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January 6, 2015

CONFIDENTIAL

Ms. Judith Delaney  
Executive Assistant  
Missouri State Employees'  
Retirement System  
907 Wildwood Drive  
Jefferson City, MO 65109

**Re: Senate Bill No. 94 (SB 94)**

Dear Judy:

Enclosed are the results of a supplemental actuarial valuation related to a proposed benefit change for the Missouri State Employees' Retirement System June 30, 2014 valuation.

If you have any questions or comments, please contact us.

Respectfully submitted,

Brad Lee Armstrong, ASA, EA, FCA, MAAA

David T. Kausch, FSA, EA, FCA, MAAA

BLA/DTK:sc  
Enclosures

**Missouri State Employees' Retirement System  
Supplemental Actuarial Valuation  
as of June 30, 2014**

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**REQUESTED BY:** Mr. Gary W. Findlay, Executive Director

**SUBMITTED BY:** Brad Lee Armstrong, ASA, EA, FCA, MAAA and David T. Kausch, FSA, EA, FCA, MAAA  
Gabriel, Roeder, Smith & Company

**DATE:** January 6, 2015

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This report presents results of a supplemental actuarial valuation to measure the effect of eliminating defined benefit and providing defined contribution retirement benefits for members of the General Assembly (Legislators) and statewide Elected Officials who first take office on or after January 1, 2016.

This report is intended to describe the financial effect of the proposed changes. No statement in this report is intended to be interpreted as a recommendation in favor of the changes, or in opposition to them. The date of the valuation was June 30, 2014. Brad Lee Armstrong and David T. Kausch are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

If the scheduled contributions are made (subject to normal year-to-year experience fluctuations), then the System will be able to pay all benefits promised, when due. Our understanding is that the State is currently paying the appropriate total contribution rate.

Actuarial assumptions and methods were consistent with those used in the regular actuarial valuation of the Retirement System on the valuation date, unless otherwise noted. In particular:

- The assumed rate of interest was 8.0%.
- Payroll was assumed to increase 3% per year.
- For the regular valuation, the Unfunded Actuarial Accrued Liability is amortized over 30 years.

We believe the assumptions are internally consistent and reasonable, based on the actual experience of MOSERS. These actuarial assumptions and methods comply with current actuarial standards of practice.

The active group size is assumed to remain constant. For purposes of this supplemental valuation, the active group for Legislators and Elected Officials is assumed to decline under the assumptions disclosed herein.

A brief summary of the data used in this valuation follows:

Valuation Group	Number	Payroll	Group Averages		
			Salary	Age(yrs.)	Service(yrs.)
General Assembly	191	\$ 6,871,658	\$ 35,977	51.6	4.5
Elected Officials	6	\$ 659,978	\$ 109,996	49.3	7.4
Total MOSERS	50,621	\$ 1,902,719,928	\$ 37,588	45.7	11.3

**Missouri State Employees' Retirement System  
Supplemental Actuarial Valuation  
as of June 30, 2014**

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**For Members of the General Assembly (Legislators) or Elected Officials Hired on and after January 1, 2016:**

Eliminate retirement benefits for members of the General Assembly (Legislators) and statewide Elected Officials who first take office on or after January 1, 2016. A retired state employee who retired under the Year 2000 plan and holds one of these elected offices for the first time on or after January 1, 2016 will also be prohibited from receiving retirement benefits from the Missouri State Employees' Retirement System during his or her term of office, and shall not be eligible to accrue additional benefits based on service as a member of the General Assembly or as statewide Elected Official.

Members of the General Assembly and statewide Elected Officials who first take office on or after January 1, 2016, shall be eligible to participate in a defined contribution plan, in which the employer shall match one hundred percent of a participant's contribution of 4.0% of the participant's annual salary.

The proposed removal of benefits for new hires has **no effect** on the MOSERS current benefit obligation or current employer contributions for the active members currently covered under the Missouri State Employees' Retirement System MSEP 2000 plan.

**Missouri State Employees' Retirement System  
Supplemental Actuarial Valuation  
as of June 30, 2014**

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**Actuarial Statement**

	Impact on MOSERS DB Employer Contributions		
	Present Benefits	Proposed Benefits	Increase/ (Decrease)
<b>FY 2015-16 Contribution</b>			
Total Normal Cost	8.21 %	8.19 %	(0.02) %
Member Contribution Rate	(1.32)	(1.32)	0.00
UAAL% (30-year amortization)	10.08	10.10	0.02
Total Employer Contribution Rate	16.97 %	16.97 %	0.00 %
Employer Normal Cost (\$ millions)	\$ 139.1	\$ 138.7	\$ (0.4)
Estimated Employer Contribution (\$ millions)	\$ 342.6	\$ 342.6	\$ 0.0
<b>Valuation Results as of June 30, 2014 (\$ millions)</b>			
Market Value of Assets (MVA)	\$ 9,136.8	\$ 9,136.8	\$ -
Actuarial Accrued Liability (AAL)	11,494.6	11,494.6	-
Actuarial Value of Assets (AVA)	8,637.8	8,637.8	-
Unfunded Actuarial Accrued Liability (UAAL)	\$ 2,856.8	\$ 2,856.8	\$ -
Percent Funded	75.1 %	75.1 %	0.0 %

**Missouri State Employees' Retirement System  
Supplemental Actuarial Valuation  
as of June 30, 2014**

**Projected Change in Annual Employer Contributions  
(In Thousands)**

Fiscal Year	Current Provisions				Proposed Provisions				Projected DB Employer Contributions						Projected DC Employer Contributions		Total Projected Employer Contributions
	Projected AAL	Projected AVA	Funded Ratio	Projected MVA	Projected AAL	Projected AVA	Funded Ratio	Projected MVA	Current		Est. Impact		Proposed		Proposed		Proposed Rate
									Rate	Dollars	Rate#	Dollars	Rate	Dollars	Rate@	Dollars	
2015	\$ 11,494,572	\$ 8,637,759	75.1%	\$ 9,136,782	\$ 11,494,572	\$ 8,637,759	75.1%	\$ 9,136,782	16.97%	\$ 332,578	0.00%	\$ -	16.97%	\$ 332,578	0.00%	\$ -	16.97%
2016	11,876,237	8,990,806	75.7%	9,090,149	11,876,237	8,990,806	75.7%	9,090,149	16.97%	\$ 342,556	0.00%	-	16.97%	342,556	0.00%	27	16.97%
2017	12,233,084	9,327,067	76.2%	9,420,891	12,232,274	9,326,721	76.2%	9,420,015	16.97%	352,832	0.00%	-	16.97%	352,832	0.00%	80	16.97%
2018	12,560,849	9,644,211	76.8%	9,720,317	12,558,911	9,643,195	76.8%	9,718,234	16.97%	363,417	0.00%	-	16.97%	363,417	0.01%	134	16.98%
2019	12,862,399	9,945,896	77.3%	10,005,964	12,858,817	9,943,872	77.3%	10,002,313	16.97%	374,320	0.00%	-	16.97%	374,320	0.01%	186	16.98%
2020	13,140,057	10,235,495	77.9%	10,278,294	13,134,298	10,232,108	77.9%	10,272,702	16.97%	385,549	0.00%	-	16.97%	385,549	0.01%	230	16.98%
2021	13,397,164	10,517,466	78.5%	10,544,058	13,388,695	10,512,361	78.5%	10,536,217	16.97%	397,116	0.00%	-	16.97%	397,116	0.01%	269	16.98%
2022	13,636,940	10,796,235	79.2%	10,812,792	13,625,219	10,789,062	79.2%	10,802,292	16.97%	409,029	0.00%	-	16.97%	409,029	0.01%	300	16.98%
2023	13,859,832	11,073,607	79.9%	11,083,725	13,844,382	11,064,079	79.9%	11,070,354	16.97%	421,300	0.00%	-	16.97%	421,300	0.01%	324	16.98%
2024	14,064,648	11,349,903	80.7%	11,352,325	14,045,051	11,337,797	80.7%	11,335,965	16.97%	322,706	(0.09%)	(2,301)	12.53%	320,404	0.01%	344	12.54%
2025	14,250,907	11,626,241	81.6%	11,619,676	14,226,783	11,611,381	81.6%	11,600,190	12.62%	328,436	(0.10%)	(2,634)	12.37%	325,802	0.01%	361	12.38%
2026	14,418,820	11,792,854	81.8%	11,790,419	14,389,832	11,773,436	81.8%	11,767,344	12.47%								

#The ultimate impact on the normal cost is a decrease of 0.11 % of projected payroll. Due to the minimum funding policy, the UAAL offsets the change in normal cost.  
@The ultimate DC contribution is 0.02% of projected payroll.

Fiscal Year	Valuation Payroll		Post 1/1/2016 Payroll	
	Projected	Pre 1/1/2016 Payroll*	All Others	Elected Officials & General Assembly
2015	\$ 1,902,720	\$ 1,902,720	\$ -	\$ -
2016	1,959,802	1,938,588	21,213	-
2017	2,018,596	1,880,742	137,178	676
2018	2,079,153	1,741,050	336,095	2,008
2019	2,141,528	1,624,953	513,238	3,338
2020	2,205,774	1,523,845	677,288	4,641
2021	2,271,947	1,433,076	833,123	5,748
2022	2,340,106	1,349,764	983,623	6,719
2023	2,410,309	1,271,195	1,131,618	7,495
2024	2,482,618	1,195,490	1,279,023	8,105
2025	2,557,096	1,122,305	1,426,185	8,606
2026	2,633,809	1,051,661	1,573,111	9,037

\*DB, DC and Total Contribution Rates are based on open group payroll.  
DC Contributions based on 4% employer contribution for Post-2014 hires for Elected Officials and members of the General Assembly only.

Numbers may not add due to rounding.

## Missouri State Employees' Retirement System Supplemental Actuarial Valuation as of June 30, 2014

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**Comment A:** The long-term effect of the proposed changes on Defined Benefit contributions is a decrease in the employer normal cost of approximately 0.11% of total MOSERS payroll. It is important to note that UAAL contributions for MOSERS are assumed to be made on total payroll, including those members hired on or after January 1, 2016.

**Comment B:** We assumed that all current DB Elected Officials would stay in the DB plan.

**Comment C:** At the September 17, 2014 Board meeting, the Board adopted a minimum funding policy such that the employer contribution rate will be no less than 16.97% of payroll (the rate calculated in the June 30, 2013 valuation) until such a time as the plan is at least 80% funded on an actuarial value of assets basis. Additionally, any benefit increase will result in a commensurate increase in the minimum contribution rate of 16.97%. This supplemental valuation reflects the 16.97% minimum contribution rate until the plan is 80% funded. Since the proposed change is not an increase in system benefits, the rate of 16.97% is unchanged by the proposal.

**Comment D:** The calculations are based upon assumptions regarding future events, which may or may not materialize. They are also based upon present and proposed assumptions that are outlined in the report. If you have reason to believe that the assumptions that were used are unreasonable, that the plan provisions are incorrectly described, that important plan provisions relevant to this proposal are not described, or that conditions have changed since the calculations were made, you should contact the authors of this report prior to relying on information in the report.

**Comment E:** If you have reason to believe that the information provided in this report is inaccurate, or is in any way incomplete, or if you need further information in order to make an informed decision on the subject matter of this report, please contact the authors of the report prior to making such decision.

**Comment F:** In the event that more than one plan change is being considered, it is very important to remember that the results of separate actuarial valuations cannot generally be added together to produce a correct estimate of the combined effect of all of the changes. The total can be considerably greater than the sum of the parts due to the interaction of various plan provisions with each other, and with the assumptions that must be used.

**Comment G:** This report is intended to describe the financial effect of the proposed plan changes on the Retirement System. Except as otherwise noted, potential effects on other benefit plans were not considered.

**Comment H:** The reader of this report should keep in mind that actuarial calculations are mathematical estimates based on current data and assumptions about future events (which may or may not materialize). Please note that actuarial calculations can and do vary from one valuation year to the next. As a result, the cost impact of a benefit change may fluctuate over time, as the demographics of the group changes.

**Summary of Assumptions Used  
for the June 30, 2014 Actuarial Valuation**

-----**Economic Assumptions**-----

The economic assumptions were adopted by the Board on July 19, 2012 to be first effective for the June 30, 2012 valuation.

**The investment return rate** used in the valuations was 8.0% per year, compounded annually (net after investment expenses). This assumption is used to account for the fact that equal amounts of money payable at different points in time in the future do not have the same value presently.

**Pay increase assumptions** for individual active members are shown for sample ages on page 8. Part of the assumption for each age is for merit and/or seniority increase, and the other 3.0% recognizes wage inflation. This assumption is used to project a member's current salary to the salaries upon which benefits will be based.

**The active member payroll** is assumed to increase 3.0% annually, which is the portion of the individual pay increase assumptions attributable to wage inflation.

**The annual Cost-of-Living Adjustment (COLA)** is assumed to be 4.00%, on a compounded basis, when a minimum COLA of 4% is in effect (4.0% for 12 years, 3.06% the next year to reach a cumulative 65% followed by 2.0%). When no minimum COLA is in effect, price inflation is assumed to be 2.5% and the annual COLA is assumed to be 2.0% (80% of 2.5%), on a compounded basis.

-----**Non-Economic Assumptions**-----

The demographic assumptions were adopted by the Board on June 20, 2012 to be first effective for the June 30, 2012 valuation.

**The mortality table**, for post-retirement mortality, used in evaluating allowances to be paid was the RP 2000 combined healthy mortality table, projected to 2016 with Scale AA. Related values are shown on page 9. This assumption is used to measure the probabilities of each benefit payment being made after retirement. The pre-retirement mortality rates used were 100% of the post-retirement mortality rates for males and 80% of the post-retirement mortality for females.

The mortality tables include a margin of 15% for men and 17% for women for mortality improvements based on the four-year experience study from June 30, 2007 to June 30, 2011.

## **Summary of Assumptions Used for the June 30, 2014 Actuarial Valuation**

*The probabilities of age and service retirement* are shown on page 10. It was assumed that each member will be granted one half year (4 months for 2011 plan members) of service credit for unused leave upon retirement and military service purchases.

*The probabilities of withdrawal from service, disability and death-in-service* are shown for sample ages on page 8. For disability retirement, impaired longevity was recognized by use of special mortality tables.

*The entry age normal actuarial cost method of valuation* was used in determining liabilities and normal cost. Each member's normal cost was based on the benefit provisions applicable to that member. The normal cost is projected to the applicable fiscal year. Differences in the past between assumed experience and actuarial experience ("actuarial gains and losses") become part of actuarial accrued liabilities. Unfunded actuarial accrued liabilities are amortized to produce payments, (principal & interest) which are level percents of payroll contributions.

*The amortization of the unfunded actuarial accrued liability is based on a closed 30-year amortization period, level percent-of-payroll amortization. This method was first effective with the June 30, 2014 valuation. The amortization is based on the projected unfunded actuarial accrued liability to the beginning of the fiscal year during which the contributions are expected to be made.*

*Employer contribution dollars* were assumed to be *paid in equal installments* throughout the employer's fiscal year.

*Actuarial value of assets.* Valuation assets recognize assumed investment return fully each year. Differences between actual and assumed investment return are phased-in over an open three-year period. Valuation assets are not permitted to deviate from the market value by less than 80% or more than 125%.

*The data about persons now covered and about present assets* were furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary.

*The liabilities for active members hired on or after January 1, 2011 were based on MSEP 2011 benefits. The liabilities for active members hired on or after July 1, 2000 (April 26, 2005 for administrative law judges) were based on MSEP 2000 benefits. The liabilities for active members hired before July 1, 2000 for Elected Officials, General Assembly, and Uniformed Water Patrol were based on MSEP benefits. The liabilities for all other active members hired before July 1, 2000 were based on the assumption that members would elect MSEP 2000 prior to age 62 and MSEP on or after age 62.*

*For members on long-term disability, the actuarial accrued liability is the present value of benefits under active assumptions plus the difference of the present value of benefits with and without future pay growth to reflect indexing of pay in ultimate retirement benefits.*

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The actuarial valuation computations were made by or under the supervision of Brad Lee Armstrong and David T. Kausch who are Members of the American Academy of Actuaries (MAAA).



**Separations from Active Employment before Service Retirement  
and Individual Pay Increase Assumptions  
as of June 30, 2014**

Sample Ages	Years of Service	Percent of Active Members ----- Separating within the Next Year -----						Pay Increase Assumptions -- For An Individual Employee --		
		Withdrawal ***		Death*		Disability		Merit & Seniority**	Base (Economy)	Increase Next Year
		Men	Women	Men	Women	Men	Women			
	0	23.0 %	26.9 %							
	1	18.0	20.5							
	2	15.0	15.4							
	3	13.0	12.5							
	4	11.0	10.9							
25	5+	13.0	13.3	0.03 %	0.01 %	0.17 %	0.30 %	2.9 %	3.0 %	5.9 %
30		10.2	10.5	0.04	0.02	0.17	0.30	2.2	3.0	5.2
35		7.9	8.1	0.07	0.03	0.21	0.30	1.6	3.0	4.6
40		5.6	5.7	0.09	0.04	0.26	0.32	1.2	3.0	4.2
45		4.2	4.3	0.12	0.07	0.34	0.38	0.9	3.0	3.9
50		2.8	2.9	0.16	0.10	0.49	0.57	0.7	3.0	3.7
55		2.8	2.9	0.27	0.19	1.07	0.89	0.5	3.0	3.5
60		2.8	2.9	0.52	0.37	1.50	1.50	0.4	3.0	3.4
65		2.8	2.9	1.02	0.72	1.60	1.70	0.3	3.0	3.3
70		2.8	2.9	1.74	1.24	1.60	1.70	0.2	3.0	3.2

- \* 2% of the deaths in active service are assumed to be duty related.
- \*\* Does not apply to members of the General Assembly.
- \*\*\* Does not apply to Elected Officials and Legislators.

**Elected Officials and Legislators**

Percent of Active Members Separating within the Next Year	
Years of Service	Withdrawal Male/Female
1	8.0 %
2	8.0
3	8.0
4	8.0
5	12.0
6	12.0
7	12.0
8+	35.0

## Post-Retirement Mortality Rates

The mortality tables were the RP 2000 mortality table, projected to 2016 with Scale AA, including a margin of 15% for men and 17% for women for mortality improvements. Disabled mortality tables are the healthy mortality tables set forward 10 years. The pre-retirement mortality rates used were 100% of the post-retirement mortality rates for males and 80% of the post-retirement mortality for females.

Age	Service		Disability	
	Men	Women	Men	Women
45	0.0012	0.0009	0.0027	0.0024
50	0.0016	0.0013	0.0052	0.0047
55	0.0027	0.0024	0.0102	0.0090
60	0.0052	0.0047	0.0174	0.0155
65	0.0102	0.0090	0.0302	0.0247
70	0.0174	0.0155	0.0548	0.0410
75	0.0302	0.0247	0.0990	0.0703
80	0.0548	0.0410	0.1720	0.1255
85	0.0990	0.0703	0.2591	0.1884

## Retirement Values June 30, 2014

Sample Attained Ages	Present Value of \$1/Month the First Year (with 50% Joint & Survivor) Increasing 4.0% / 2.0% Yearly				Present Value of \$1/Month the First Year Increasing 2.0% Yearly			
	Service		Disability		Service		Disability	
	Men	Women	Men	Women	Men	Women	Men	Women
40	\$224.11	\$224.12	\$212.76	\$211.89	\$184.40	\$186.75	\$169.01	\$172.32
45	217.22	217.01	202.65	201.39	177.68	180.43	157.94	162.08
50	208.28	207.81	190.14	188.39	169.01	172.32	144.49	149.76
55	196.76	196.07	175.18	172.83	157.94	162.08	128.94	135.56
60	182.48	181.61	157.88	154.80	144.49	149.76	111.76	119.87
65	165.46	164.49	138.11	134.44	128.94	135.56	92.72	102.82
70	145.94	144.91	116.94	112.03	111.76	119.87	73.10	84.62
75	123.90	123.17	96.04	88.83	92.72	102.82	55.15	66.19
80	100.55	100.10	76.52	68.15	73.10	84.62	40.28	50.49
85	78.09	77.41	59.89	52.82	55.15	66.19	30.32	40.10

Sample Attained Ages	Future Life Expectancy (Years)			
	Service		Disability	
	Men	Women	Men	Women
40	41.95	44.10	32.39	34.43
45	37.15	39.24	27.68	29.69
50	32.39	34.43	23.13	25.13
55	27.68	29.69	18.87	20.84
60	23.13	25.13	14.96	16.90
65	18.87	20.84	11.39	13.32
70	14.96	16.90	8.29	10.12
75	11.39	13.32	5.83	7.37
80	8.29	10.12	4.03	5.31
85	5.83	7.37	2.91	4.05

## Percent of Eligible Active Members Retiring Next Year

Normal Retirement Pattern					Early Retirement Pattern		
Retirement Age	MSEP and MSEP 2000*			MSEP 2011**	Retirement Age	MSEP and MSEP 2000*	MSEP 2011**
	Percent Eligible			Percent Eligible		Percent Eligible	Percent Eligible
	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year				
48	22%						
49	22	10%					
50	22	10	21%				
51	22	10	21				
52	22	10	21				
53	22	10	18				
54	22	10	18				
55	22	12	26	45%			
56	22	12	25	45			
57	22	12	22	35	57	2.5%	
58	22	12	22	35	58	3.5	
59	22	12	20	30	59	3.5	
60	21	12	22	35	60	5.0	
61	20	12	20	25	61	6.0	
62	19	22	30	40	62	6.0	10%
63	15	18	25	30	63	6.0	10
64	15	20	17	20	64	6.0	10
65	20	20	27	30	65	6.0	50
66	22	20	26	25	66	6.0	50
67	15	25	22	20	67	6.0	
68	15	20	22	20	68	6.0	
69	15	20	22	20	69	6.0	
70	25	20	22	20	70	6.0	
71	25	20	22	20	71	6.0	
72	25	20	22	20	72	6.0	
73	25	20	22	20	73	6.0	
74	25	20	22	20	74	6.0	
75	50	50	22	50	75	6.0	
76	50	50	22	50	76	6.0	
77	75	75	22	75	77	6.0	
78	100	100	100	100	78	100.0	

\* For members hired prior to January 1, 2011.

\*\* For members hired on or after January 1, 2011.