: With 4.25% general salary, with mortality improvement

Set 2: Without 4.25% general salary, with mortality improvement,

Set 3: With 4.25% general salary, without mortality improvement, and

Set 4: Without 4.25% general salary, without mortality improvement.

We have reviewed each set and agree with the Office of the State Actuary's calculations. We have reviewed Set 1, which the Office of the State Actuary is recommending, for compliance with Actuarial Standards of Practice and agree that it satisfies those standards. The actual contribution rates are set out in Table 1.

# SECTION 1

## SUMMARY

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**Table 1: Proposed Contribution Rates excluding DRS Administrative Expense**

1. With 4.25% General Salary, With Mortality Improvements

<b>Employer Rate 2009-11</b>	<b>Member Rate 2009-11</b>	<b>State Rate 2009-11</b>
4.44%	7.39%	2.95%

2. Without 4.25% General Salary, With Mortality Improvements

<b>Employer Rate 2009-11</b>	<b>Member Rate 2009-11</b>	<b>State Rate 2009-11</b>
4.56%	7.60%	3.04%

3. With 4.25% General Salary, Without Mortality Improvements

<b>Employer Rate 2009-11</b>	<b>Member Rate 2009-11</b>	<b>State Rate 2009-11</b>
4.30%	7.17%	2.87%

4. Without 4.25% General Salary, Without Mortality Improvements

<b>Employer Rate 2009-11</b>	<b>Member Rate 2009-11</b>	<b>State Rate 2009-11</b>
4.43%	7.38%	2.95%

### Recommendations

As a result of the audit we did not find any material gaps in the valuation processes or procedures. However, based on our review, we make the recommendations in the treatment of dual members for valuation purposes which are outlined at the end of Section 3.

We wish to thank the Office of the State Actuary for their cooperation during the course of the audit.

## **SECTION 2**

### **INTRODUCTION**

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Bartel Associates was retained by the Law Enforcement Officers' & Firefighters' Plan 2 Retirement Board to conduct the year 2008 concurrent biennial audit of the June 30, 2007 actuarial valuation and 2001-2006 experience study prepared by the Office of the State Actuary (OSA) and used for contribution rate setting purposes.

The audit took place over a three-month period and was conducted concurrently with the final stages of the Office of the State Actuary's June 30, 2007 actuarial valuation and 2001-2006 experience study.

Four sets of contribution rates are being brought before the Board as follows:

Set 1: With 4.25% general salary, with mortality improvement

Set 2: Without 4.25% general salary, with mortality improvement,

Set 3: With 4.25% general salary, without mortality improvement, and

Set 4: Without 4.25% general salary, without mortality improvement.

## SECTION 3

### REVIEW OF 2001-2006 EXPERIENCE STUDY

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#### **a. Overview**

In the experience study, each demographic assumption used in the valuation process is reviewed and adjusted as necessary to reflect past and anticipated future experience. The assumptions reviewed in this experience study included the following major assumptions:

- Mortality rates
- Rates of employment termination net of rehires
- % of terminated employees electing contribution account refunds
- Salary increases that vary by individual (for instance increases based on step, longevity, promotion, and merit)
- Disability rates
- Retirement rates.

In addition, a considerable number of minor assumptions were reviewed including:

- % Married
- Spouse age
- Portability

The experience study was extensive. Historic data was analyzed in detail in this study. Though the experience study incorporated data from 2001 through 2006, this data was combined with data from OSA's historic database and studied over longer periods than had previously been the case. (For instance, salary increases were studied over 23 years and retirement rates were analyzed over a 12-year period.) Both trend rates and combined experience were analyzed for all major and many minor assumptions.

## **SECTION 3**

### **REVIEW OF 2001-2006 EXPERIENCE STUDY**

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#### **b. Review**

Our review included the following:

##### ***Member Data***

We reviewed OSA's data processing procedures. In addition, we reviewed the summarized data for reasonability and also conducted spot checks of data compilations and processing for various assumptions.

##### ***Actuarial methods, techniques, and formulas***

We reviewed the methods, techniques, and formulas used in the study for reasonableness and conformance with actuarial theory and standards of practice. As a further check we also tested derivations of certain of the assumptions for reasonableness using alternate methodologies.

##### ***Reasonability***

We reviewed each final assumption to determine if it incorporated a reasonable reflection of credible historic experience and if we believed that it was a reasonable predictor of anticipated experience.

#### **c. Conclusions**

We found all assumptions to have been derived in accordance with actuarial theory and standards and to be appropriate for performance of the actuarial valuations until the next six-year experience study.

We also concluded that the new experience procedures developed in this experience study will provide a solid foundation for future experience studies.

##### ***Mortality Improvement Assumption***

We concur with OSA's recommendation of recognizing mortality improvement in calculating contribution rates. The recognition of future mortality improvement in actuarial valuations is in line with current trends in actuarial practice. It presents a picture of the plan's liabilities that is

## **SECTION 3**

### **REVIEW OF 2001-2006 EXPERIENCE STUDY**

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more accurate because the possibility of future mortality improvement, though not predictable, would generally be recognized as more likely than not. The future mortality improvement assumption would be included by using 50% of a mortality projection scale developed by the Society of Actuaries (Scale AA). We agree that 50% of Scale AA is a reasonable assumption for projecting future mortality improvement.

#### ***Decrease in general salary increase rate from 4.50% to 4.25%***

The general salary increase assumption (4.50%) is made up of two components: inflation and a productivity / market adjustment. Currently the inflation assumption is 3.50% and the productivity / market adjustment component is 1.00%. Our understanding is that the productivity / market adjustment component will be reduced from 1% to .75%. We consider the recommended assumption to be reasonable.

#### **d. Observations and Recommendations**

We offer a suggestion below for future studies.

##### ***Portability***

In the past, and in the June 30, 2007 valuation, benefits for dual members have been valued using estimation techniques. We understand that OSA intends to make this procedure more exact in the June 30, 2008 valuation, which will be performed in 2009.

The new procedures will include utilizing actual dual membership service in determining benefit eligibility for active LEOFF 2 members. We recommend that at the same time current procedures be changed so that future pay increases are included in valuing vested benefits of inactive LEOFF 2 dual members.

# SECTION 4

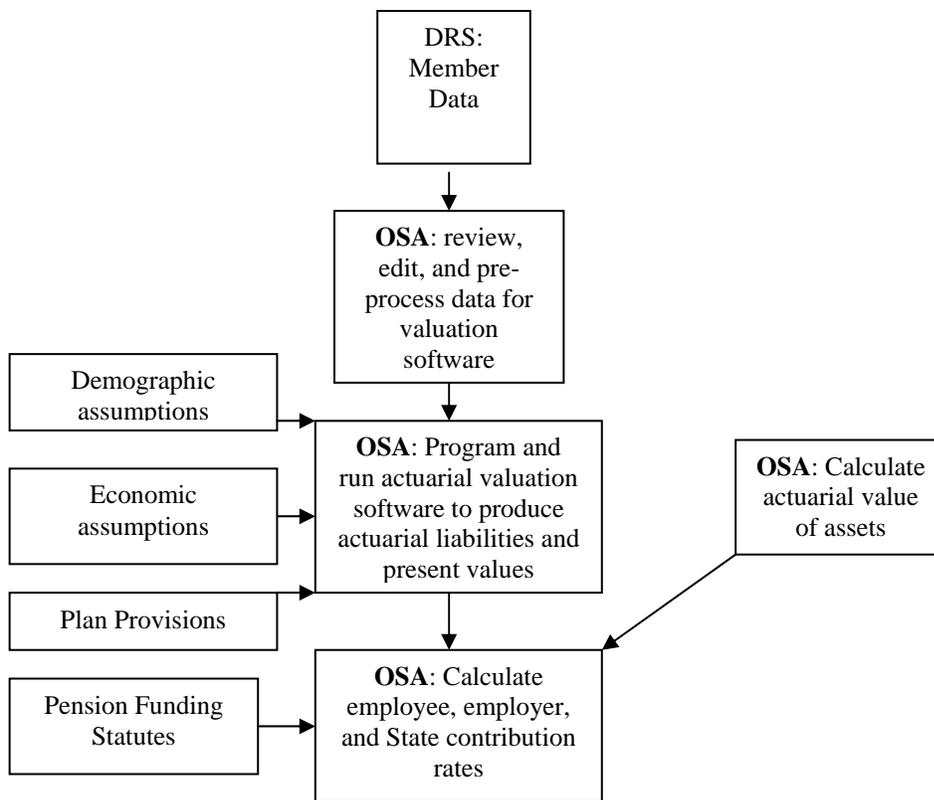
## REVIEW OF CONTRIBUTION RATE DETERMINATION

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### a. Overview

Chart 1, below, provides an overview of the main components of the actuarial valuation process. Processes performed by the Office of the State Actuary are labeled “OSA” and were included in the concurrent audit. In addition, we reviewed actuarial methods and processes used in the calculations and assumption changes since the last actuarial audit.

Chart 1: Overview of the Main Components of the Actuarial Valuation Process



OSA: Office of the State Actuary  
 DRS: Department of Retirement Systems



## SECTION 4

### REVIEW OF CONTRIBUTION RATE DETERMINATION

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#### **b. Review**

Results of our review are discussed by area below.

#### *Member Data*

Audit of the data was not within the scope of the project, but we did perform data checks that include the following to assure that the data and editing and pre-processing procedures were reasonable. These include:

Sample Records: We reviewed 3-year comparisons of data for sample records for actives and retirees.

Procedures: We reviewed OSA data editing procedures as well as the results of their intermediate data editing and compilation programs.

We noted that the procedures used to check and edit the data were appropriate and reasonable for a plan of this size.

#### *Valuation Software*

We performed a parallel determination of the actuarial results produced by the OSA software. As part of this process, we also reviewed actual benefit calculations supplied by DRS to assure that our understanding of plan provisions was correct.

The rationale behind “parallel processing” of the valuation is to ensure that the OSA computer models have been evaluated in their totality, that no material items have been overlooked, and that the methods are reasonable. The appropriate test is that any differences between the two “parallel” sets of liabilities fall within reasonable tolerances. (The anticipated result is not to exactly duplicate the results of the OSA valuation. Differences in software model implementations and OSA’s long-term and in-depth understanding of the system make it unlikely that the numbers will match to the dollar.) This procedure yields the strongest test

## SECTION 4

### REVIEW OF CONTRIBUTION RATE DETERMINATION

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possible of the liabilities and other present values used in the contribution determination process.

A comparison of the results of our parallel processing with the results of the Office of the State Actuary is shown in Table 2 for the “with 4.25% general study, with mortality improvement,” rates recommended by OSA. Total OSA active and retired liabilities fall within a reasonable range of the parallel run liabilities. Results for the other three sets of contribution rates are similar. Detailed results of the testing are shown in Appendix A.

**Table 2: Results of Parallel Processing for Contribution Rate Set 1**

(With 4.25% General Salary, With Mortality Improvement)

<b>Present Value of Fully Projected Benefits (Millions):</b>		
<b>OSA</b>	<b>Bartel Associates</b>	<b>Ratio: BA to OSA</b>
\$5,959	\$5,964	100.1%

<b>Present Value of Future Salaries (Millions):</b>		
<b>OSA</b>	<b>Bartel Associates</b>	<b>Ratio: BA to OSA</b>
\$15,067	\$15,035	99.8%

As part of the process we reviewed actuarial formulas used in the software to calculate plan benefits from a technical and process-oriented perspective and consider them reasonable in the aggregate and appropriate for the current contribution rate-setting process.

#### *Actuarial Value of Assets*

Because the actuarial liabilities of the Plan are reduced by the value of the assets in determining the contribution rate, volatility in the value of assets is reduced by using a smoothed asset value when calculating contribution rates. This “actuarial value” of assets is calculated by adjusting

## **SECTION 4**

### **REVIEW OF CONTRIBUTION RATE DETERMINATION**

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market value to take into account yearly actuarial investment gains and losses<sup>1</sup> over a period that runs from 1 to 8 years depending on the size of the gain or loss. We reviewed the Office of the State Actuary's calculation of the actuarial value of assets.

#### ***Contribution Rate Formulas and Calculations***

Using actuarial formulas, actuarial liabilities and present values are combined with the actuarial value of assets to produce contribution rates. As part of our audit, we check these formulas. Under Actuarial Standards of Practice a variety of formulas for this combination can be acceptable. The contribution rate formulas used by the OSA were reviewed to ascertain whether they fit within this range, both from the perspective of actuarial acceptability and from the perspective of representing acceptable interpretations of the State of Washington's pension funding statutes and Board policies.

The Board's minimum contribution rate policy will become effective for the coming biennium. We reviewed the application of the minimum in the calculation of contribution rates from both an actuarial theory perspective and for conformance with the Board's policy. Based on our review we found that the formulas used were appropriate from an actuarial view and complied with the Board's policy.

The contribution rate formulas were applied in Microsoft Excel to produce the final contribution rates. These contribution rates were then adjusted for the impact of year 2008 legislation using the contribution rates contained in the fiscal notes for the applicable legislation - which were accepted for audit purposes. We reviewed and checked the contribution rate calculations for the sets of contribution rates being brought before the Board.

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<sup>1</sup> Earnings in excess of those expected using the actuarial valuation assumptions.

## SECTION 4

### REVIEW OF CONTRIBUTION RATE DETERMINATION

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#### (c) Contribution Rates

Four sets of contribution rates are being brought before the Board as follows:

Set 1: With 4.25% general salary, with mortality improvement

Set 2: Without 4.25% general salary, with mortality improvement,

Set 3: With 4.25% general salary, without mortality improvement, and

Set 4: Without 4.25% general salary, without mortality improvement.

We have reviewed each set and agree with the Office of the State Actuary's calculations. We have reviewed Set 1, which the Office of the State Actuary is recommending, for compliance with Actuarial Standards of Practice and agree that it satisfies those standards. The contribution rates are set out below.

**Table 3: Proposed Contribution Rates excluding Administrative Expense<sup>2</sup>**

Set 1. With 4.25% General Salary, With Mortality Improvement

<b>Employer Rate 2009-11</b>	<b>Member Rate 2009-11</b>	<b>State Rate 2009-11</b>
4.44%	7.39%	2.95%

Set 2. Without 4.25% General Salary, With Mortality Improvement

<b>Employer Rate 2009-11</b>	<b>Member Rate 2009-11</b>	<b>State Rate 2009-11</b>
4.56%	7.60%	3.04%

Set 3. With 4.25% General Salary, Without Mortality Improvement

<b>Employer Rate 2009-11</b>	<b>Member Rate 2009-11</b>	<b>State Rate 2009-11</b>
4.30%	7.17%	2.87%

Set 4. Without 4.25% General Salary, Without Mortality Improvement

<b>Employer Rate 2009-11</b>	<b>Member Rate 2009-11</b>	<b>State Rate 2009-11</b>
4.43%	7.38%	2.95%

<sup>2</sup> Excludes DRS administrative expense rate of 0.16%

## APPENDIX A

### DETAILED RESULTS OF PARALLEL COMPUTER RUNS

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#### 1. Summary of Present Values of Projected Benefits<sup>3</sup> and Future Salaries by Contribution Rate Set (Millions):

Set 1: (With 4.25% General Salary, With Mortality Improvement)

OSA	Bartel Associates	Ratio: BA to OSA
<b>Present Values of Fully Projected Benefits (Millions):</b>		
\$5,959	\$5,964	100.1%
<b>Present Values of Future Salaries (Millions):</b>		
\$15,067	\$15,035	99.8%

Set 2: (Without 4.25% General Salary, With Mortality Improvement)

OSA	Bartel Associates	Ratio: BA to OSA
<b>Present Values of Fully Projected Benefits (Millions):</b>		
\$6,121	\$6,127	100.1%
<b>Present Values of Future Salaries (Millions):</b>		
\$15,405	\$15,372	99.8%

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<sup>3</sup> Excludes value of account refunds for current terminated nonvesteds, LOP liabilities and survivor OPEB benefits

**APPENDIX A**  
**DETAILED RESULTS OF PARALLEL COMPUTER RUNS**

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**1. Summary of Present Values of Projected Benefits and Future Salaries by Contribution Rate Set (Continued):**

Set 3: (With 4.25% General Salary, Without Mortality Improvement)

OSA	Bartel Associates	Ratio: BA to OSA
<b>Present Values of Fully Projected Benefits (Millions):</b>		
\$5,790	\$5,799	100.2%
<b>Present Values of Future Salaries (Millions):</b>		
\$15,033	\$15,002	99.8%

Set 4: (Without 4.25% General Salary, Without Mortality Improvement)

OSA	Bartel Associates	Ratio: BA to OSA
<b>Present Values of Fully Projected Benefits (Millions):</b>		
\$5,946	\$5,957	100.2%
<b>Present Values of Future Salaries (Millions):</b>		
\$15,371	\$15,338	99.8%

**APPENDIX A**  
**DETAILED RESULTS OF PARALLEL COMPUTER RUNS**

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**2. Summary of Active / Inactive Results<sup>4</sup> (Millions):**

**Contribution Rate Set 1**

(With 4.25% General Salary, With Mortality Improvement)

	OSA	Bartel Associates	Ratio BA / OSA <sup>5</sup>
<b>Present Value of Fully Projected Benefits</b>			
Actives	\$5,521	\$5,532	100.2%
Retirement	\$5,174	\$5,187	100.3%
Termination	\$117	\$115	98.5%
Death	\$93	\$91	97.9%
Disability	\$138	\$140	101.2%
Inactives	\$438	\$432	98.7%
Retirement	\$280	\$279	99.7%
Termination	\$117	\$113	96.0%
Death	\$13	\$13	98.8%
Disability	\$29	\$28	99.6%

**Contribution Rate Set 2**

(Without 4.25% General Salary, With Mortality Improvement)

	OSA	Bartel Associates	Ratio BA / OSA
<b>Present Value of Fully Projected Benefits</b>			
Actives	\$5,683	\$5,695	100.2%
Retirement	\$5,331	\$5,344	100.3%
Termination	\$118	\$116	98.5%
Death	\$94	\$92	97.9%
Disability	\$140	\$142	101.2%
Inactives	\$438	\$432	98.8%
Retirement	\$280	\$279	99.7%
Termination	\$117	\$113	96.4%
Death	\$13	\$13	98.8%
Disability	\$29	\$28	99.6%

<sup>4</sup> Excludes value of account refunds for current terminated members, LOP liabilities, and survivor OPEB benefits

<sup>5</sup> Ratios are based on unrounded present values

**APPENDIX A**  
**DETAILED RESULTS OF PARALLEL COMPUTER RUNS**

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**2. Summary of Active / Inactive Results (Millions) (Continued):**

**Contribution Rate Set 3**

(With 4.25% General Salary, Without Mortality Improvement)

	OSA	Bartel Associates	Ratio BA / OSA <sup>6</sup>
<b>Present Value of Fully Projected Benefits</b>			
Actives	\$5,361	\$5,377	100.3%
Retirement	\$5,007	\$5,020	100.3%
Termination	\$116	\$114	98.5%
Death	\$109	\$111	102.2%
Disability	\$130	\$131	101.4%
Inactives	\$428	\$422	98.6%
Retirement	\$274	\$273	99.7%
Termination	\$115	\$110	95.9%
Death	\$12	\$12	99.2%
Disability	\$27	\$27	99.5%

**Contribution Rate Set 4**

(Without 4.25% General Salary, Without Mortality Improvement)

	OSA	Bartel Associates	Ratio BA / OSA
<b>Present Value of Fully Projected Benefits</b>			
Actives	\$5,518	\$5,534	100.3%
Retirement	\$5,159	\$5,173	100.3%
Termination	\$117	\$115	98.5%
Death	\$111	\$113	102.1%
Disability	\$132	\$133	101.4%
Inactives	\$428	\$422	98.8%
Retirement	\$274	\$273	99.7%
Termination	\$114	\$110	96.3%
Death	\$12	\$12	99.2%
Disability	\$27	\$27	99.5%

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<sup>6</sup> Ratios are based on unrounded present values





## Preliminary Experience Study Report

## Attachment A

Mortality Rates for Active Employees and Retirees Without Disabilities								
Current					Recommended			
Plan	Mortality Rates	Projection	Male Age Offset	Female Age Offset	Mortality Rates	Projection	Male Age Offset	Female Age Offset
<b>PERS 1</b>	RP 2000 H	None	0	0	RP 2000 H	2018	-1	-1
<b>PERS 2/3</b>	RP 2000 H	None	0	0	RP 2000 H	2031	-1	-1
<b>TRS 1</b>	RP 2000 H	None	-2	-2	RP 2000 H	2018	-2	-2
<b>TRS 2/3</b>	RP 2000 H	None	-2	-2	RP 2000 H	2036	-2	-2
<b>SERS</b>	RP 2000 H	None	0	-2	RP 2000 H	2030	0	-2
<b>PSERS</b>	RP 2000 H	None	0	0	RP 2000 H	2038	-1	-1
<b>WSPRS</b>	RP 2000 H	None	0	0	RP 2000 H	2028	-1	1
<b>LEOFF 1</b>	RP 2000 H	None	0	0	RP 2000 H	2019	-1	1
<b>LEOFF 2</b>	RP 2000 H	None	0	0	RP 2000 H	2034	-1	1

Mortality Rates for Retirees With Disabilities								
Current					Recommended			
Plan	Mortality Rates	Projection	Male Age Offset	Female Age Offset	Mortality Rates	Projection	Male Age Offset	Female Age Offset
<b>PERS 1</b>	Custom Table	None	0	0	RP 2000 D	2018	0	0
<b>PERS 2/3</b>	Custom Table	None	0	0	RP 2000 D	2031	0	0
<b>TRS 1</b>	Custom Table	None	0	0	RP 2000 D	2018	0	0
<b>TRS 2/3</b>	Custom Table	None	0	0	RP 2000 D	2036	0	0
<b>SERS</b>	Custom Table	None	0	0	RP 2000 D	2030	0	0
<b>PSERS</b>	Custom Table	None	0	0	RP 2000 D	2038	0	0
<b>WSPRS</b>	Custom Table	None	0	0	RP 2000 D	2028	0	0
<b>LEOFF 1</b>	Custom Table	None	0	0	RP 2000 H	2019	3	3
<b>LEOFF 2</b>	Custom Table	None	0	0	RP 2000 D	2034	0	0

\*Projection uses 50% of Scale AA.

RP 2000 H is the table used for active employees and non-disabled retirees.

RP 2000 D is the table used for retirees with disabilities.

## Preliminary Experience Study Report

## LEOFF 2 Sample of Recommended Mortality Rates (New) Vs. Old Mortality Rates (Old)

Sample of Healthy Male Mortality Rates by Age				Sample of Healthy Female Mortality Rates by Age			
Type	New w/o Projection	New w/ Projection	Old	Type	New w/o Projection	New w/ Projection	Old
Projection Year	N/A	2034	N/A	Projection Year	N/A	2034	N/A
20	0.034%	0.025%	0.034%	20	0.019%	0.015%	0.019%
25	0.038%	0.032%	0.038%	25	0.022%	0.017%	0.021%
30	0.041%	0.038%	0.044%	30	0.035%	0.026%	0.026%
35	0.070%	0.064%	0.077%	35	0.055%	0.043%	0.047%
40	0.102%	0.089%	0.108%	40	0.085%	0.060%	0.071%
45	0.140%	0.112%	0.151%	45	0.133%	0.093%	0.112%
50	0.199%	0.147%	0.214%	50	0.202%	0.139%	0.168%
55	0.320%	0.231%	0.362%	55	0.348%	0.270%	0.272%
60	0.594%	0.452%	0.675%	60	0.666%	0.534%	0.505%
65	1.128%	0.888%	1.274%	65	1.216%	1.006%	0.971%
70	1.980%	1.535%	2.220%	70	2.066%	1.704%	1.674%
75	3.389%	2.666%	3.783%	75	3.410%	2.702%	2.810%
80	5.792%	4.878%	6.436%	80	5.629%	4.507%	4.588%
85	9.978%	8.857%	11.075%	85	9.634%	7.811%	7.744%
90	16.642%	15.524%	18.341%	90	15.762%	13.741%	13.168%
95	25.069%	24.194%	26.749%	95	21.524%	19.851%	19.451%
100	33.021%	32.971%	34.456%	100	25.450%	24.483%	23.747%
105	39.200%	39.200%	39.789%	105	32.273%	30.781%	29.312%
110	100.000%	100.000%	100.000%	110	100.000%	100.000%	100.000%

## Preliminary Experience Study Report

Sample of Disabled Male Mortality Rates by Age				Sample of Disabled Female Mortality Rates by Age			
Type	New w/o Projection	New w/ Projection	Old	Type	New w/o Projection	New w/ Projection	Old
Projection Year	N/A	2034	N/A	Projection Year	N/A	2034	N/A
<b>20</b>	2.257%	1.632%	0.500%	<b>20</b>	0.745%	0.567%	0.500%
<b>25</b>	2.257%	1.903%	0.500%	<b>25</b>	0.745%	0.587%	0.500%
<b>30</b>	2.257%	2.073%	0.500%	<b>30</b>	0.745%	0.628%	0.500%
<b>35</b>	2.257%	2.073%	0.500%	<b>35</b>	0.745%	0.618%	0.500%
<b>40</b>	2.257%	1.970%	0.500%	<b>40</b>	0.745%	0.577%	0.500%
<b>45</b>	2.257%	1.808%	0.500%	<b>45</b>	0.745%	0.567%	0.500%
<b>50</b>	2.898%	2.131%	0.500%	<b>50</b>	1.154%	0.863%	0.500%
<b>55</b>	3.544%	2.562%	0.500%	<b>55</b>	1.654%	1.444%	0.500%
<b>60</b>	4.204%	3.199%	0.876%	<b>60</b>	2.184%	2.006%	0.666%
<b>65</b>	5.017%	3.951%	1.608%	<b>65</b>	2.803%	2.574%	1.216%
<b>70</b>	6.258%	4.845%	2.728%	<b>70</b>	3.764%	3.456%	2.067%
<b>75</b>	8.207%	6.463%	4.691%	<b>75</b>	5.223%	4.558%	3.411%
<b>80</b>	10.937%	9.223%	8.049%	<b>80</b>	7.231%	6.419%	5.629%
<b>85</b>	14.160%	12.569%	13.604%	<b>85</b>	10.020%	9.047%	9.634%
<b>90</b>	18.341%	17.134%	21.661%	<b>90</b>	14.005%	13.308%	15.762%
<b>95</b>	26.749%	25.854%	29.985%	<b>95</b>	19.451%	18.800%	21.524%
<b>100</b>	34.456%	34.456%	37.169%	<b>100</b>	23.747%	23.747%	25.450%
<b>105</b>	39.789%	39.789%	40.000%	<b>105</b>	29.312%	29.312%	32.273%
<b>110</b>	100.000%	100.000%	100.000%	<b>110</b>	100.000%	100.000%	100.000%

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Preliminary Experience Study Report

### Sample of Observed Mortality Improvement

We first measured annual mortality improvement for five-year age groupings for PERS, TRS, and LEOFF. We did not analyze SERS or WSPRS because they did not have enough data. We then compared the mortality improvement in the data to Scale AA (standard table) in order to determine what percentage of Scale AA we should use. The system-specific results are found on pages A-5 through A-10.

We used six different measures of mortality improvement for each system. We calculated a simple average for all age groupings and for all age groupings with outliers excluded. We calculated a weighted average based on the number of lives in each age grouping for all age groupings and for all age groupings with outliers excluded. We also calculated a weighted average based on the number of deaths in each age grouping for all age groupings and for all age groupings with outliers excluded. Each measure provided a slightly different result; however, analyzing different measures allowed us to be more comfortable with the final recommendation.

Next, we decided to combine the mortality improvement for PERS, TRS, and LEOFF because we thought one general number for all three systems was better than the perception of a precise number for each system. We combined the three systems' mortality improvement with the same six measures of mortality improvement mentioned in the previous paragraph. This provided us with (3 x 6) 18 different measures of general mortality improvement across all systems. These calculations are not provided in this attachment, but the results are summarized on page A-4.

The 18 different measurements were then ranked in order to determine the expected value and variability of mortality improvement in our data. The expected value is about 59 percent of Scale AA. The range of mortality improvement is more likely than not to be between 33 percent and 81 percent of Scale AA. These results are found on page A-4.

## Preliminary Experience Study Report

<b>Observed Improvement as a % of Scale AA</b>	<b>Percentile</b>
19.6%	5%
24.2%	11%
32.1%	16%
32.1%	21%
33.5%	26%
38.0%	32%
39.3%	37%
41.7%	42%
64.2%	47%
69.1%	53%
69.3%	58%
70.5%	63%
79.5%	68%
80.7%	74%
84.7%	79%
93.8%	84%
95.3%	89%
95.3%	95%
<b>59.1%</b>	<b>Average</b>

## Preliminary Experience Study Report

## PERS mortality improvement by age grouping for males and females

<b>PERS Male Annual Mortality Improvement</b>				
<b>Ages</b>	<b>Observed (PERS)</b>	<b>Scale AA</b>	<b>PERS as a % of Scale AA</b>	<b>PERS as a % of Scale AA Excluding Outliers</b>
<b>20-24</b>		1.58%		
<b>25-29</b>		0.58%		
<b>30-34</b>	-2.85%	0.50%	-569.83%	
<b>35-39</b>	3.62%	0.57%	635.26%	
<b>40-44</b>	-1.99%	1.02%	-195.32%	-195.32%
<b>45-49</b>	-0.43%	1.51%	-28.31%	-28.31%
<b>50-54</b>	0.69%	1.94%	35.75%	35.75%
<b>55-59</b>	2.07%	1.70%	121.55%	121.55%
<b>60-64</b>	2.93%	1.45%	201.74%	201.74%
<b>65-69</b>	2.13%	1.36%	156.97%	156.97%
<b>70-74</b>	1.71%	1.50%	114.20%	114.20%
<b>75-79</b>	1.55%	1.28%	121.34%	121.34%
<b>80-84</b>	0.77%	0.85%	90.50%	90.50%
<b>85-89</b>	-0.47%	0.61%	-76.96%	-76.96%
<b>90-94</b>	-0.55%	0.35%	-156.30%	-156.30%
<b>95-99</b>	1.20%	0.18%	669.35%	
<b>Average</b>			<b>80.00%</b>	<b>35.02%</b>
<b>Weighted Average (Lives)</b>			<b>50.57%</b>	<b>32.26%</b>
<b>Weighted Average (Deaths)</b>			<b>80.64%</b>	<b>67.02%</b>

## Preliminary Experience Study Report

<b>PERS Female Annual Mortality Improvement</b>				
<b>Ages</b>	<b>Observed (PERS)</b>	<b>Scale AA</b>	<b>PERS as a % of Scale AA</b>	<b>PERS as a % of Scale AA Excluding Outliers</b>
<b>20-24</b>		1.62%		
<b>25-29</b>		1.22%		
<b>30-34</b>	-1.36%	0.90%	-150.57%	-150.57%
<b>35-39</b>	-0.37%	1.32%	-27.92%	-27.92%
<b>40-44</b>	-1.18%	1.50%	-78.91%	-78.91%
<b>45-49</b>	-6.80%	1.74%	-391.02%	
<b>50-54</b>	-1.13%	1.39%	-81.37%	-81.37%
<b>55-59</b>	0.17%	0.57%	29.12%	29.12%
<b>60-64</b>	2.04%	0.50%	407.96%	
<b>65-69</b>	0.87%	0.50%	174.57%	174.57%
<b>70-74</b>	1.13%	0.62%	182.58%	182.58%
<b>75-79</b>	1.11%	0.74%	150.29%	150.29%
<b>80-84</b>	0.71%	0.70%	100.96%	100.96%
<b>85-89</b>	1.00%	0.45%	221.37%	221.37%
<b>90-94</b>	-0.49%	0.27%	-179.94%	-179.94%
<b>95-99</b>	1.27%	0.16%	792.15%	
<b>Average</b>			<b>82.09%</b>	<b>30.93%</b>
<b>Weighted Average (Lives)</b>			<b>-26.73%</b>	<b>-1.93%</b>
<b>Weighted Average (Deaths)</b>			<b>147.29%</b>	<b>106.36%</b>

## Preliminary Experience Study Report

TRS mortality improvement by age grouping for males and females:

<b>TRS Male Annual Mortality Improvement</b>				
<b>Ages</b>	<b>Observed (TRS)</b>	<b>Scale AA</b>	<b>TRS as a % of Scale AA</b>	<b>TRS as a % of Scale AA Excluding Outliers</b>
<b>20-24</b>		1.58%		
<b>25-29</b>		0.58%		
<b>30-34</b>		0.50%		
<b>35-39</b>		0.57%		
<b>40-44</b>	4.11%	1.02%	402.70%	
<b>45-49</b>	-0.03%	1.51%	-2.04%	-2.04%
<b>50-54</b>	1.67%	1.94%	85.94%	85.94%
<b>55-59</b>	0.61%	1.70%	36.05%	36.05%
<b>60-64</b>	2.77%	1.45%	191.00%	191.00%
<b>65-69</b>	1.41%	1.36%	103.54%	103.54%
<b>70-74</b>	1.54%	1.50%	102.97%	102.97%
<b>75-79</b>	0.32%	1.28%	24.86%	24.86%
<b>80-84</b>	0.08%	0.85%	9.63%	9.63%
<b>85-89</b>	-0.80%	0.61%	-130.47%	-130.47%
<b>90-94</b>	-1.10%	0.35%	-314.78%	
<b>95-99</b>		0.18%		
<b>Average</b>			<b>46.31%</b>	<b>46.83%</b>
<b>Weighted Average (Lives)</b>			<b>115.48%</b>	<b>69.95%</b>
<b>Weighted Average (Deaths)</b>			<b>10.82%</b>	<b>34.56%</b>

## Preliminary Experience Study Report

<b>TRS Female Annual Mortality Improvement</b>				
<b>Ages</b>	<b>Observed (TRS)</b>	<b>Scale AA</b>	<b>TRS as a % of Scale AA</b>	<b>TRS as a % of Scale AA Excluding Outliers</b>
<b>20-24</b>		1.62%		
<b>25-29</b>		1.22%		
<b>30-34</b>		0.90%		
<b>35-39</b>		1.32%		
<b>40-44</b>	-2.98%	1.50%	-198.43%	-198.43%
<b>45-49</b>	0.97%	1.74%	55.63%	55.63%
<b>50-54</b>	1.65%	1.39%	118.84%	118.84%
<b>55-59</b>	2.82%	0.57%	495.14%	
<b>60-64</b>	2.51%	0.50%	501.03%	
<b>65-69</b>	0.57%	0.50%	113.05%	113.05%
<b>70-74</b>	0.02%	0.62%	3.66%	3.66%
<b>75-79</b>	0.43%	0.74%	58.00%	58.00%
<b>80-84</b>	0.76%	0.70%	108.87%	108.87%
<b>85-89</b>	0.38%	0.45%	85.53%	85.53%
<b>90-94</b>	-0.87%	0.27%	-321.93%	-321.93%
<b>95-99</b>		0.16%		
<b>Average</b>			<b>92.67%</b>	<b>2.58%</b>
<b>Weighted Average (Lives)</b>			<b>116.56%</b>	<b>14.36%</b>
<b>Weighted Average (Deaths)</b>			<b>8.78%</b>	<b>-18.24%</b>

## Preliminary Experience Study Report

## LEOFF mortality improvement by age grouping for males and females:

<b>LEOFF Male Annual Mortality Improvement</b>				
<b>Ages</b>	<b>Observed (LEOFF)</b>	<b>Scale AA</b>	<b>LEOFF as a % of Scale AA</b>	<b>LEOFF as a % of Scale AA Excluding Outliers</b>
<b>20-24</b>				
<b>25-29</b>				
<b>30-34</b>				
<b>35-39</b>				
<b>40-44</b>	-2.54%	1.02%	-248.95%	-248.95%
<b>45-49</b>	4.21%	1.51%	278.82%	278.82%
<b>50-54</b>	3.92%	1.94%	201.99%	201.99%
<b>55-59</b>	5.24%	1.70%	308.27%	308.27%
<b>60-64</b>	3.34%	1.45%	230.27%	230.27%
<b>65-69</b>	3.93%	1.36%	289.02%	289.02%
<b>70-74</b>	0.92%	1.50%	61.05%	61.05%
<b>75-79</b>	1.63%	1.28%	127.08%	127.08%
<b>80-84</b>	2.58%	0.85%	303.05%	303.05%
<b>85-89</b>				
<b>90-94</b>				
<b>95-99</b>				
<b>Average</b>			<b>172.29%</b>	<b>172.29%</b>
<b>Weighted Average (Lives)</b>			<b>94.63%</b>	<b>94.63%</b>
<b>Weighted Average (Deaths)</b>			<b>188.97%</b>	<b>188.97%</b>

## Preliminary Experience Study Report

<b>LEOFF Female Annual Mortality Improvement</b>				
<b>Ages</b>	<b>Observed (LEOFF)</b>	<b>Scale AA</b>	<b>LEOFF as a % of Scale AA</b>	<b>LEOFF as a % of Scale AA Excluding Outliers</b>
20-24		1.62%		
25-29		1.22%		
30-34		0.90%		
35-39		1.32%		
40-44		1.50%		
45-49		1.74%		
50-54		1.39%		
55-59		0.57%		
60-64	-4.01%	0.50%	-801.86%	
65-69	3.12%	0.50%	624.45%	
70-74	-0.54%	0.62%	-87.39%	-87.39%
75-79	-0.24%	0.74%	-32.41%	-32.41%
80-84	3.29%	0.70%	470.38%	
85-89		0.45%		
90-94		0.27%		
95-99		0.16%		
<b>Average</b>			<b>34.64%</b>	<b>-59.90%</b>
<b>Weighted Average (Lives)</b>			<b>32.40%</b>	<b>-62.28%</b>
<b>Weighted Average (Deaths)</b>			<b>112.49%</b>	<b>-55.54%</b>

**Duty-Related Death Rates**

The old duty-related death rates were 0.00028 at all ages. They increased to 0.000374 with the passage of HB 1833 (2007). The new duty-related death rates are 0.000376 solely because our percent police/firefighter assumption is changing with the current experience study.

<b>Duty-Related Death Rates</b>			
<b>Type</b>	<b>Old</b>	<b>Intermediate</b>	<b>New</b>
All Ages	0.0280%	0.0374%	0.0376%

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## Preliminary Experience Study Report

**Attachment B****LEOFF 2 Retirement Rates****Observed Experience**

Fewer LEOFF members retired during the study period than our assumptions predicted. The previous retirement assumptions predicted about 29 percent of the actual LEOFF 2 retirements we saw during the study period.

The following table shows the actual and expected retirements for LEOFF 2 by age using the current assumptions.

<b>LEOFF Plan 2 Retirements By Age Using Current Assumptions Male and Female</b>			
<b>Age</b>	<b>Actual</b>	<b>Expected</b>	<b>Ratio</b>
<b>50-54</b>	194	691	0.28
<b>55-59</b>	175	647	0.27
<b>60-64</b>	75	197	0.38
<b>65-69</b>	21	54	0.39
<b>70+</b>	-	1	-
<b>Total</b>	<b>465</b>	<b>1,590</b>	<b>0.29</b>

**Current and Recommended LEOFF Retirement Rates**

The table below shows the actual retirement rates over the last two six-year experience study periods, over the twelve-year period, and our current and the recommended retirement assumptions.

## Preliminary Experience Study Report

<b>LEOFF Plan 2 Retirement Rates</b>					
<b>Age</b>	<b>1995-2000</b>	<b>2001-2006</b>	<b>1995-2006</b>	<b>Current Assumptions</b>	<b>Recommended Assumption</b>
50	0.00	0.01	0.01	0.09	0.05
51	0.00	0.02	0.02	0.09	0.05
52	0.03	0.05	0.05	0.09	0.05
53	0.01	0.05	0.05	0.16	0.10
54	0.02	0.06	0.05	0.19	0.12
55	0.04	0.07	0.07	0.24	0.15
56	0.06	0.07	0.07	0.25	0.15
57	0.06	0.07	0.07	0.25	0.15
58	0.14	0.08	0.09	0.33	0.20
59	0.10	0.08	0.09	0.33	0.20
60	0.11	0.09	0.09	0.33	0.20
61	0.18	0.13	0.14	0.37	0.25
62	0.14	0.19	0.18	0.37	0.25
63	0.06	0.25	0.20	0.37	0.25
64	0.25	0.09	0.14	0.48	0.25
65	0.50	0.48	0.48	1.00	0.25
66	0.00	0.30	0.23	1.00	0.25
67	0.67	0.40	0.50	1.00	0.25
68	0.00	0.00	0.00	1.00	0.25
69	0.00	0.00	0.00	1.00	0.25
70	0.00	0.00	0.00	1.00	1.00

The following table shows the actual and expected retirements for LEOFF 2 by age using the recommended assumptions.

<b>LEOFF Plan 2 Retirements By Age Using Recommended Assumptions Male and Female</b>			
<b>Age</b>	<b>Actual</b>	<b>Expected</b>	<b>Ratio</b>
<b>50-54</b>	194	414	0.47
<b>55-59</b>	175	394	0.44
<b>60-64</b>	75	126	0.60
<b>65-69</b>	21	14	1.56
<b>70+</b>	-	1	-
<b>Total</b>	<b>465</b>	<b>948</b>	<b>0.49</b>

## Preliminary Experience Study Report

**Attachment C****LEOFF 2 Termination Rates****Observed Experience**

The following table shows the actual and expected terminations by years of service. We see more terminations than our current assumptions predicted.

<b>LEOFF Termination Experience 1995-2004</b>			
<b>Male &amp; Female</b>			
<b>Service</b>	<b>Actual</b>	<b>Expected</b>	<b>Ratio</b>
<b>0-4</b>	1,327	1,262	1.05
<b>5-9</b>	637	606	1.05
<b>10-14</b>	408	349	1.17
<b>15-19</b>	198	157	1.26
<b>20-24</b>	131	91	1.43
<b>25-29</b>	21	20	1.07
<b>30+</b>	0	0	0.00
<b>Total</b>	<b>2,722</b>	<b>2,484</b>	<b>1.10</b>

**Current, Observed, and Recommended Termination Rates**

We recommend new rates that move toward a better fit between observed and expected, but we give some credibility to the current rates as well.

LEOFF 2 termination rates required an additional adjustment to reflect the effect of duty-related disability benefits recently added to the plan.

The table below present a sampling of our current, observed, and recommended termination rates by system.

## Preliminary Experience Study Report

<b>LEOFF - All Plans</b>				
<b>Probability of Termination</b>				
<b>Male &amp; Female</b>				
<b>Service Years</b>	<b>Current Assumptions</b>	<b>Actual Rates</b>	<b>Recommended Assumptions</b>	<b>Plan 2 - Adjusted Rates</b>
<b>0</b>	0.1043	0.110639	0.104793	0.103812
<b>1</b>	0.0469	0.049741	0.047112	0.046132
<b>2</b>	0.0237	0.025710	0.024351	0.023370
<b>3</b>	0.0208	0.022870	0.021661	0.020680
<b>4</b>	0.0198	0.018175	0.020340	0.019359
<b>5</b>	0.0194	0.018871	0.019230	0.018250
<b>10</b>	0.0167	0.020241	0.016767	0.015786
<b>15</b>	0.0099	0.013576	0.011304	0.010324
<b>20</b>	0.0070	0.015504	0.010362	0.009381
<b>25</b>	0.0070	0.009009	0.005937	0.004957
<b>30+</b>	0.0000	0.000000	0.003465	0.002485

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## Preliminary Experience Study Report

## Attachment D

### LEOFF 2 Disability Rates

#### Observed Experience

The actual number of LEOFF 2 members selecting disability benefits during the study period was less than the number our current disability assumption predicted. The following table shows the actual and expected disabilities, by age, over the twelve year period.

<b>LEOFF 2 Disability Experience 1995-2006</b>			
<b>Age</b>	<b>Actual</b>	<b>Expected</b>	<b>Ratio</b>
<b>20-24</b>	0	0	0.00
<b>25-29</b>	3	3	0.95
<b>30-34</b>	1	8	0.13
<b>35-39</b>	8	13	0.61
<b>40-44</b>	10	16	0.61
<b>45-49</b>	17	27	0.63
<b>50-54</b>	32	44	0.72
<b>55-59</b>	20	23	0.88
<b>60-64</b>	7	5	1.45
<b>65+</b>	1	0	2.56
<b>Total</b>	<b>99</b>	<b>140</b>	<b>0.71</b>

Our actual disabilities for LEOFF 2 are 71 percent of the number of disabilities we expected. Our current assumptions are not a good fit to our experience data. However, there are several reasons which contribute to this. LEOFF 2 has had several changes to actual and expected disabilities since 2005. The actual counts are increasing rapidly due to recent legislation that introduced duty (occupational) disability benefits, total (catastrophic) disability benefits, and expanded definitions for occupational disease. We have started seeing duty-related disability experience but some of that data reflects previous terminations or non-duty disabilities that have qualified as duty disabilities. The experience data at this time is not reliable to properly model duty disability.

## Preliminary Experience Study Report

We expect to see the disability experience in LEOFF 2 continue to increase in the future as a result of the new disability benefits. Our current disability rates were just introduced in 2005 to reflect the new duty disability benefit provisions. At this time, we feel it is prudent to maintain these rates until we have enough experience to make appropriate adjustments.

### Best Estimate LEOFF Disability Rates

The table below shows a sample of the actual disability rates over the experience study period and our current disability assumptions for duty and non-duty combined.

LEOFF 2 Disability Rates 1995-2006		
Age	Actual Rate	Current Assumption
20	0.000000	0.000961
25	0.000466	0.001053
30	0.000173	0.001155
35	0.000000	0.001561
40	0.000308	0.002113
45	0.000806	0.002719
50	0.000364	0.008957
55	0.006944	0.020522
60	0.009569	0.020522
65	0.000000	0.020522
70	0.000000	0.000000

The following table shows a sample of the percent of disabilities that are assumed to be duty-related. We are not recommending any changes to these assumptions due to our lack of experience data at this time.

LEOFF 2	
Age	Current Duty Disability Rate
20	99.89%
25	99.84%
30	99.71%
35	99.65%
40	99.38%
45	98.87%
50	98.47%
55+	98.61%

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Preliminary Experience Study Report

We also develop an assumption to value total disability benefits in the plan. We assume that 18 percent of all duty disabilities are total disabilities. There are no recommended assumption changes for total disability as a result of this experience study.

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## Preliminary Experience Study Report

**Attachment E****LEOFF 2 Service-Based Salary Increases****Observed Experience**

The following table shows the observed and expected salary increases by service. These service-based salary increases are in addition to the general salary increases observed during the period. We see lower salary increases than our current assumptions predicted for LEOFF.

<b>LEOFF Service Based Salary Increases 1984-2006</b>			
<b>Service</b>	<b>Actual</b>	<b>Expected</b>	<b>Ratio</b>
<b>1</b>	10.35%	11.70%	0.88
<b>2</b>	7.33%	8.10%	0.90
<b>3</b>	5.52%	6.60%	0.84
<b>4</b>	3.54%	4.50%	0.79
<b>5</b>	2.40%	3.20%	0.75
<b>6-10</b>	1.15%	2.15%	0.53
<b>11-15</b>	0.84%	1.72%	0.49
<b>16-20</b>	0.68%	1.51%	0.45
<b>21+</b>	0.08%	0.00%	0.00

**Current, Observed, and Recommended Salary Increases**

We recommend new salary increases that move toward a better fit between observed and expected, but we give some credibility to the current increases as well.

The table below presents a sampling of our current, observed, and recommended service related salary increases for LEOFF.

## Preliminary Experience Study Report

<b>LEOFF - All Plans - Service Based Salary Increase Assumption</b>			
<b>Service</b>	<b>Current</b>	<b>Actual</b>	<b>Proposed</b>
<b>1</b>	11.70%	10.35%	11.00%
<b>2</b>	8.10%	7.33%	7.70%
<b>3</b>	6.60%	5.52%	6.10%
<b>4</b>	4.50%	3.54%	4.00%
<b>5</b>	3.20%	2.40%	2.80%
<b>10</b>	2.00%	1.37%	1.70%
<b>15</b>	1.60%	1.00%	1.30%
<b>20</b>	1.30%	0.90%	1.10%
<b>25</b>	0.00%	0.04%	0.00%
<b>30</b>	0.00%	0.00%	0.00%

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## Preliminary Experience Study Report

## Attachment F

### LEOFF 2 Miscellaneous Assumptions

#### Age Difference

Our valuation model requires the age of the member's spouse in order to calculate the survivor benefits that are payable for the spouse's life. If this spousal data is missing from our valuation data file, we use an assumption for the age difference between the member and their spouse.

We used service and disability retiree records from our experience study data, 2001 through 2006. The current and recommended Age Difference Assumptions, based on the gender of the plan member, are as follows:

Plan	Member	Current	Recommended
		Assumption	Assumption
Age Difference			
LEOFF	Male	4	3
	Female	-4	-2

#### Certain and Life Annuity

The standard retirement option is a monthly benefit payable for the lifetime of the member. If the member dies in retirement before the total pension payments they've received exceed the value of their accumulated contributions, the difference is paid to their beneficiary. The value of this benefit is calculated using a Certain and Life Annuity - a life annuity with a certain, or guaranteed, payment period.

We used active records from the 2006 valuation data to study expected certain periods for LEOFF 2 members. The certain, or guaranteed, period for the standard life annuity retirement option is unchanged from the current assumption of 5 years.

#### Member Salaries

Each year we review the salaries reported in the valuation data for reasonableness and make salary adjustments when necessary. We also need to set default salaries for data that is not reported or is considered unreliable.

We used active records from the 2006 valuation data to study member salaries.

**Maximum Salaries** are set each year equal to the salary limit of the Internal Revenue Code. For 2007, the maximum salary is \$225,000.

## Preliminary Experience Study Report

**Minimum Salaries** are determined by Plan and reflect full time employment. For LEOFF 2, the minimum salary for 2007 is \$38,000. This is determined as the salary level that 99 percent of all plan salaries will exceed.

**Low-Service Salary** assumption is used to adjust salaries for members that have less than two months of service in the current valuation year. This adjustment is necessary because our valuation model assumes all active members become full-time in the future and salary data for low-service members is not reliable.

We use the average salary for actives with one year of service and adjust the salary with one year of the general salary increase assumption to bring it forward to the current valuation year. Then, to reflect that not all members with low service are new members, we adjust this entry salary by our step salary increase scale. There is not a set salary amount for this assumption, but rather a process that takes place to assign a default salary for any given set of circumstances.

**Terminated Vested Salary** is used to estimate the average final salary for terminated and vested members when the actual salary data is missing. We estimate this amount by average pay, by system, in various service groups. The salary is adjusted by the general salary increase assumption to reflect the number of years between the date of termination and the date the average salary is determined. The following table shows the 2006 base salaries for LEOFF by service group.

Terminated Vested Base Salaries as of 2006	
Years of Service	LEOFF
Less Than 5	\$60,000
At least 5, Less Than 10	72,000
At least 10, Less Than 15	76,000
At least 15, Less Than 20	81,000
At least 20, Less Than 25	86,000
At Least 25	87,000

### Percent Male/Female

Our valuation data requires a gender code for each plan member in order to calculate and project benefits accurately. Some assumptions used in the actuarial valuation are gender-based, such as mortality and disability, and occasionally the data we receive is missing gender information. As a result, we make assumptions as to the percent male/female in order to assign a missing gender code.

We used active records from the 2000 through 2006 valuation data to study percent male/female. The assumptions for LEOFF are 90 percent male and 10 percent female.

## Preliminary Experience Study Report

### Percent Vested

Members who leave eligible positions, but are not annuitants in the system, are generally considered inactive, or terminated. Some of these members may be vested in their plan and entitled to a future annual benefit. Still other members are not vested, but may return to active employment at some time in the future. Any member who terminates has the right to withdraw their contributions, with interest. Members of LEOFF 2 who make such withdrawals lose their membership service and forfeit their rights to future benefits.

Our Percent Vested assumption models the likelihood that terminated vested members will leave their savings intact and be entitled to deferred retirement benefits.

We used experience study records from 1995-2004 to count terminations, and among those, members who withdraw their savings. The following table shows a sample of the actual percent vested rates, our current assumptions, and our recommended assumptions by service.

LEOFF 2 Percent Vested			
Service Years	Male & Female		
	Actual Rates	Current Assumption	Recommended Assumption
0	0.6439	0.0000	0.0000
5	0.2803	0.1500	0.2400
10	0.2422	0.1500	0.2400
15	0.3266	0.1500	0.2700
20	0.6652	0.7500	0.6900
25	1.0000	1.0000	0.9100
30+	0.0000	1.0000	0.9100

### Portability

An active member of an eligible plan can elect to become a dual member if they have prior service in another eligible plan. Dual membership, also known as portability, allows the member to restore service credit withdrawn from another dual member system, combine service credit for benefit eligibility, and use their highest "base salary" in a dual member system to calculate their retirement benefit. Our current valuation model uses a portability increase factor, or load, to increase the accrued benefit for all eligible plans to reflect the expected number of dual members and the expected increase in benefits as a result of portability.

## Preliminary Experience Study Report

Current portability loads will remain for 2007 and actual portability data will be requested starting with the 2008 valuation. LEOFF 2 has a current portability load of 0.10 percent.

### Ratio of Survivors of Active Deaths Selecting Annuities

This assumption models the ratio of active deaths whose survivors select annuities (percent married for short).

We used experience study records from 1995-2006 to count members who die and leave a survivor. The following table shows a sample of the actual ratio of survivors selecting annuities, our current assumptions, and our recommended assumptions by age.

<b>LEOFF 2 Ratio of Survivors of Active Deaths Selecting Annuities</b>			
<b>Age</b>	<b>Actual Rates</b>	<b>Male &amp; Female Current Assumptions</b>	<b>Recommended Assumptions</b>
<b>35</b>	0.0000	0.0000	0.0658
<b>40</b>	0.2000	0.0000	0.1644
<b>45</b>	0.5000	0.0000	0.2631
<b>50</b>	0.5000	0.2500	0.2960
<b>55</b>	1.0000	0.2500	0.3947
<b>60</b>	1.0000	0.5000	0.5262
<b>65</b>	0.0000	0.5000	0.5262
<b>70</b>	0.0000	0.5000	0.5262
<b>75</b>	0.0000	0.5000	0.5262
<b>80+</b>	0.0000	0.5000	0.5262

### Terminated Vested Indexed Benefit

Any LEOFF 2 member that terminates from employment with twenty or more years of service will receive a pre-retirement COLA of 3 percent per year. The COLA is paid on their accrued benefit amount until the date they retire. Our valuation model requires that we make an assumption for the number of years that the member will receive pre-retirement COLAs.

Members with 20 or more years of service have subsidized early retirement reduction factors starting at age 50. As a result, we assume the member will retire at age 50. We are not recommending any adjustments to this assumption as a result of this experience study.

## Preliminary Experience Study Report

**Occupational Disease for Fire Fighters**

If a fire fighter dies from a duty-related cause as an active member, or within a certain extended period of time after they stop working, their survivor will receive a \$150,000 benefit. The survivor may also receive an unreduced annuity.

This extended period of time from termination is three months for each year of service to a maximum of 60 months.

These additional benefits are provided to the member at no cost. Our valuation model requires that we develop an assumption about the average length of service for active members who might be eligible for these benefits in the future. We also estimate the percentage of LEOFF Plan 2 members who are fire fighters.

We used active and annuitant valuation data from 1995 through 2007. The following table shows the average years of service for active members and the resulting extended period of time for eligibility of this benefit under the current assumptions and the recommended assumptions.

LEOFF Plan 2 Expected Average Length of Service					
Current Assumption			Recommended Assumption		
Status	Years of Service (Unrounded)	Extended Period (In Years)	Status	Years of Service (Unrounded)	Extended Period (In Years)
<b>Disability</b>	16.55	4	<b>Disability</b>	16.26	4
<b>Termination</b>	12.21	3	<b>Termination</b>	14.20	4
<b>Retirement</b>	18.08	5	<b>Retirement</b>	27.78	5

We also developed our recommended percent fire fighter assumption of 43 compared to the current assumption of 42 percent.

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## **Catastrophic Disability Medical Insurance Bill Draft**

(Amending RCW 41.26.470, RCW 41.05.080, RCW 41.05.195)

1       **Sec. 1. RCW 41.26.470 Earned disability allowance — Cancellation of allowance — Reentry**  
2       **— Receipt of service credit while disabled — Conditions — Disposition upon death of**  
3       **recipient — Disabled in the line of duty — Total disability.**

4       (1) A member of the retirement system who becomes totally incapacitated for continued  
5       employment by an employer as determined by the director shall be eligible to receive an  
6       allowance under the provisions of RCW 41.26.410 through 41.26.550. Such member shall  
7       receive a monthly disability allowance computed as provided for in RCW 41.26.420 and shall  
8       have such allowance actuarially reduced to reflect the difference in the number of years  
9       between age at disability and the attainment of age fifty-three, except under subsection (7) of  
10      this section.

11      (2) Any member who receives an allowance under the provisions of this section shall be  
12      subject to such comprehensive medical examinations as required by the department. If such  
13      medical examinations reveal that such a member has recovered from the incapacitating  
14      disability and the member is no longer entitled to benefits under Title 51 RCW, the retirement  
15      allowance shall be canceled and the member shall be restored to duty in the same civil service  
16      rank, if any, held by the member at the time of retirement or, if unable to perform the duties of  
17      the rank, then, at the member's request, in such other like or lesser rank as may be or become  
18      open and available, the duties of which the member is then able to perform. In no event shall a  
19      member previously drawing a disability allowance be returned or be restored to duty at a salary  
20      or rate of pay less than the current salary attached to the rank or position held by the member  
21      at the date of the retirement for disability. If the department determines that the member is

## **Catastrophic Disability Medical Insurance Bill Draft**

(Amending RCW 41.26.470, RCW 41.05.080, RCW 41.05.195)

22 able to return to service, the member is entitled to notice and a hearing. Both the notice and  
23 the hearing shall comply with the requirements of chapter 34.05 RCW, the Administrative  
24 Procedure Act.

25 (3) Those members subject to this chapter who became disabled in the line of duty on or  
26 after July 23, 1989, and who receive benefits under RCW 41.04.500 through 41.04.530 or  
27 similar benefits under RCW 41.04.535 shall receive or continue to receive service credit subject  
28 to the following:

29 (a) No member may receive more than one month's service credit in a calendar month.

30 (b) No service credit under this section may be allowed after a member separates or is  
31 separated without leave of absence.

32 (c) Employer contributions shall be paid by the employer at the rate in effect for the period  
33 of the service credited.

34 (d) Employee contributions shall be collected by the employer and paid to the department at  
35 the rate in effect for the period of service credited.

36 (e) State contributions shall be as provided in RCW 41.45.060 and 41.45.067.

37 (f) Contributions shall be based on the regular compensation which the member would have  
38 received had the disability not occurred.

39 (g) The service and compensation credit under this section shall be granted for a period not  
40 to exceed six consecutive months.

## **Catastrophic Disability Medical Insurance Bill Draft**

(Amending RCW 41.26.470, RCW 41.05.080, RCW 41.05.195)

41 (h) Should the legislature revoke the service credit authorized under this section or repeal  
42 this section, no affected employee is entitled to receive the credit as a matter of contractual  
43 right.

44 (4)(a) If the recipient of a monthly retirement allowance under this section dies before the  
45 total of the retirement allowance paid to the recipient equals the amount of the accumulated  
46 contributions at the date of retirement, then the balance shall be paid to the member's estate,  
47 or such person or persons, trust, or organization as the recipient has nominated by written  
48 designation duly executed and filed with the director, or, if there is no such designated person  
49 or persons still living at the time of the recipient's death, then to the surviving spouse, or, if  
50 there is neither such designated person or persons still living at the time of his or her death nor  
51 a surviving spouse, then to his or her legal representative.

52 (b) If a recipient of a monthly retirement allowance under this section died before April 27,  
53 1989, and before the total of the retirement allowance paid to the recipient equaled the  
54 amount of his or her accumulated contributions at the date of retirement, then the department  
55 shall pay the balance of the accumulated contributions to the member's surviving spouse or, if  
56 there is no surviving spouse, then in equal shares to the member's children. If there is no  
57 surviving spouse or children, the department shall retain the contributions.

58 (5) Should the disability retirement allowance of any disability beneficiary be canceled for  
59 any cause other than reentrance into service or retirement for service, he or she shall be paid  
60 the excess, if any, of the accumulated contributions at the time of retirement over all payments  
61 made on his or her behalf under this chapter.

## **Catastrophic Disability Medical Insurance Bill Draft**

(Amending RCW 41.26.470, RCW 41.05.080, RCW 41.05.195)

62 (6) A member who becomes disabled in the line of duty, and who ceases to be an employee  
63 of an employer except by service or disability retirement, may request a refund of one hundred  
64 fifty percent of the member's accumulated contributions. Any accumulated contributions  
65 attributable to restorations made under RCW 41.50.165(2) shall be refunded at one hundred  
66 percent. A person in receipt of this benefit is a retiree.

67 (7) A member who becomes disabled in the line of duty shall be entitled to receive a  
68 minimum retirement allowance equal to ten percent of such member's final average salary. The  
69 member shall additionally receive a retirement allowance equal to two percent of such  
70 member's average final salary for each year of service beyond five.

71 (8) A member who is totally disabled in the line of duty is entitled to receive a retirement  
72 allowance equal to seventy percent of the member's final average salary. The allowance  
73 provided under this subsection shall be offset by:

74 (a) Temporary disability wage-replacement benefits or permanent total disability benefits  
75 provided to the member under Title 51 RCW; and

76 (b) Federal social security disability benefits, if any; so that such an allowance does not result  
77 in the member receiving combined benefits that exceed one hundred percent of the member's  
78 final average salary. However, the offsets shall not in any case reduce the allowance provided  
79 under this subsection below the member's accrued retirement allowance.

80 A member is considered totally disabled if he or she is unable to perform any substantial  
81 gainful activity due to a physical or mental condition that may be expected to result in death or  
82 that has lasted or is expected to last at least twelve months. Substantial gainful activity is

## **Catastrophic Disability Medical Insurance Bill Draft**

(Amending RCW 41.26.470, RCW 41.05.080, RCW 41.05.195)

83 defined as average earnings in excess of eight hundred sixty dollars a month in 2006 adjusted  
84 annually as determined by the director based on federal social security disability standards. The  
85 department may require a person in receipt of an allowance under this subsection to provide  
86 any financial records that are necessary to determine continued eligibility for such an  
87 allowance. A person in receipt of an allowance under this subsection whose earnings exceed  
88 the threshold for substantial gainful activity shall have their benefit converted to a line-of-duty  
89 disability retirement allowance as provided in subsection (7) of this section.

90 Any person in receipt of an allowance under the provisions of this section is subject to  
91 comprehensive medical examinations as may be required by the department under subsection  
92 (2) of this section in order to determine continued eligibility for such an allowance.

93 A retirement allowance provided under the provisions of this section shall include  
94 reimbursement for any payments of premium rates to the Washington state health care  
95 authority pursuant to RCW 41.05.080.

96 **Sec. 2. RCW 41.05.080 Participation in insurance plans and contracts — Retired, disabled,**  
97 **or separated employees — Certain surviving spouses and dependent children. (Effective**  
98 **January 1, 2009.)**

99 (1) Under the qualifications, terms, conditions, and benefits set by the board:

100 (a) Retired or disabled state employees, retired or disabled school employees, retired or  
101 disabled employees of county, municipal, or other political subdivisions, or retired or disabled  
102 employees of tribal governments covered by this chapter may continue their participation in  
103 insurance plans and contracts after retirement or disablement;

## Catastrophic Disability Medical Insurance Bill Draft

(Amending RCW 41.26.470, RCW 41.05.080, RCW 41.05.195)

104 (b) Separated employees may continue their participation in insurance plans and contracts if  
105 participation is selected immediately upon separation from employment;

106 (c) Surviving spouses and dependent children of emergency service personnel killed in the  
107 line of duty and surviving spouses and dependent children of Law Enforcement Officers and Fire  
108 Fighters who are totally disabled in the line of duty and receiving a retirement allowance as  
109 provided under RCW 41.26.470(8) may participate in (~~insurance plans and contracts~~) health  
110 insurance.

111 (d) Law Enforcement Officers' and Fire Fighters' who are totally disabled in the line of duty  
112 and receiving a retirement allowance as provided under RCW 41.26.470(8) and their  
113 dependents may participate in health insurance.

114 (2) Rates charged surviving spouses of emergency service personnel killed in the line of duty,  
115 Law Enforcement Officers' and Fire Fighters' who are totally disabled in the line of duty and  
116 receiving a retirement allowance as provided under RCW 41.26.470(8) and their dependents,  
117 retired or disabled employees, separated employees, spouses, or dependent children who are  
118 not eligible for parts A and B of medicare shall be based on the experience of the community  
119 rated risk pool established under RCW 41.05.022.

120 (3) Rates charged to surviving spouses of emergency service personnel killed in the line of  
121 duty, Law Enforcement Officers' and Fire Fighters' who are totally disabled in the line of duty  
122 and receiving a retirement allowance as provided under RCW 41.26.470(8) and their  
123 dependents, retired or disabled employees, separated employees, spouses, or children who are  
124 eligible for parts A and B of medicare shall be calculated from a separate experience risk pool

## **Catastrophic Disability Medical Insurance Bill Draft**

(Amending RCW 41.26.470, RCW 41.05.080, RCW 41.05.195)

125 comprised only of individuals eligible for parts A and B of medicare; however, the premiums  
126 charged to medicare-eligible retirees and disabled employees shall be reduced by the amount  
127 of the subsidy provided under RCW 41.05.085.

128 (4) Surviving spouses and dependent children of emergency service personnel killed in the  
129 line of duty, Law Enforcement Officers' and Fire Fighters' who are totally disabled in the line of  
130 duty and receiving a retirement allowance as provided under RCW 41.26.470(8) and their  
131 dependents, and retired or disabled and separated employees shall be responsible for payment  
132 of premium rates developed by the authority which shall include the cost to the authority of  
133 providing (~~insurance coverage~~) health insurance including any amounts necessary for reserves  
134 and administration in accordance with this chapter. These self pay rates will be established  
135 based on a separate rate for the employee, the spouse, and the children.

136 (5) The term "retired state employees" for the purpose of this section shall include but not  
137 be limited to members of the legislature whether voluntarily or involuntarily leaving state  
138 office.

139 **Sec. 3. RCW 41.05.195 Medicare supplemental insurance policies. (Effective January 1,**  
140 **2009.)**

141 Notwithstanding any other provisions of this chapter or rules or procedures adopted by the  
142 authority, the authority shall make available to retired or disabled employees who are enrolled  
143 in parts A and B of medicare one or more medicare supplemental insurance policies that  
144 conform to the requirements of chapter 48.66 RCW. The policies shall be chosen in consultation  
145 with the public employees' benefits board. These policies shall be made available to retired or

## **Catastrophic Disability Medical Insurance Bill Draft**

(Amending RCW 41.26.470, RCW 41.05.080, RCW 41.05.195)

146 disabled state employees; retired or disabled school district employees; retired employees of  
147 county, municipal, or other political subdivisions or retired employees of tribal governments  
148 eligible for coverage available under the authority; or surviving spouses of emergency service  
149 personnel killed in the line of duty((-)); or Law Enforcement Officers' and Fire Fighters' who are  
150 totally disabled in the line of duty and receiving a retirement allowance as provided under RCW  
151 41.26.470(8) or their dependents.