



Office of the State Actuary

"Supporting financial security for generations."

September 20, 2016

Mr. Steve Nelsen
Executive Director
LEOFF 2 Retirement Board
PO Box 40918
Olympia, Washington 98504-0918

**SUBJECT: POST-RETIREMENT JOINT AND SURVIVOR OPTION FACTORS
FOR LEOFF 2 ANNUITY PURCHASE**

Dear Steve:

We have completed our development of a new set of Joint and Survivor (J&S) Option Factors specifically for Law Enforcement Officers' and Fire Fighters' (LEOFF) Plan 2 retired members. The development of these Post-Retirement J&S factors was requested by the Department of Retirement Systems (DRS), in consultation with our office, to implement the provisions of Senate Bill 6264 which passed during the 2016 Legislative Session. This bill creates a new window, opening January 1, 2017 and closing June 1, 2017, during which LEOFF 2 members who retired before June 1, 2014 may purchase an additional annuity through their respective plan trust fund. This new set of J&S factors will apply only to the purchased annuity of members who elected a J&S benefit upon retirement.

The attached appendices contain supporting information for the LEOFF 2 Post-Retirement J&S factors. **Appendix A** supplies general information about data, assumptions, and methods used to develop the factors. **Appendix B** provides more detailed information about the Post-Retirement J&S factors and about Senate Bill 6264. These appendices should be used together with this cover letter and attached excel spreadsheet to form a complete actuarial communication.

We developed the Post-Retirement J&S factors as a single age-difference table (member age minus beneficiary age) based upon the average age of LEOFF 2 retirees. This differs from the J&S factors sent in our previous communication dated November 10, 2015, which was based upon the average age of retirement of LEOFF 2 members. Both tables of factors are informed by our understanding of how DRS applies them and according to policy decisions made by DRS. The policy decisions were documented in our letter dated May 27, 2009, and have been updated to incorporate mortality improvement trends. We intend this communication to be used by the Board and DRS only. If a party other than the Board or DRS reads this communication, they should address questions to the Board or DRS and seek professional guidance with the content and interpretation of this communication.



In my opinion, all of the data, assumptions, and methods we used in developing the factors are reasonable and appropriate for this project. The use of another set of assumptions and methods, however, could also be reasonable and could produce materially different results.

The economic and demographic assumptions we used for updating the factors were adopted by the Board consistent with RCW 41.26.720. In my opinion, all methods, assumptions, and calculations are reasonable and in conformity with generally accepted actuarial principles and standards of practice as of the date of this letter.

The undersigned, with actuarial credentials, meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. While this letter and supporting attachments are intended to be complete, we are available to offer extra advice and explanations as needed.

Please let me know if you have any questions concerning these administrative factors or the assumptions and methods used to develop them.

Sincerely,

Lisa A. Won, ASA, FCA, MAAA
Deputy State Actuary

cc: Kelly Fox, Chair
 LEOFF Plan 2 Retirement Board
Tracy Guerin, Director
 Department of Retirement Systems
Jacob White, Legal and Legislative Services Manager
 Department of Retirement Systems
Shawn Merchant, Assistant Director, Project Management
 Department of Retirement Systems
Seth Miller, Assistant Director, Customer and Policy Services
 Department of Retirement Systems
Matt Smith, FCA, EA, MAAA, State Actuary
 Office of the State Actuary
Mitch DeCamp, Actuarial Analyst
 Office of the State Actuary

Attachments

- Appendix A – General Data, Assumptions, and Methods
- Appendix B – Post-Retirement Joint and Survivor Option Factors
- Excel Spreadsheet – 2016.LEOFF.2.Post-Ret.J&S.OSA.9-20-16.xlsx

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APPENDIX A – GENERAL DATA, ASSUMPTIONS, AND METHODS

Data

We relied on the [*2015 Actuarial Valuation Report*](#) (AVR) data whenever necessary to develop the Post-Retirement J&S factors. Please see the *Actuarial Certification Letter* in the 2015 AVR for further considerations on the data we used.

Assumptions

We relied on the following key assumptions in the 2015 AVR to develop the Post-Retirement J&S factors.

❖ **Economic Assumptions**

System	Interest	Annual COLA
LEOFF 2	7.50%	3%

- ❖ **Mortality Assumptions:** Consistent with your current policy decision to reflect assumed future mortality improvements in the administrative factors, we used the mortality improvement method developed in our 2007-2012 Demographic Experience Study (DES) to project the RP-2000 table to the year 2017 (RP-2017) for the underlying mortality assumption for the plan. We use 2017 because it's the approximate midpoint between the current and next expected update to administrative factors.

Mortality improvements are projected generationally from the RP-2017 rates consistent with the 2015 AVR (see the DES for more information on generational mortality improvement projections). Generational mortality improvement means mortality rates get smaller every year in the future for every age. See the **Methods** section below for a description of the development of projected mortality assumptions.

- ❖ **Mortality Blending:** We used the retirement and disability rates as disclosed in the 2015 AVR and RP-2017 mortality rates to blend healthy and disabled mortality assumptions (see the **Methods** section below for a description of the process).

Methods

Development of Underlying Mortality Assumptions

Consistent with your previous policy decisions, we blended healthy and disabled mortality assumptions using the following method.

- ❖ We multiplied the RP-2017 healthy mortality rates by the probability that benefit commencement from active status is from a healthy cause. Healthy causes include service retirement and the death of a member from active service. Where retirement rates vary by service, we used active



membership counts by service and age to develop weighted average retirement rates.

- ❖ We multiplied the RP-2017 disabled mortality rates by the probability a member will take a disability benefit when leaving active status. In other words, we multiplied the RP-2017 disabled mortality rates by the probability of a benefit commencing due to a non-healthy cause.
- ❖ We added the weighted rates above to come up with male and female RP-2017 blended mortality assumptions by age for the plan.
- ❖ We projected the blended mortality rates from RP-2017 generationally, incorporating expected mortality improvements using 100 percent of Scale BB, as developed in the DES and applied in the 2015 AVR.



APPENDIX B – POST-RETIREMENT JOINT AND SURVIVOR OPTION FACTORS

Purpose

Members of LEOFF 2 may elect a reduced monthly benefit amount on retirement to provide an ongoing survivor benefit for their designated survivor beneficiary. The department currently offers three J&S choices for these members:

- ❖ Survivor receives 100 percent of the member's benefit (Option 2).
- ❖ Survivor receives 50 percent of the member's benefit (Option 3).
- ❖ Survivor receives 66 2/3 percent of the member's benefit (Option 4).

The current J&S factors are based on member average age at retirement. These factors are not actuarially equivalent for post-retirement annuity purchases. Members buying a J&S annuity in retirement require a larger reduction because the cost of providing a survivor benefit increases with member age. The post-retirement factors presented in this communication can be multiplied by a member's purchased monthly annuity amount to find the additional monthly benefit.

Data

We used the 2015 AVR data as described in **Appendix A**. We also used data from the 2007-2012 DES about service and disability retirees to develop the percent male assumption and average age (see the **Assumptions** section below).

Assumptions

We relied on the following key assumptions:

- ❖ We used the economic and mortality assumptions shown in **Appendix A**.
- ❖ We assumed percent male assumptions specifically for the Post-Retirement J&S factors of 98.23 percent, based on information in the DES. This assumption is consistent with the assumption used to develop the J&S administrative factors currently in place.
- ❖ We used the average LEOFF 2 retiree age to develop the Post-Retirement J&S factors.

LEOFF 2 Average Service and Disabled Retiree Age	
Males	Females
62	62



Methods

Development of J&S Option Factor Tables

J&S option factors reduce members' benefits so that the selection of the option makes the benefits under that option actuarially equivalent to the members' single life benefits.

$$\text{PV (single-life benefits)} = \text{Factor} \times \text{PV (J&S benefits)}$$

Where "PV" denotes Present Value and includes the annuity factors produced for this project. "Benefits" means the sum of all expected lifetime benefits.

The next table displays additional information we used to develop these factors.

Annuity Factor Details		
	Single-Life Annuity	Joint & Survivor Annuity
Annuity Type	Single Life	Joint Life
Payment Commencement	Immediate	Immediate
Payment Frequency	Monthly	Monthly
Payment Timing	End of Period	End of Period
Certain Period (Years)	None	None
COLA Percent	3%	3%
COLA Increase Frequency	Annual	Annual

We developed the Post-Retirement J&S option factors to include the probability that a survivor will pre-decease the member, and the member's additional monthly benefit will pop up to its pre-reduction level.

Other Information

We formatted the Post-Retirement J&S option factor tables in a way consistent with the current J&S option format in [WAC 415-02-380](#). Please see the tables in the attached spreadsheet for the resulting Post-Retirement J&S option factors.

Administrative Factors

Follow-Up From September

$$\int x^2 \sqrt{x^2 \pm a^2} dx = \frac{x}{8} (2x^2 \pm a^2) \sqrt{x^2 \pm a^2} - \frac{a^2}{8} \ln|x + \sqrt{x^2 \pm a^2}| + C$$

Lisa Won, ASA, FCA, MAAA
Deputy State Actuary

*Presentation to:
LEOFF 2 Board*

$$\int \frac{\sqrt{x^2 - a^2}}{x} dx = \sqrt{x^2 - a^2} - a \sec^{-1} \frac{x}{a} + C$$
$$\int x^2 \sqrt{x^2 \pm a^2} dx = \frac{x}{8} (2x^2 \pm a^2) \sqrt{x^2 \pm a^2} - \frac{a^2}{8} \ln|x + \sqrt{x^2 \pm a^2}| + C$$
$$\int \sqrt{x^2 + a^2} dx = \frac{x}{2} \sqrt{x^2 + a^2} \mp \frac{a^2}{2} \ln|x + \sqrt{x^2 + a^2}| + C$$
$$\int \frac{\sqrt{x^2 \pm a^2}}{x^2} dx = -\frac{\sqrt{x^2 \pm a^2}}{x} + \ln|x + \sqrt{x^2 \pm a^2}| + C$$
$$\int \frac{dx}{x^2 \sqrt{x^2 \pm a^2}} = \mp \frac{1}{a^2 x} + C$$
$$\int (x^2 \pm a^2)^{1/2} dx = \frac{\pm x}{a^2} \sqrt{x^2 \pm a^2} + C$$
$$\int (x^2 \pm a^2)^{3/2} dx = \frac{x}{8} (2x^2 \pm 5a^2) \sqrt{x^2 \pm a^2} + \frac{3a^4}{8} \ln|x + \sqrt{x^2 \pm a^2}| + C$$



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November 9, 2016

Today's Presentation

- Purpose of new factors
- Recommendation
- Next steps



Why Are New Administrative Factors Needed?

- SSB 6264 passed in 2016 Session and provides LEOFF 2 retired members with a one-time opportunity to purchase additional annuity
 - Actuarial Fiscal Note assumes actuarial equivalent administrative factors
- Administrative factors adjust pensions for optional payment forms
 - Optional payments should be cost-neutral to the plan as a whole - "Actuarial Equivalence"
- Two different administrative factors used for annuity purchase
 - Annuity purchase factors are based on age at purchase and payable for the members' lifetime
 - Joint and Survivor (J&S) factors convert the single life annuity so it's payable on the life of both the member and their beneficiary
 - Current factors are not actuarially equivalent since they are based on average age at retirement, not average age of current retirees

Joint & Survivor Option Factors

- J&S factors reduce a member's benefit to provide an ongoing benefit for their survivor
- Three types of survivor benefits available under the plan:
 - J&S 100 percent
 - J&S 50 percent
 - J&S 66 2/3 percent
- New factors needed for retired members
 - Current J&S factors are based on members at retirement
 - Members electing J&S option after retirement need larger reduction since the cost to provide an ongoing survivor benefit increases as the member ages



Joint & Survivor Factor Comparison

- J&S factors vary based on the member's age and the age of their joint annuitant when the benefit commences
- Compares the value of a single life annuity to a joint life annuity
- J&S factors reduce a member's benefit to recognize additional cost of providing a benefit payable on two lives

Percent Change From 2015 'At Retirement' Factors			
	J&S 100%	J&S 50%	J&S 66.67%
MIN	(0.94%)	(0.48%)	(0.64%)
AVG	(4.94%)	(2.84%)	(3.60%)
MAX	(8.49%)	(5.11%)	(6.38%)

Joint & Survivor Factor Example

- Impact on \$2,000 additional monthly retirement benefit purchased by a 65 year old member electing J&S 100 percent (age difference = 3)

	Current	New	Change
J&S Factor	0.855	0.822	(3.93%)
Monthly Benefit	\$1,710	\$1,644	(\$66)

Comparing Purchase At Retirement To Purchase In Retirement

- Member 1 is retiring at age 55 on January 1, 2017, and has \$100,000 of qualified savings to purchase additional annuity through the plan
- Member 2 is retired, currently age 65, and uses \$100,000 of qualified savings to purchase additional annuity under SSB 6264
- Both members will elect J&S 100 percent and have a spouse three years younger

Comparison of Member Annuity Purchases			
	Purchase Factor*	J&S 100% Factor**	Additional Annual Benefit***
Member 1	16.2	0.855	\$5,278
Member 2	13.1	0.822	\$6,275

*Based on age at time of purchase.

**Uses recommended factor for Member 2.

***Increases annually with Cost of Living Adjustment.

Recommendations

- We recommend adopting new J&S administrative factors to apply to current retired members who purchase an additional annuity
 - Best estimate of life expectancies for impacted members
 - Best actuarial equivalence (accuracy) for cost of optional benefits
 - Consistent with assumptions used in the actuarial valuation to determine funding requirements of the plan
 - Consistent with the analysis prepared for SSB 6264

Next Steps

- OSA has provided additional information and tables of new factors
- The Board has authority to adopt factors for LEOFF 2
 - DRS adopts factors for all other plans
- DRS will use new factors during the temporary window, January 1, 2017, through June 1, 2017



Questions?



2016 LEOFF 2 Post-Retirement J&S Factors			
Age Difference	Option 2 100%	Option 3 50%	Option 4 66 2/3%
(20)	0.944	0.971	0.962
(19)	0.941	0.969	0.960
(18)	0.937	0.968	0.957
(17)	0.933	0.965	0.954
(16)	0.929	0.963	0.952
(15)	0.925	0.961	0.949
(14)	0.920	0.959	0.946
(13)	0.916	0.956	0.942
(12)	0.911	0.953	0.939
(11)	0.906	0.951	0.935
(10)	0.901	0.948	0.932
(9)	0.896	0.945	0.928
(8)	0.890	0.942	0.924
(7)	0.885	0.939	0.920
(6)	0.879	0.936	0.916
(5)	0.873	0.932	0.912
(4)	0.867	0.929	0.907
(3)	0.861	0.925	0.903
(2)	0.854	0.921	0.898
(1)	0.848	0.918	0.893
0	0.842	0.914	0.888
1	0.835	0.910	0.884
2	0.828	0.906	0.879
3	0.822	0.902	0.874
4	0.815	0.898	0.869
5	0.809	0.894	0.864
6	0.802	0.890	0.859
7	0.796	0.886	0.854
8	0.789	0.882	0.849
9	0.783	0.878	0.844
10	0.777	0.874	0.839
11	0.771	0.870	0.834
12	0.765	0.867	0.830
13	0.759	0.863	0.825
14	0.753	0.859	0.821
15	0.748	0.856	0.816
16	0.742	0.852	0.812
17	0.737	0.849	0.808
18	0.732	0.845	0.804
19	0.727	0.842	0.800
20	0.723	0.839	0.796
21	0.718	0.836	0.793
22	0.714	0.833	0.789
23	0.710	0.830	0.786

24	0.706	0.827	0.782
25	0.702	0.825	0.779
26	0.698	0.822	0.776
27	0.694	0.820	0.773
28	0.691	0.817	0.770
29	0.688	0.815	0.768
30	0.685	0.813	0.765
31	0.682	0.811	0.763
32	0.679	0.809	0.760
33	0.676	0.807	0.758
34	0.674	0.805	0.756
35	0.671	0.803	0.754
36	0.669	0.801	0.752
37	0.666	0.800	0.750
38	0.664	0.798	0.748
39	0.662	0.797	0.746
40	0.660	0.795	0.744