



**Minnesota Legislative Commission  
on Pensions and Retirement**

**Replication of the Actuarial Valuation of the  
Minnesota State Retirement System  
State Employees Retirement Fund  
as of July 1, 2010**

Prepared by:

**Milliman, Inc.**

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Principal & Consulting Actuary

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Consulting Actuary

March 23, 2011

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March 23, 2011

Minnesota Legislative Commission  
on Pensions and Retirement  
State Office Building, Room 55  
100 Rev. Dr. Martin Luther King Jr. Boulevard  
St. Paul, Minnesota 55155

Attention: Mr. Lawrence A. Martin, Executive Director

Ladies and Gentlemen:

The enclosed report presents the findings and comments resulting from a review and replication of the July 1, 2010 actuarial valuation of the State Employees Retirement Fund (Fund) administered by the Minnesota State Retirement System (MSRS). An overview of our major findings is included in the Executive Summary section of the report. More detailed commentary and information is provided in the sections that follow.

We pursued this analysis and review with a constructive mindset. We looked to identify any possible suggestions that might improve understanding of or confidence in the actuarial services being provided. Naturally, some of the comments may be viewed as personal preference or nit-picky in nature. While we are not trying to impose our own preferences or biases on the Fund or the retained actuary, neither did we hesitate to make such comments if we believed that some change, however minor, would improve the actuarial functions.

This report has been prepared for use by the Minnesota Legislative Commission on Pensions and Retirement (LCPR) in their oversight role with regard to the Fund. It has been prepared using Milliman valuation systems in a manner that would be used by Milliman to prepare a full actuarial valuation of the Fund. We recognize that there are hundreds of thousands of complex calculations performed by the actuarial valuation system. For this reason, even the smallest differences between valuation systems can produce noticeable differences in the valuation results between two different actuaries.

In preparing this report, we have relied without audit on the employee data, plan provisions, value of the plan assets and other plan financial information as provided by various involved entities including your office, MSRS, Fund Actuary and others. We have reviewed this data for reasonableness and for consistency with previously supplied information. If any of this information as summarized in this report is inaccurate or incomplete, the results shown could be materially affected and this report may need to be revised.

On the basis of the foregoing we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the principles prescribed by the Actuarial Standards Board (ASB) and the Code of Professional Conduct and Qualification Standards for Public Statements of Actuarial Opinion of the American Academy of Actuaries.

Any distribution of the enclosed report must be in its entirety including this cover letter, unless prior written consent is obtained from Milliman, Inc. This report has been prepared in accordance with the terms and provisions of the Consulting Services Agreement effective November 25, 2009.

March 23, 2011  
Page Two

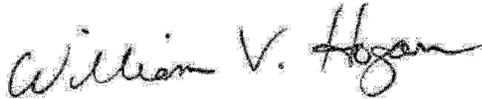
I, William V. Hogan, FSA, am an actuary for Milliman, Inc. I am a member of the American Academy of Actuaries and a Fellow of the Society of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

I, Allan L. Bittner, FSA, am an actuary for Milliman, Inc. I am a member of the American Academy of Actuaries and a Fellow of the Society of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

We look forward to making a personal presentation of our findings in briefings to the Minnesota Legislative Commission on Pensions and Retirement and to relevant staff members.

Respectfully submitted,

Milliman, Inc.



William V. Hogan, FSA, MAAA  
Principal & Consulting Actuary



Allan L. Bittner, FSA, MAAA  
Consulting Actuary

WVH/ALB/cw

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### Opinion Letter

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## Executive Summary

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### **Purpose and Scope of the Actuarial Replication Audit**

In accordance with Minnesota Statutes, Section 356.214, Subdivision 4, the LCPR has engaged Milliman, Inc. to perform a replication of the July 1, 2010 actuarial valuation of the Fund administered by MSRS.

In performing the replication of the actuarial valuation, we follow several well defined steps. These steps involve a review and cleansing of the data used in the actuarial valuation, an assessment of the plan provisions to be valued, analysis of the actuarial assumptions to be applied, review of the reported value of plan assets as of the valuation date, prepare the actuarial calculations using appropriate computer programming and summarizing the results. All of the above steps are to be applied in accordance with the requirements of Minnesota statutes and the Actuarial Standards For Actuarial Work adopted by the LCPR.

In conducting our work, we initially prepared the above steps independently from the work of the Fund actuary. After completing that work, we conducted a review of some individual benefit trace information in order to identify any key differences in programming or technique. We then prepared a summary of the key valuation results, showing a comparative of our results to those of the Fund actuary. Please note that we have shown costs assuming beginning of the year decrements in order to match with the Fund actuary. We have also provided costs assuming mid-year decrements in accordance with the Actuarial Standards for Actuarial Work.

It is important to recognize that the actuarial valuation process, while very sophisticated in its calculation methodology, is still an estimate of the financial value of benefits payable on contingent events, most of which occur many years into the future. As such, a considerable amount of uncertainty and variability surrounds those estimates. As actuaries we recognize this fact and are comfortable that small differences (in percentages) in the results do not change the overall financial results portrayed in the valuation. Furthermore, the actuarial software used by different firms has implicit differences that create differences in the valuation numbers. For this reason, we believe the comparison of valuation results should be evaluated in terms of percentage differences. To provide some context to our comments, in a replication audit, where the differences that are identified can also be quantified, we generally expect to be within 1%-2% on the calculation of the present value of future benefits and within 4%-5% on the calculation of the actuarial accrued liability and normal cost. The wider range on the latter items is because there tends to be more variability in how different actuarial software programs allocate the total liability (present value of future benefits) to past and future years of service.

### **Statement of Findings**

In general, we found the actuarial calculations by the Fund actuary to be reasonably consistent with our own separate calculations to within a reasonable degree of tolerance. Where we saw differences, we attempted to identify the reasons. Overall, we are satisfied that the July 1, 2010 actuarial valuation results for the Fund as prepared by the Fund actuary present a fair and reasonable representation of the present value of future benefits, actuarial liabilities and contribution requirements for the Fund.

The following commentary provides our main conclusions on the various areas of our review:

## Executive Summary

(continued)

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- **Membership Data:** Our raw data counts matched up with the counts as summarized by MSRS. After applying our own cleansing methods, our valuation data count was the same count as reported by the Fund actuary. Our conclusion is that the Fund actuary is correctly applying the data received from MSRS.
- **Plan Provisions:** We started with the summary of plan provisions for the Fund that Milliman reviewed last year and modified those provisions to reflect the changes enacted due to recent legislation. After reviewing the actuarial report prepared by the Fund actuary, we believe that their summary of plan provisions is consistent with our understanding of the current plan provisions. One small technical exception that has no actuarial cost impact is the description of early retirement eligibility. Minnesota statute 352.115 appears to allow for early retirement (with reduction) for any age with 30 years of service. Since no members are assumed to retire prior to age 55, the omission of this provision has no practical impact. In addition, the Fund actuary's report on early retirement omits the change in augmentation from 3.0% to 2.5% for members hired after June 30, 2006 pursuant to Minnesota statute 352.116.
- **Actuarial Assumptions and Methods:** In general, we believe that the assumptions and methods employed by the Fund actuary are reasonable and consistent with statutes and the Standards for Actuarial Work with one exception. We do note that the valuation results prepared by the Fund actuary are based upon beginning of the year decrement timing. While we prefer mid-year decrement timing, we note that the Standards for Actuarial Work would allow for either mid-year or end of the year decrement timing for the 2010 actuarial valuations. Upon further discussion with the Fund actuary, it is our understanding that beginning of the year decrement timing is consistent with results published in prior years. Consequently, the use of this timing in the 2010 actuarial valuation should be consistent with prior year results. In addition, we note that the Fund actuary has assumed that former Members with deferred vested benefits will elect a single life annuity. Our valuation assumes that percentages of these Members will elect optional forms the same as for regular retirements. We believe that either assumption is reasonable; however, our preference is to use the "blended" assumption.
- **Actuarial Value of Assets:** We believe that the Fund actuary has fairly and correctly presented the actuarial value of assets.
- **Valuation System Results:** Based upon our own valuation system results, we were able to match the Fund actuary valuation results within 1% on the present value of future benefits and within 1% on the actuarial liabilities. However, we are about 7.0% different on the Normal Cost when valued using beginning of the year assumption for the occurrence of decrements. This difference is a little larger than would be desired. Since we are very close in our values for total present value of benefits, at issue is how costs are allocated between past and future service. While we have attempted to identify programming differences in this methodology, we have been unable to resolve this difference to date. Under the entry age method, this difference can occur due to a number of different methodologies or computer techniques involving the calculation of entry age, present value of future salary, cutoff points, etc. We have also run our actuarial valuation assuming a mid-year assumption for decrements. The result of this change is a modest decrease in Accrued Liability but an increase in normal costs over the beginning of the year calculations.

## Executive Summary

(continued)

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- Valuation Report: We believe the actuarial valuation report prepared by the Fund actuary provides all of the information required by the Standards for Actuarial Work. Overall, the work by the Fund actuary is comprehensive and thorough. We note that some of the healthy pre-retirement mortality rates reported in the assumptions do not appear to be consistent with the table that is referenced. In particular, the mortality rates for ages under 30 and over 70 are slightly different than the values in the referenced tables. In our discussions with the fund actuary, we understand the fund actuary's firm-wide approach is to use a modification of the referenced table to extend the "white collar adjustment" included in the standard tables. We do not disagree with this approach. However, we recommend the fund actuary modify the description of the table to specify this adjustment. Because this comment only affects the description of the mortality assumption, there is no impact on the valuation results. On a more "nit-picky" level, we note that the reported salary increase assumption for ages 45, 50, 55 and 60 are incorrect. After discussing with the Fund actuary, they have been confirmed to be typing errors and that the valuation results are accurate.
- COLA: As part of legislation enacted earlier in 2010, the annual Cost of Living Adjustment (COLA) applied to the pensions of retired Members was changed from 2.5% to 2.0%. However, if the Fund achieves a 90% funded ratio on the market value of assets to actuarial liability, the COLA will increase back to 2.5%. The valuation by the Fund actuary assumes that the lower 2.0% COLA will remain in place for all years. Based upon the current fund ratio and the current level of contributions, we believe this to be a reasonable assumption. This does create interesting questions for future valuations if the funded ratio improves and/or contribution levels are raised. Questions such as (1) when is it appropriate to assume the return to a 2.5% COLA for valuation purposes and (2) how to handle the situation when the COLA achieves a 90% funded ratio when 2.0% is applied but is less than 90% when 2.5% is applied? We believe that these questions should be addressed in the near future.

## Principal Valuation Results

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This section provides a summary of the key measurements from the July 1, 2010 Actuarial Valuation. In this section, we have provided two columns of numbers from Milliman. The middle column reflects a valuation basis which assumes all decrements (death, retirement, disability, turnover, etc.) occur at the beginning of the year. The far right column provides our calculations assuming that decrements occur during the middle of the valuation year. We have provided the middle column for comparative purposes to the Fund Actuary numbers. We have provided the midyear column for information regarding the impact from assuming beginning of the year decrements to middle of the year decrements.

In general, our beginning of the year calculations provide slightly higher funding ratios and slightly lower required contributions. By moving the assumed decrements to midyear, the present value of benefits becomes lower. As a result, the funding ratios improve and the required contributions decrease. As the numbers show, we were able to match the primary data totals with those shown by the Fund actuary in almost all cases.

## Principal Valuation Results

	Actuarial Valuation as of		July 1, 2010 (Milliman Midyear)
	July 1, 2010 (Fund Actuary)	July 1, 2010 (Milliman)	
<b><u>Contributions</u></b> (% of Payroll)			
Statutory – Chapter 352	10.00%	10.00%	10.00%
Required – Chapter 356	10.99%	10.47%	10.91%
Sufficiency/(Deficiency)	(0.99)%	(0.47)%	(0.91)%
Required – Chapter 356 (market assets)	13.90%	13.36%	13.80%
Sufficiency/(Deficiency) – market assets	(3.90)%	(3.36)%	(3.80)%
<b><u>Unfunded Actuarial Accrued Liability</u></b>			
Based upon AVA	\$ 1,303,680	\$ 1,351,152	\$ 1,127,021
Based upon MVA	2,571,540	2,619,013	2,394,882
<b><u>Funding Ratios</u></b> (dollars in thousands)			
Accrued Benefit Funding Ratio			
Current assets (AVA)	\$ 8,960,391	\$ 8,960,392	\$ 8,960,392
Current benefit obligations	9,879,753	9,707,827	9,644,980
Funding ratio	90.69%	92.30%	92.90%
Accrued Liability Funding Ratio			
Current assets (AVA)	8,960,391	8,960,392	\$ 8,960,392
Current assets (MVA)	7,692,531	7,692,531	7,692,531
Actuarial accrued liability	10,264,071	10,292,248	10,156,202
Funding ratio (AVA)	87.30%	87.06%	88.23%
Funding ratio (MVA)	74.95%	74.74%	75.74%
Projected Benefit Funding Ratio			
Current and expected future assets	11,200,516	11,400,894	11,189,509
Current and expected future benefit obligations	11,633,641	11,583,203	11,586,779
Funding ratio	96.28%	98.43%	96.57%
<b><u>Participant Data</u></b>			
Active Members			
Number	48,494	48,494	48,494
Projected annual earnings (000s)	\$2,483,519	\$ 2,492,577	\$ 2,492,577
Average projected annual earnings	51,213	51,400	51,400
Average age	47.0	47.0	47.0
Average service	12.7	12.7	12.7
Service Retirements	23,337	23,337	23,337
Survivors	3,414	3,414	3,414
Disability Retirements	1,684	1,684	1,684
Deferred Retirements	15,388	15,388	15,388
Terminated Other Non-vested	6,537	6,537	6,537
<b>TOTAL</b>	<b>98,854</b>	<b>98,854</b>	<b>98,854</b>

## Plan Assets

### Statement of Plan Net Assets for Year Ended June 30, 2010

(dollars in thousands)

We received asset information from the Minnesota State Retirement System which provided assets by class as of June 30, 2010. We have reviewed these assets and summarized them below. Our summary exactly matches the summary provided by the Fund actuary in their Actuarial Valuation Report.

	Market Value		Cost Value	
	Fund Actuary	Milliman	Fund Actuary	Milliman
<b>Assets in Trust</b>				
Cash, equivalents, short term securities	\$ 165,194	\$ 165,194	\$ 165,194	\$ 165,194
Fixed income	1,888,987	1,888,987	1,701,974	1,701,974
Equity	5,623,170	5,623,170	5,398,604	5,398,604
Other	<u>5,899</u>	<u>5,899</u>	<u>5,899</u>	<u>5,899</u>
Total Assets in Trust	<b>7,683,250</b>	<b>7,683,250</b>	<b>7,271,671</b>	<b>7,271,671</b>
Assets Receivable	<u>19,043</u>	<u>19,043</u>	<u>19,043</u>	<u>19,043</u>
<b>Total Assets</b>	<b>7,702,293</b>	<b>7,702,293</b>	<b>7,290,714</b>	<b>7,290,714</b>
Amounts Payable	<u>(9,762)</u>	<u>(9,762)</u>	<u>(9,762)</u>	<u>(9,762)</u>
<b>Net Assets Held in Trust for Pension Benefits</b>	<b>\$7,692,531</b>	<b>\$7,692,531</b>	<b>\$7,280,952</b>	<b>\$7,280,952</b>

## Plan Assets

### Reconciliation of Plan Assets

(dollars in thousands)

The following exhibit shows the revenue, expenses and resulting assets of the Fund as reported by the Minnesota State Retirement System for the Plan's Fiscal year July 1, 2009 to June 30, 2010.

We received this information directly from MSRS and summarized it below. Our summary matches the summary provided by the Fund actuary. One item to note is that the information we received indicates that line item 4., "Other," consists of non-investment income amounts such as transfers in, etc. It is our understanding that this item was considered investment income in prior years.

	Market Value	
	Fund Actuary	Milliman
<b>1. Fund Balance at Market Value at July 1, 2009</b>	<b>\$6,897,118</b>	<b>\$6,897,118</b>
2. Contributions		
a. Member	115,180	115,180
b. Employer	113,716	113,716
c. Other sources	<u>0</u>	<u>0</u>
d. Total contributions	228,896	228,896
3. Investment Income		
a. Investment income/(loss)	1,051,863	1,051,863
b. Investment expenses	<u>(10,990)</u>	<u>(10,990)</u>
c. Total investment income/(loss)	1,040,873	1,040,873
4. Other	<u>14,626</u>	<u>14,626</u>
<b>5. Total Income (2.d. + 3.c. + 4.)</b>	<b>\$1,284,395</b>	<b>\$1,284,395</b>
6. Benefits Paid		
a. Annuity benefits	(473,447)	(473,447)
b. Refunds	<u>(9,733)</u>	<u>(9,733)</u>
c. Total benefits paid	(483,180)	(483,180)
7. Expenses		
a. Other	(31)	(31)
b. Administrative	<u>(5,771)</u>	<u>(5,771)</u>
c. Total expenses	(5,802)	(5,802)
<b>8. Total Disbursements (6.c. + 7.c.)</b>	<b>(488,982)</b>	<b>(488,982)</b>
<b>9. Fund Balance at Market Value at June 30, 2010 (1. + 5. + 8.)</b>	<b>\$7,692,531</b>	<b>\$7,692,531</b>

## Plan Assets

### Actuarial Asset Value

(dollars in thousands)

Based upon the assets reported to us by MSRS and prior year actuarial valuation information regarding unrecognized asset returns, we have constructed the Actuarial Value of Assets for the July 1, 2010 Actuarial Valuation. Our calculation matches the Fund actuary except for small rounding of the Unrecognized Asset Returns for the year ended June 30, 2009. One other item to note is that the actual return reported for determining asset gains and losses in the smoothing method does not include "Other Income" this year as it was determined that this amount did not consist of investment income as stated on the previous page. Based upon that information, we believe this change is reasonable; however, we note that it does reflect a change in the treatment of this item for purposes of determining asset smoothing gains and losses. If that amount (\$14,626) had been included as part of asset gains for smoothing purposes, the Actuarial Value of Assets would be lower by approximately \$11,701.

### FUND ACTUARY

	<u>June 30, 2010</u>		
1. Market Value of Assets Available for Benefits			\$7,692,531
2. Determination of Average Balance			
a. Total assets available at July 1, 2009			6,897,118
b. Total assets available at June 30, 2010			7,692,531
c. Net investment income for fiscal year ending June 30, 2010			1,040,873
d. Average balance [a.+ b. – c.] / 2			6,774,388
3. Expected Return [8.5% x 2.d.]			575,823
4. Actual Return			1,040,873
5. Current Year Asset Gain/(Loss) [4. – 3.]			465,050
6. Unrecognized Asset Returns*			
	<b>Original Amount</b>	<b>% Not Recognized</b>	
a. Year ended June 30, 2010	\$ 465,050	80%	\$ 372,040
b. Year ended June 30, 2009	(2,397,363)	60	(1,438,417)
c. Year ended June 30, 2008	(747,984)	40	(299,194)
d. Year ended June 30, 2007	488,554	20	<u>97,711</u>
e. Total unrecognized return			(1,267,860)
7. Actuarial Value at June 30, 2010 (1. – 6.e.)			\$8,960,391

\*Prior to the year ending June 30, 2009, unrecognized asset returns do not include MPRIF gains or losses.

## Plan Assets

### Actuarial Asset Value (dollars in thousands)

#### MILLIMAN

	<b>June 30, 2010</b>		
1. Market Value of Assets Available for Benefits			\$7,692,531
2. Determination of Average Balance			
a. Total assets available at July 1, 2009			6,897,118
b. Total assets available at June 30, 2010			7,692,531
c. Net investment income for fiscal year ending June 30, 2010			1,040,873
d. Average balance [a.+ b. – c.] / 2			6,774,388
3. Expected Return [8.5% x 2.d.]			575,823
4. Actual Return			1,040,873
5. Current Year Asset Gain/(Loss) [4. – 3.]			465,050
6. Unrecognized Asset Returns*			
	<b>Original Amount</b>	<b>% Not Recognized</b>	
a. Year ended June 30, 2010	\$ 465,050	80%	\$ 372,040
b. Year ended June 30, 2009	(2,397,363)	60	(1,438,418)
c. Year ended June 30, 2008	(747,984)	40	(299,194)
d. Year ended June 30, 2007	488,554	20	<u>97,711</u>
e. Total unrecognized return			(1,267,860)
7. Actuarial Value at June 30, 2010 (1. – 6.e.)			\$8,960,392

\*Prior to the year ending June 30, 2009, unrecognized asset returns do not include MPRIF gains or losses.

**Development of Costs**  
**Actuarial Valuation Balance Sheet**  
(dollars in thousands)

The actuarial balance sheet is based on the fundamental equation that at any given time the present value of benefits to be paid in the future must be equal to the assets on hand plus the present value of future contributions to be received. The total rate of contribution is determined as the amount which will make the total present and potential assets balance with the total present value of future benefits. The members' rate of contribution is fixed at the current schedule. The employer's rate of contribution is the balance required to cover the total rate of contribution.

The contributions made in excess of amounts required for current benefit payments are accumulated as a reserve to help meet benefit payments in later years. It is this reserve system which permits the establishment of a level rate of contribution each year.

	<u>June 30, 2010</u> <u>(Fund Actuary)</u>	<u>June 30, 2010</u> <u>(Milliman)</u>	<u>June 30, 2010</u> <u>(Milliman Midyear)</u>
A. Actuarial Value of Assets	\$ 8,960,391	\$ 8,960,392	\$8,960,392
B. Expected Future Assets			
1. Present value of expected future statutory supplemental contributions	870,555	1,149,547	798,540
2. Present value of future normal cost contributions	<u>1,369,570</u>	<u>1,290,955</u>	<u>1,430,577</u>
3. Total expected future assets (1. + 2.)	2,240,125	2,440,502	2,229,117
C. Total Current and Expected Future Costs	\$11,200,516*	11,400,894*	11,189,509*
D. Current Benefit Obligations			
1. Benefit recipients			
a. Service retirements	3,931,303	3,950,046	3,950,046
b. Disability	194,458	195,674	195,674
c. Survivors	409,640	427,090	427,090
2. Deferred retirement with augmentation	1,156,208	1,155,472	1,155,472
3. Former members without vested rights**	13,284	13,279	13,279
4. Active members	<u>4,174,860</u>	<u>3,966,266</u>	<u>3,903,419</u>
5. Total current benefit obligations	9,879,753	9,707,827	9,644,980
E. Expected Future Benefit Obligations	1,753,888	1,875,376	1,941,799
F. Total Current and Expected Future Benefit Obligations	11,633,641	11,583,203	11,586,779
G. Unfunded Current Benefit Obligations (D.5. – A.)	919,362	747,435	684,588
H. Unfunded Current and Future Benefit Obligations (F. – C.)	433,125	182,309	397,270

\*Does not reflect deferred investment losses due to the asset smoothing method. Total expected future assets on a market value basis are \$9,932,656,000.

\*\*Former members with less than three years of service in this plan that have not collected a refund of member contributions as of the valuation date.

## Development of Costs

### Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate (dollars in thousands)

In the tables that follow the Commentary in this section, we provide the calculations which ultimately determine the required supplemental contribution rate. From these tables, a critical calculation is the Actuarial Present Value of Projected Benefits. This calculation reflects the actuary's estimate of the total present value cost of all benefits yet to be paid by the Fund to the current members (active and inactive). In replication audits, we typically strive to be within 2% of the actuary's calculation. If that level cannot be achieved, then it is important to identify the differences in more detail. When using the beginning of the year decrement methodology, we match very closely with the Fund actuary's numbers. When midyear decrements are applied, our numbers become a little further apart. This was expected since we were aware of the methodology difference in advance. The following comments show, as a percentage, the ratio of each column to the reported numbers by the Fund actuary:

	<b>Actuarial Present Value of Projected Benefits</b>		
	<b>Fund</b>		
	<b>Actuary</b>	<b>Milliman</b>	<b>Milliman Midyear</b>
Active Members	100.0%	99.0%	99.0%
Deferred members	100.0	99.9	99.9
Former Members Without Vested Rights	100.0	100.0	100.0
Benefit Recipients	<u>100.0</u>	<u>100.2</u>	<u>100.2</u>
Total	100.0%	99.6%	99.6%

The tables that follow the Actuarial Present Value of Projected Benefits are designed to determine how much of the Actuarial Present Value of Projected Benefits is to be funded by the future "normal cost" contributions (Actuarial Present Value of Future Normal Cost) versus how much belongs to past contributions (Actuarial Accrued Liability). This allocation does not change the total costs determined in the Actuarial Present Value of Projected Benefits. It simply allocates cost to past versus future based upon the Entry Age Normal actuarial cost method. In replication audits, we typically look to be within 5% of the actuary's calculations for active member Actuarial Accrued Liability. The larger range recognizes that different valuation systems have different ways of rounding service and ages. In addition, the Entry Age Method requires projection of theoretical past amounts which can be handled somewhat differently between actuarial valuation systems. The following amounts show, as a percentage, the ratio of each column to the reported numbers by the Fund actuary.

	<b>Actuarial Accrued Liability</b>		
	<b>Fund</b>		
	<b>Actuary</b>	<b>Milliman</b>	<b>Milliman Midyear</b>
Active Members	100.0%	100.4%	97.4%
Deferred members	100.0	99.9	99.9
Former Members Without Vested Rights	100.0	100.0	100.0
Benefit Recipients	<u>100.0</u>	<u>100.2</u>	<u>100.2</u>
Total	100.0%	100.3%	98.9%

## Development of Costs

### Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate (dollars in thousands)

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Once the Actuarial Accrued Liability is determined, it is compared to the Actuarial Value of Assets to determine the funded amount. The difference between these numbers is then amortized over thirty years based upon the present value of future payrolls. Because this calculation is based upon the difference of two relatively close numbers, any change in one of the numbers can have a large impact when viewed as a percentage.

For example, if the Actuarial Accrued Liability is \$1,000 and the Actuarial Value of Assets is \$900, then unfunded liability is \$100. If the Actuarial Accrued Liability is reduced by \$25, the unfunded liability becomes \$75. In this example, the reduction in the Actuarial Accrued Liability of 2.5% generates a reduction of 25% in both the unfunded liability and the supplemental contribution rate.

Based upon the above, it should be expected that small deviations in the amount of Actuarial Accrued Liability will have a larger impact on the supplemental contribution rate. It is evidenced here where our calculation of the Actuarial Accrued Liability is 0.3% higher than the Fund actuary but our supplemental contribution rate is 1.7% higher than the Fund actuary.

## Development of Costs

### Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate (dollars in thousands)

	Actuarial Present Value of Projected Benefits		
	Fund Actuary	Milliman	Milliman Midyear
1. Active members			
a. Retirement annuities	\$ 5,279,481	\$5,241,037	\$5,245,609
b. Disability benefits	222,322	205,247	205,226
c. Survivor's benefits	121,014	119,182	118,915
d. Deferred retirements	180,894	195,099	204,404
e. Refunds	<u>98,408</u>	<u>81,076</u>	<u>71,064</u>
f. Total	5,902,119	5,841,641	5,845,218
2. Deferred retirements with future augmentation	1,156,208	1,155,472	1,155,472
3. Former members without vested rights	13,284	13,279	13,279
4. Benefit recipients	4,535,401	4,572,810	4,572,810
5. Contingent actuarial accrued liability – UNCL Plan	<u>26,629</u>	Included in (4)	Included in (4)
6. Total	\$11,633,641	\$11,583,203	\$11,586,779

	Actuarial Present Value of Future Normal Costs		
	Fund Actuary	Milliman	Milliman Midyear
1. Active members			
a. Retirement annuities	\$ 1,016,194	\$970,353	\$1,010,494
b. Disability benefits	76,081	67,350	70,870
c. Survivor's benefits	35,291	36,378	38,248
d. Deferred retirements	121,617	95,527	104,792
e. Refunds	<u>120,387</u>	<u>121,347</u>	<u>206,173</u>
f. Total	1,369,570	1,290,955	1,430,577
2. Deferred retirements with future augmentation	0	0	0
3. Former members without vested rights	0	0	0
4. Benefit recipients	0	0	0
5. Contingent actuarial accrued liability – UNCL Plan	<u>0</u>	<u>0</u>	<u>0</u>
6. Total	\$ 1,369,570	\$1,290,955	\$1,430,577

## Development of Costs

### Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate (dollars in thousands)

	Actuarial Accrued Liability		
	Fund Actuary	Milliman	Milliman Midyear
<b>A. Determination of Actuarial Accrued Liability (AAL)</b>			
1. Active members			
a. Retirement annuities	\$ 4,263,287	\$ 4,270,684	\$ 4,235,115
b. Disability benefits	146,241	137,897	134,356
c. Survivor's benefits	85,723	82,804	80,667
d. Deferred retirements	59,277	99,572	99,612
e. Refunds	<u>(21,979)</u>	<u>(40,271)</u>	<u>(135,109)</u>
f. Total	4,532,549	4,550,687	4,414,641
2. Deferred retirements with future augmentation	1,156,208	1,155,472	1,155,472
3. Former members without vested rights	13,284	13,279	13,279
4. Benefit recipients	4,535,401	4,572,810	4,572,810
5. Contingent actuarial accrued liability – UNCL Plan	<u>26,629</u>	<u>Included in (4)</u>	<u>Included in (4)</u>
6. Total	10,264,071	10,292,248	10,156,202
<b>B. Determination of Unfunded Actuarial Accrued Liability (UAAL)</b>			
1. Actuarial accrued liability	10,264,071	10,292,248	10,156,202
2. Current assets (AVA)	<u>8,960,391</u>	<u>8,960,392</u>	<u>8,960,392</u>
3. Unfunded actuarial accrued liability	1,303,680	1,331,856	1,195,810
<b>C. Determination of Supplemental Contribution Rate*</b>			
1. Present value of future payrolls through the amortization date of July 1, 2040	43,578,379	43,875,840	43,875,840
2. Supplemental contribution rate (B.3. / C.1.)	2.99%	3.04%	2.73%

\*The amortization of the unfunded actuarial accrued liability (UAAL) using the current amortization method results in initial payments less than the "interest only" payment on the UAAL. Payments less than the interest only amount will result in the UAAL increasing for an initial period of time.

## Development of Costs

### Determination of Contribution Sufficiency/(Deficiency)

(dollars in thousands)

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In this section, we compare the statutory contributions provided under Chapter 352 of Minnesota statutes (352 contributions) to the required contributions under chapter 356 of Minnesota statutes (356 contributions). The difference between these amounts results in a reported contribution sufficiency or deficiency.

With respect to the 352 contributions, the percentage is set by statute and we agree with the percentages reported by the Fund actuary. The dollar amount is determined by applying the statutory percentage to the member compensation provided in the data file and projected (and annualized where necessary) with expected pay increases for the upcoming year. While reasonably close, our projection methodology was slightly different from the Fund actuary resulting in a small dollar difference.

With respect to the 356 contributions, the total is equal to the sum of the Normal Cost (Entry Age Normal method) plus the supplemental contribution calculated earlier in this report plus an allowance for expected administrative expenses. Typically, in a replication audit, it is desirable to be within 5% of the actuary's Normal Cost. In this case, our Normal Cost is 7.1% lower than the Fund actuary. We do note that our components of Normal Cost are somewhat different from the Fund actuary. This is not an uncommon result as the treatment of where to categorize certain costs on an "entry age" basis between actuarial valuation systems quite often results in these differences.

As mentioned earlier, the supplemental contributions are highly leveraged to the value of the Actuarial Accrued Liability. In this case, our supplemental contribution percentage is higher by 1.7% but this is based upon an Actuarial Accrued Liability that is higher by 0.3%.

Similar to the 352 contributions, we arrive at the same expense allowance percentage but our dollar contribution is different due to payroll projection methodology.

As a result of the above, our calculation of the Contribution Sufficiency/Deficiency is a deficiency of (0.47)%. This compares to a deficiency reported by the Fund actuary of (0.99)%. The difference of 0.52% is primarily the result of the normal cost rate difference. When viewing our midyear results, the contribution deficiency shrinks even further. The overall conclusion from these results is that a contribution deficiency exists and that it is less than (1.0)%.

## Development of Costs

### Determination of Contribution Sufficiency/(Deficiency) (dollars in thousands)

	Fund Actuary July 1, 2010		Milliman July 1, 2010		Milliman Midyear July 1, 2010	
	Percent of Payroll	Dollar Amount	Percent of Payroll	Dollar Amount	Percent of Payroll	Dollar Amount
A. Statutory Contributions – Chapter 352						
1. Employee contributions	5.00%	\$124,176	5.00%	\$124,629	5.00%	\$124,629
2. Employer contributions	<u>5.00</u>	<u>124,176</u>	<u>5.00</u>	<u>124,629</u>	<u>5.00</u>	<u>124,629</u>
3. Total	10.00	248,352	10.00	249,982	10.00	249,982
B. Required Contributions – Chapter 356						
1. Normal cost						
a. Retirement benefits	5.91	146,695	5.55	138,275	5.78	143,911
b. Disability benefits	0.41	10,138	0.35	8,813	0.37	9,247
c. Survivors	0.20	5,070	0.20	4,845	0.20	5,077
d. Deferred retirement benefits	0.68	16,944	0.49	12,274	0.53	13,247
e. Refunds	<u>0.57</u>	<u>14,180</u>	<u>0.61</u>	<u>15,156</u>	<u>1.07</u>	<u>26,695</u>
f. Total	7.77	193,027	7.20	179,362	7.95	198,177
2. Supplemental contribution amortization by July 1, 2040 of unfunded actuarial accrued liability	2.99	74,200	3.04	75,774	2.73	68,047
3. Allowance for expenses	0.23	5,712	0.23	5,750	0.23	5,750
4. Total	10.99	272,939	10.47	259,793	10.91	271,974
C. Contribution Sufficiency/(Deficiency) (A.3. – B.4.)	(0.99)%	\$ (24,587)	(0.47)	(9,811)	(0.91)	(21,992)

Note: Projected annual payroll for fiscal year beginning on the valuation date: \$2,483,519 for Fund Actuary and \$2,492,577 for Milliman.

## Actuarial Basis

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### Actuarial Cost Method

Liabilities and contributions in this report are computed using the Individual Entry Age Normal Cost Method. This method is prescribed by Minnesota Statutes.

The objective under this method is to fund each member's benefits under the Plan as payments which are level as a percentage of salary, starting at original participation date (or employment date), and continuing until the assumed date of retirement, termination, disability or death. For valuation purposes, entry age for each member is determined as the age at valuation minus years of service as of the valuation date.

At any given date, a liability is calculated equal to the contributions which would have been accumulated if this method of funding had always been used, the current plan provisions had always been in place, and all assumptions had been precisely accurate. The difference between this liability and the assets (if any) which are held in the fund is the unfunded liability. The unfunded liability is typically funded over a chosen period in accordance with the amortization schedule.

A detailed description of the calculation follows:

The normal cost for each active member under the assumed retirement age is determined by applying to earnings the level percentage of salary which, if contributed each year from date of entry into the Plan until the assumed retirement (termination, disability or death) date, is sufficient to provide the full value of the benefits expected to be payable.

- The present value of future normal costs is the total of the discounted values of all active members' normal cost, assuming these to be paid in each case from the valuation date until retirement (termination, disability or death) date. The discount rate assumptions used in this calculation are 8.5% pre-retirement and 6.5% post-retirement, as described in the Summary of Actuarial Assumptions.
- The present value of projected benefits is calculated as the value of all benefit payments expected to be paid to the Plan's current members, including active and retired members, beneficiaries, and terminated members with vested rights.
- The accrued liability is the excess of the present value of projected benefits over the present value of future normal costs.
- The unfunded liability is the excess of the accrued liability over the assets of the fund, and represents that part of the accrued liability which has not been funded by accumulated past contributions.

### Change in Actuarial Cost Method

The statutory amortization date changed from July 1, 2020 to July 1, 2040 and assumes 4.50% annual payroll increases. A negative Unfunded Actuarial Accrued Liability is amortized over 30 years from the valuation date as a level percentage of payroll.

## Actuarial Basis

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### Asset Valuation Method

The assets are valued based on a five-year moving average of expected and market values (five-year average actuarial value) determined as follows:

At the end of each plan year, an average asset value is calculated as the average of the market asset value at the beginning and end of the fiscal year net of investment income for the fiscal year;

The investment gain or (loss) is taken as the excess of actual investment income over the expected investment income based on the average asset value as calculated above;

The investment gain or (loss) so determined is recognized over five years at 20% per year;

The asset value is, the sum of the market asset value plus the scheduled recognition of investment gains or (losses) during the current and the preceding four fiscal years.

The Minnesota Post Retirement Investment Fund (MPRIF) was dissolved on June 30, 2009. For the purpose of determining the actuarial value of assets, the MPRIF asset loss for the fiscal year ending June 30, 2009 is recognized incrementally over five years at 20% per year, similar to the smoothing described above. Prior to June 30, 2009, MPRIF asset gains and losses were not smoothed.

## Actuarial Basis

### Summary of Actuarial Assumptions

The following assumptions were used in valuing the liabilities and benefits under the plan. All assumptions are prescribed by Statutes, the LCPR, or the Board of Trustees and reflect the recently adopted changes during the summer of 2010.

<b>Investment Return</b>	6.50% compounded annually post-retirement. 8.50% compounded annually pre-retirement.												
<b>Benefit Increases After Retirement</b>	The post-retirement investment return changed from 6.0% to 6.5% to reflect the change in post-retirement benefit increases from 2.5% to 2.0%.												
<b>Salary Increases</b>	Reported salary for prior fiscal year, with new hires annualized, increased to current fiscal year and annually for each future year according to the ultimate rates in the rate table. During a 5-year select period, $0.6\% \times (5 - T)$ , where T is completed years of service, is added to the ultimate rate.												
<b>Mortality</b>													
<i>Healthy Pre-retirement</i>	RP 2000 non-annuitant generational mortality, white collar adjustment, set forward three years for males and set back one year for females.												
<i>Healthy Post-retirement</i>	RP 2000 annuitant generational mortality, white collar adjustment, with no setbacks for males or females.												
<i>Disabled</i>	RP 2000 disabled mortality, with no setback for males and a five year set forward for females.												
<b>Retirement</b>	Members retiring from active status are assumed to retire according to the age related rates as shown in rate table. Members who have attained the highest assumed retirement age will retire in one year.												
<b>Withdrawal</b>	Select and ultimate rates based on actual plan experience. Ultimate rates after the third year are shown in the rate table. Select rates are as follows:												
	<table border="1"> <thead> <tr> <th></th> <th>First Year</th> <th>Second Year</th> <th>Third Year</th> </tr> </thead> <tbody> <tr> <td>Male</td> <td style="text-align: center;">0.45</td> <td style="text-align: center;">0.14</td> <td style="text-align: center;">0.09</td> </tr> <tr> <td>Female</td> <td style="text-align: center;">0.48</td> <td style="text-align: center;">0.15</td> <td style="text-align: center;">0.10</td> </tr> </tbody> </table>		First Year	Second Year	Third Year	Male	0.45	0.14	0.09	Female	0.48	0.15	0.10
	First Year	Second Year	Third Year										
Male	0.45	0.14	0.09										
Female	0.48	0.15	0.10										
<b>Disability</b>	Age-related rates based on actual experience; see table of sample rates.												
<b>Allowance for Combined Service Annuity</b>	Liabilities for active members are increased by 1.20% and liabilities for former members are increased by 40.00% to account for the effect of some members having eligibility for a Combined Service Annuity.												
<b>Administrative Expenses</b>	Prior year administrative expenses expressed as percentage of prior year payroll.												
<b>Return of Contributions</b>	All employees withdrawing after becoming eligible for a deferred benefit are assumed to take the larger of their contributions accumulated with interest or the value of their deferred benefit.												
<b>Commencement of Deferred Benefits</b>	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at age 65 or the earliest age at which unreduced benefits may commence if earlier.												
<b>Percentage Married</b>	85% of active male members are assumed to be married and 70% of active female members are assumed to be married. Actual marital status is provided for members in payment status.												
<b>Age of Spouse</b>	Male members are assumed to have a beneficiary three years younger and female members are assumed to have a beneficiary two years older.												

## Actuarial Basis

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### Summary of Actuarial Assumptions (continued)

<b>Form of Payment</b>	<p>Married members retiring from active status are assumed to elect form of annuity as follows:</p> <p>Males:           25% elect Straight Life                       15% elect 50% J&amp;S option                       10% elect 75% J&amp;S option                       50% elect 100% J&amp;S option</p> <p>Females:          60% elect Straight Life                       15% elect 50% J&amp;S option                       0% elect 75% J&amp;S option                       25% elect 100% J&amp;S option</p> <p>Members receiving deferred annuities (including current terminated deferred members) are assumed to elect forms based upon the same percentages above.</p>
<b>Changes in Actuarial Assumptions</b>	<p>Healthy pre-retirement mortality was changed from 1983 Group Annuity Mortality set back five years for males and set back two years for females to RP 2000 non-annuitant generational mortality, white collar adjustment, set forward three years for males and set back one year for females.</p> <p>Healthy post-retirement mortality was changed from 1983 Group Annuity Mortality set back two years for males and set back one year for females to RP 2000 annuitant generational mortality, white collar adjustment, with no age set backs.</p> <p>Disabled retired mortality was changed to RP 2000 disabled retiree mortality with no set back for males and set forward five years for females. The previous table was based on 1965 Railroad Retirement Board (RRB) rates through age 54; graded rates for ages 55 to 65, and for ages 65 and later, the healthy postretirement mortality table.</p> <p>The marital status assumption for females was changed from 85% to 70% for active members.</p> <p>The beneficiary age difference was changed from three years older to two years older for active females.</p> <p>The form of benefit assumption for active male members was changed from 30% electing a straight life annuity to 25%, from 20% electing the 50% J&amp;S form to 15% and from 0% electing the 75% J&amp;S form to 10%. The form of benefit assumption for active female members was changed from 75% electing a straight life annuity to 60%, from 10% electing the 50% J&amp;S form to 15% and from 15% electing the 100% J&amp;S form to 25%.</p> <p>The post-retirement investment return changed from 6.0% to 6.5% to reflect the change in post-retirement benefit increases from 2.5% to 2.0%.</p> <p>Retirement rates were reduced at some ages to more closely reflect actual retirement experience.</p>

## Actuarial Basis

### Summary of Actuarial Assumptions (continued)

#### Summary of Rates

Age	Mortality Rates (%)					
	Healthy Pre-Decrement *		Healthy Post-Decrement**		Disabled	
	Male	Female	Male	Female	Male	Female
20	0.0321%	0.0163%	0.00862%	0.0250%	2.2571%	0.7450%
25	0.0374%	0.0173%	0.1029%	0.0277%	2.2571%	0.7450%
30	0.0457%	0.0220%	0.1016%	0.0395%	2.2571%	0.7450%
35	0.0722%	0.0393%	0.1700%	0.0643%	2.2571%	0.7450%
40	0.1066%	0.0515%	0.2485%	0.0854%	2.2571%	0.7450%
45	0.1456%	0.0793%	0.3563%	0.1332%	2.2571%	1.1535%
50	0.1960%	0.1220%	0.4989%	0.2062%	2.8975%	1.6544%
55	0.3017%	0.1977%	0.4484%	0.3219%	3.5442%	2.1839%
60	0.4896%	0.3248%	0.5622%	0.5343%	4.2042%	2.8026%
65	0.7404%	0.5179%	1.0104%	0.8665%	5.0174%	3.7635%
70	2.6125%	0.7785%	1.6571%	1.4443%	6.2583%	5.2230%
75	4.6195%	2.373%	2.9211%	2.3732%	8.2067%	7.2312%

\* Rates shown are RP 2000 non-annuitant mortality, projected to 2010, white collar adjustment, set forward three years for males and set back one year for females.

\*\* Rates shown are RP 2000 annuitant mortality, projected to 2010, white collar adjustment, with no age adjustments.

Age	Ultimate Withdrawal		Disability	
	Male	Female	Male	Female
20	6.90%	8.55%	0.010%	0.010%
25	5.90	7.80	0.010	0.010
30	4.90	7.05	0.010	0.010
35	3.90	5.10	0.030	0.030
40	3.20	4.38	0.080	0.080
45	2.70	3.75	0.130	0.130
50	2.20	3.05	0.288	0.288
55	0.00	0.00	0.504	0.432
60	0.00	0.00	0.780	0.624
65	0.00	0.00	0.000	0.000
70	0.00	0.00	0.000	0.000

## Actuarial Basis

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### Summary of Actuarial Assumptions (continued)

#### Summary of Rates

Age	Retirement	
	Rule of 90 Eligible	All Others
55	20%	5%
56	15	5
57	15	5
58	15	5
59	20	6
60	20	7
61	22	12
62	40	22
63	30	16
64	30	18
65	40	40
66	30	30
67	25	25
68	25	25
69	25	25
70	30	30
71+	100	100

## Actuarial Basis

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### Summary of Actuarial Assumptions (continued)

#### Summary of Rates

Salary Scale			
Baseline Assumption		Alternative Assumption	
Age	Salary Increase	Service	Salary Increase
20	5.75%	1	10.75%
25	5.75	2	8.35
30	5.75	3	7.15
35	5.75	4	6.45
40	5.75	5	5.95
45	5.45	6	5.55
50	4.95	7	5.25
55	4.45	8	4.95
60	4.25	9	4.75
65	4.25	10	4.65
70	4.25	11	4.45
		12	4.35
		13	4.25
		14	4.05
		15	3.95
		16	3.85
		17+	3.75

## Actuarial Basis

### Summary of Plan Provisions

This summary of provisions reflects the interpretation of applicable Statutes for purposes of preparing this valuation. This interpretation is not intended to create or rescind any benefit rights in conflict with any Minnesota Statutes.

<b>Plan Year</b>	July 1 through June 30				
<b>Eligibility</b>	State employees, non-academic staff of the University of Minnesota and employees of certain Metro level government units, unless excluded by law.				
<b>Contributions</b>	Shown as a percent of salary: <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><u>Employee</u></td> <td style="text-align: center;"><u>Employer</u></td> </tr> <tr> <td style="text-align: center;">5.00%</td> <td style="text-align: center;">5.00%</td> </tr> </table> <p>Employee contributions are “picked up” according to the provisions of Internal Revenue Code 414(h).</p>	<u>Employee</u>	<u>Employer</u>	5.00%	5.00%
<u>Employee</u>	<u>Employer</u>				
5.00%	5.00%				
<b>Allowable Service</b>	Service during which member contributions were made. May also include certain leaves of absence, military service and periods while temporary Worker's Compensation is paid. Excludes lump sum vacation pay at termination.				
<b>Average Salary</b>	Average of the five highest years of Salary. Average Salary is based on all Allowable Service if less than five years.				
<b>Salary</b>	Includes wages, allowances and fees. Excludes lump sum payments at separation, employer contributions to deferred compensation and tax-sheltered annuity plans and benevolent vacation and sick leave donation programs.				
<b>Retirement</b>					
<u>Normal Retirement Benefit</u> <i>Age/Service Requirements</i>	<p>First hired before July 1, 1989:</p> <ul style="list-style-type: none"> <li>(a) Age 65 and three years of Allowable Service.</li> <li>(b) Proportionate Retirement Annuity is available at age 65 and one year of Allowable Service.</li> </ul> <p>First hired after June 30, 1989:</p> <ul style="list-style-type: none"> <li>(a) The greater of age 65 or the age eligible for full Social Security retirement benefits (but not higher than age 66) and three years of Allowable Service (five years if hired after June 30, 2010).</li> <li>(b) Proportionate Retirement Annuity is available at normal retirement age and one year of Allowable Service.</li> </ul>				
<i>Amount</i>	1.70% of Average Salary for each year of Allowable Service.				

## Actuarial Basis

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### Summary of Plan Provisions (continued)

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#### Retirement (continued)

##### Early Retirement

###### *Age/Service Requirements*

First hired before July 1, 1989:

- (a) Age 55 and three years of Allowable Service.
- (b) Any age with 30 years of Allowable Service.
- (c) Rule of 90: Age plus Allowable Service totals 90.

First hired after June 30, 1989

- (a) Age 55 with three years of Allowable Service (five years if hired after June 30, 2010).
- (b) Any age with 30 years of Allowable Service.

###### *Amount*

First hired before July 1, 1989:

The greater of (a) or (b):

- (a) 1.20% of Average Salary for each of the first ten years of Allowable Service and 1.70% of Average Salary for each subsequent year with reduction of 0.25% for each month the member is under age 65 at time of retirement or under age 62 if 30 years of Allowable Service. No reduction if age plus years of Allowable Service totals 90.
- (b) 1.70% of Average Salary for each year of Allowable Service assuming augmentation to age 65 at 3.00% per year and actuarial reduction for each month the member is under age 65.

First hired after June 30, 1989:

1.70% of Average Salary for each year of Allowable Service assuming augmentation to the age eligible for full Social Security retirement benefit (but not higher than age 66) at 3.00% per year (2.50% per year if hired after June 30, 2006) and actuarial reduction for each month member is under the normal retirement age.

###### *Form of Payment*

Life annuity with return on death of any balance of contributions over aggregate monthly payments. Actuarially equivalent options are:

50%, 75% or 100% Joint and Survivor with bounce back feature without additional reduction.  
15-year Certain and Life thereafter.

###### *Benefit Increases*

Benefit recipients receive future annual 2.0% benefit increases. When the funding ratio reaches 90% (on a Market Value of Assets basis), the benefit increase will revert to 2.5%. A benefit recipient who has been receiving a benefit for at least 18 full months as of December 31 will receive a full increase. Members receiving benefits for at least six full months but less than 18 full months will receive a pro rata increase.

Prior to 2002, members who retired under the laws in effect before July 1, 1973 received an additional lump sum payment each year. In 1989, this lump sum payment was the greater of \$25 times each full year of Allowable Service or \$400 per full year of service less any Social Security benefits received or annuity from a Minnesota public employee pension plan. In each following year, the lump sum payment was increased by the same percentage increase that was applied to regular annuities paid from the MPRIF. Effective January 1, 2002, the annual lump sum payment was divided by 12 and paid as a monthly life annuity in the annuity form elected.

## Actuarial Basis

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### Summary of Plan Provisions (continued)

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#### **Disability**

##### Disability Benefit

###### *Age/Service Requirement*

Total and permanent disability before normal retirement age with three years of Allowable Service (five years if hired after June 30, 2010).

###### *Amount*

Normal Retirement benefit based on Allowable Service and Average Salary at disability without reduction for commencement before normal retirement age.

Payments stop if disability ceases or death occurs. Payments revert to a retirement annuity at normal retirement age. Benefits may be reduced on resumption of partial employment.

##### Retirement After Disability

###### *Age/Service Requirement*

Normal retirement age with continued disability.

###### *Amount*

Any optional annuity continues. Otherwise, a normal retirement benefit equal to the disability benefit paid before normal retirement age, or an actuarial equivalent optional annuity.

##### Form of Payment

Same as for retirement.

##### Benefit Increases

Same as for retirement.

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## Actuarial Basis

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### Summary of Plan Provisions (continued)

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#### **Death**

##### Surviving Spouse Optional Benefit

*Age/Service Requirement* Member or former member who dies before retirement or disability benefits commence with three years of Allowable Service (five years if hired after June 30, 2010). If a former member dies before age 55 and has less than 30 years of Allowable Service, benefits commence when the former member would have been age 55. If an active member dies, benefits may commence immediately, regardless of age.

*Amount* Surviving spouse receives the 100% joint and survivor benefits using the Normal Retirement formula above. If commencement is prior to age 55, the appropriate early retirement formula described above applies except that one-half the monthly reduction factor is used from age 55 to the commencement age and the Rule of 90 does not apply. In lieu of this benefit, the surviving spouse may elect a refund of contributions with interest or an actuarially equivalent term certain annuity.

If a member dies prior to July 1, 1997 and the beneficiary was not eligible to commence a survivor benefit as of July 1, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.

*Benefit Increases* Same as for retirement.

##### Surviving Dependent Children's Benefit

*Age/Service Requirement* If no surviving spouse, all dependent children (biological or adopted) below age 20 who are dependent for more than half of their support on deceased member.

*Amount* Actuarially equivalent to surviving spouse 100% joint and survivor annuity payable to the later of age 20 or five years. The amount is proportionally divided among surviving children.

*Benefit Increases* Same as for retirement.

##### Surviving Dependent Children's Benefit

*Age/Service Requirement* Active member dies and survivor benefits are not payable or a former member dies before annuity begins or former member who is not entitled to an annuity dies.

*Amount* Member's contributions with 5.00% interest through June 30, 2011 compounded annually if death occurred before May 16, 1989 and 6.00% interest through June 30, 2011 compounded annually if death occurred on or after May 16, 1989. Beginning July 1, 2011, a member's contributions will increase at 4.00% interest compounded annually.

*Age/Service Requirement* Retired or disabled annuitant who did not select an optional annuity dies, or the remaining recipient of an option dies.

*Amount* The excess of the member's contributions over all benefits paid.

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## Actuarial Basis

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### Summary of Plan Provisions (continued)

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<b>Unclassified Plan Provision</b>	Members credited with employee shares in the Unclassified Plan may elect to terminate participation in the Unclassified Plan and be covered by the State Employees Retirement Fund prior to termination of covered employment assuming that the member has acquired at least 10 years of allowable state service.
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#### **Termination**

##### Refund of Contributions

##### *Age/Service Requirements*

Termination of state service.

##### *Amount*

Member's contributions with 5.00% interest through June 30, 2011 compounded annually if termination occurred before May 16, 1989 and 6.00% interest through June 30, 2011 if termination occurred on or after May 16, 1989. Beginning July 1, 2011 a member's contributions will increase at 4.00% interest compounded annually. If a member is vested, a deferred annuity may be elected in lieu of a refund.

##### Deferred Benefit

##### *Age/Service Requirements*

Three years of Allowable Service if hired prior to June 30, 2010, five years of Allowable Service if hired after June 30, 2010.

##### *Amount*

Benefit computed under law in effect at termination and increased by the following percentage:

- (a) 0.00% before July 1, 1971;
- (b) 5.00% from July 1, 1971 to January 1, 1981;
- (c) 3.00% thereafter until January 1 of the year following attainment of age 55 or January 1, 2012, whichever is earlier; and
- (d) 5.00% thereafter until the annuity begins (2.50% if hired after June 30, 2006), but before January 1, 2012. Amount is payable as a normal or early retirement;
- (e) 2.00% from January 1, 2012 thereafter.

Amount is payable at normal or early retirement.

If a member terminated employment prior to July 1, 1997 but was not eligible to commence their pension before July 1, 1997, an actuarial increase shall be made for the change in the post-retirement interest rates from 5.00% to 6.00%.

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#### **Changes in Plan Provisions**

The following changes in plan provisions are reflected in this valuation:

Post-retirement benefit increases change from 2.5% to 2.0% beginning January 1, 2011. When the funded status of the plan reaches 90% (on a Market Value of Assets basis), the benefit increase reverts to 2.5%.

The requirement for benefit recipients to receive a full increase in benefits changed from 12 full months receiving as of December 31 to 18 full months and the requirement to receive a partial increase in benefits changed from 0 months receiving as of December 31 to 6 months.

Vesting was changed from three years to five years for employees hired after June 30, 2010.

The increase on deferred benefits changes to 2% after December 31, 2011. The interest earned on member contributions changes from 6.0% to 4.0% effective as of July 1, 2011

## Summary of All Changes

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The following changes in amortization period, plan provisions and actuarial assumptions were recognized as of July 1, 2010:

### Plan Changes

- The amortization date for the payment of unfunded accrued liability was changed from July 1, 2020 to July 1, 2040.
- Post-retirement benefit increases change from 2.5% to 2.0% beginning January 1, 2011 unless the accrued liability funding ratio of the plan reaches 90% (on a Market Value of Assets basis).
- The requirement for benefit recipients to receive a full increase in benefits changed from 12 full months receiving as of December 31 to 18 full months and the requirement to receive a partial increase in benefits changed from 0 months receiving as of December 31 to 6 months.
- Vesting was changed from three years to five years for employees hired after June 30, 2010.
- The increase on deferred benefits changes from 3% (5% if 55 or older and hired before July 1, 2006 or 2.5% if hired after June 30, 2006) to 2% after December 31, 2011.
- The interest earned on member contributions changes from 6.0% to 4.0% effective as of July 1, 2011.

### Assumption Changes

- Healthy pre-retirement mortality was changed from 1983 Group Annuity Mortality set back five years for males and set back two years for females to RP 2000 non-annuitant generational mortality, white collar adjustment, set forward three years for males and set back one year for females. Healthy post-retirement mortality was changed from 1983 Group Annuity mortality set back two years for males and set back one year for females to RP 2000 annuitant generational mortality, white collar adjustment, with no age set backs.
- Disabled retired mortality was changed from a table based on 1965 Railroad Retirement Board (RRB) rates to RP 2000 disabled retiree mortality with no setback for males and set forward five years for females.
- The marital status assumption for females was changed from 85% to 70% for active members. The beneficiary age difference was changed from three years older to two years older for active females. The form of benefit assumption for active male members was changed from 20% electing the 50% J&S form to 15% and from 0% electing the 75% J&S form to 10%. The form of benefit assumption for active female members was changed from 10% electing the 50% J&S form to 15% and from 15% electing the 100% J&S form to 25%.
- Retirement rates were reduced at some ages to more closely reflect actual retirement experience.

## Summary of All Changes

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### Financial Impact Reported by Fund Actuary

The information in the table below was prepared by Fund Actuary, the Fund actuary, as part of the regular actuarial valuation report. We have provided this for informational purposes only.

	Before Amortization Period, Plan and Assumption Changes	Reflecting Amortization Period Change	Reflecting Amortization Period and Plan Changes	Reflecting Amortization Period, Plan and Assumption Changes
Normal Cost Rate, % of Pay	8.3%	8.3%	7.7%	7.8%
Amortization of Unfunded Accrued Liability (% of Pay)	9.8	4.6	3.1	3.0
Expenses (% of Pay)	0.2	0.2	0.2	0.2
Total Required Contribution (% of Pay)	18.3	13.1	11.0	11.0
Accrued Funding Ratio	81.9	81.9	87.1	87.3
Projected Benefit Funding Ratio	90.5	90.5	96.5	96.3
Unfunded Accrued Liability (in billions)	\$2.0	\$2.0	\$1.3	\$1.3

### COLA Discussion

A very important assumption affecting the valuation results is the expectation of future post-retirement benefit increases. The plan's funded ratio (on a market value of assets basis and assuming 2.0% benefit increases) is currently 75.0%. If the actuarial funded ratio of the plan reaches 90% (on a market value of asset basis) in the future, post-retirement increases will revert to the 2.5% level.

Fund Actuary performed a projection of liabilities and assets, using the 2010 valuation results as a baseline (including a 2.0% benefit increase assumption) and assuming future experience follows the valuation assumptions. The projection indicates that, without contribution increases, changes in benefits or assumptions, or favorable experience, the funded status of this plan is expected to decline from the current level of 75.0%. We concur with that analysis and agree with its conclusion.

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STATE EMPLOYEES RETIREMENT FUND

RECONCILIATION OF MEMBERS

	<u>ACTIVES</u>	<u>TERMINATED</u>	
		<u>DEFERRED RETIREMENT</u>	<u>OTHER NON-VESTED</u>
A. <b>On June 30, 2009</b>	48,989	15,210	6,912
B. Additions	2,554	1,036	1,189
C. Deletions:			
1. Service Retirement	(1,110)	(455)	(11)
2. Disability	(105)	(9)	(2)
3. Death	(82)	(41)	(5)
4. Terminated-Deferred	(887)	61	(61)
5. Terminated-Refund	(746)	(194)	(340)
6. Terminated Non-vested	(1,166)	(4)	4
7. Returned as Active	266	(148)	(118)
8. Transferred to Fund	(1)	(8)	(1,030)
D. Data Adjustments	782	(60)	(1)
E. <b>Total on June 30, 2010</b>	48,494	15,388	6,537

	<u>RECIPIENTS</u>		
	<u>RETIREMENT ANNUITANTS</u>	<u>DISABLED</u>	<u>SURVIVORS</u>
A. <b>On June 30, 2009</b>	22,457	1,656	3,230
B. Additions	1,653	113	65
C. Deletions:			
1. Service Retirement		(2)	0
2. Death	(896)	(81)	(133)
3. Annuity Expired	0	0	0
4. Returned as Active	0	0	0
D. Data Adjustments	123	(2)	252
E. <b>Total on June 30, 2010</b>	23,337	1,684	3,414

## STATE EMPLOYEES RETIREMENT FUND

Active Members as of June 30, 2010

Age	Years of Service								ALL
	<1	1-4	5-9	10-14	15-19	20-24	25-29	30+	
<25	498	529	7	0	0	0	0	0	1034
25-29	660	2582	432	4	0	0	0	0	3678
30-34	461	2225	1312	319	3	0	0	0	4320
35-39	288	1627	1178	878	125	3	0	0	4099
40-44	304	1540	1156	1212	663	213	13	0	5101
45-49	307	1586	1213	1214	930	1042	528	71	6891
50-54	283	1368	1182	1225	967	1284	1157	887	8353
55-59	191	1027	1022	1055	907	1183	1026	2042	8453
60-64	101	506	619	674	592	779	544	1418	5233
65+	33	174	204	203	158	179	93	288	1332
ALL	3126	13164	8325	6784	4345	4683	3361	4706	48494

### Average Annual Earnings

Age	Years of Service								ALL
	<1	1-4	5-9	10-14	15-19	20-24	25-29	30+	
<25	18070	26742	35616	0	0	0	0	0	22625
25-29	24400	35321	40314	44993	0	0	0	0	33958
30-34	26071	39638	44725	48935	39521	0	0	0	40421
35-39	28269	43299	47085	53636	52080	50402	0	0	45818
40-44	28372	43087	48998	54283	58710	55827	54089	0	48800
45-49	28769	42497	48825	54998	56710	59620	54209	52069	50705
50-54	28370	42530	49252	53833	56792	59185	58060	55311	52378
55-59	27475	42833	50243	53155	56930	59546	58633	59621	54494
60-64	64407	41360	49025	52427	56370	57623	57521	61420	55371
65+	17841	28005	43368	52883	54499	57794	59175	61920	50552
ALL	26580	39935	47619	53587	56807	58901	57558	59377	48754

**SERVICE RETIREMENTS**  
**RETIRED as of June 30, 2010**

<u>Age</u>	<u>Years in Thousands</u>							<u>ALL</u>
	<u>&lt;1</u>	<u>1-4</u>	<u>5-9</u>	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>	<u>25+</u>	
<50	0	0	0	0	0	0	0	0
50-54	6	11	0	0	0	0	0	17
55-59	465	617	26	1	0	0	0	1109
60-64	992	1738	1444	34	1	0	0	4209
65-69	611	1730	2203	1032	9	0	0	5585
70-74	94	340	1705	1732	506	6	0	4383
75-79	15	57	258	1377	1250	274	0	3231
80-84	8	19	52	213	1230	786	106	2414
85+	1	2	16	39	222	882	1227	2389
ALL	2192	4514	5704	4428	3218	1948	1333	23337

<u>Age</u>	<u>Years in Thousands</u>							<u>ALL</u>
	<u>&lt;1</u>	<u>1-4</u>	<u>5-9</u>	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>	<u>25+</u>	
<50	0	0	0	0	0	0	0	0
50-54	16794	13900	0	0	0	0	0	14921
55-59	17001	13840	14842	19916	0	0	0	15194
60-64	17762	18286	14833	16357	2102	0	0	16958
65-69	16600	16337	16779	15146	18264	0	0	16323
70-74	13681	14743	14999	16981	18145	14764	0	16096
75-79	11178	10791	12608	16400	20369	24530	0	18198
80-84	11689	7666	14019	13880	18934	21429	25907	19388
85+	4729	13456	19680	11238	17946	17114	18192	17657
ALL	17025	16512	15539	16168	19292	19890	18805	17053

**SURVIVORS**  
**SINCE DEATH as of June 30, 2010**

<u>Age</u>	<u>Years in Thousands</u>							<u>ALL</u>
	<u>&lt;1</u>	<u>1-4</u>	<u>5-9</u>	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>	<u>25+</u>	
<50	60	35	37	8	5	0	0	145
50-54	23	25	29	12	7	2	0	98
55-59	59	71	77	37	12	3	2	261
60-64	50	95	127	48	13	5	1	339
65-69	61	102	114	64	29	3	5	378
70-74	47	88	131	99	54	16	7	442
75-79	59	89	120	83	58	31	11	451
80-84	71	91	145	107	79	53	30	576
85+	46	109	169	135	109	44	112	724
ALL	476	705	949	593	366	157	168	3414

**Average Annual Benefit**

<u>Age</u>	<u>Years in Thousands</u>							<u>ALL</u>
	<u>&lt;1</u>	<u>1-4</u>	<u>5-9</u>	<u>10-14</u>	<u>15-19</u>	<u>20-24</u>	<u>25+</u>	
<50	6527	12440	6832	6148	5547	0	0	7977
50-54	11922	13292	10886	7874	3678	6683	0	10773
55-59	12036	12499	10907	10744	7625	7252	4104	11327
60-64	12799	14042	13392	12662	9896	9695	5639	13171
65-69	13987	12970	12637	14232	15046	11879	10952	13371
70-74	19604	15673	14741	16441	13262	18824	12778	15760
75-79	17785	17059	19023	18185	17904	12995	14242	17644
80-84	22089	17901	19104	20618	19657	17079	16702	19327
85+	16336	16850	15871	18853	16035	15853	15330	16543
ALL	15041	15142	14979	16775	15752	15452	15075	15442

## DISABILITY RETIREMENTS

DISABLED as of June 30, 2010

Age	Years in Thousands							ALL
	<1	1-4	5-9	10-14	15-19	20-24	25+	
<50	22	32	32	13	2	1	0	102
50-54	31	41	61	27	10	3	0	173
55-59	47	102	117	58	19	4	0	347
60-64	46	119	185	69	26	6	3	454
65-69	2	27	118	77	33	8	4	269
70-74	0	1	30	82	43	17	2	175
75-79	0	0	0	17	44	12	5	78
80-84	0	0	0	0	15	15	13	43
85+	0	0	0	0	0	3	40	43
ALL	148	322	543	343	192	69	67	1684

### Average Annual Benefit

Age	Years in Thousands							ALL
	<1	1-4	5-9	10-14	15-19	20-24	25+	
<50	7779	6968	6535	6503	4225	3330	0	6858
50-54	15118	11407	10618	7825	10989	3653	0	11076
55-59	15146	15657	11221	11172	10702	7070	0	12972
60-64	13432	15797	14606	13986	13887	12939	9148	14605
65-69	15370	11610	12448	13282	15357	10520	12468	12924
70-74	0	11219	12243	13972	15579	8744	9684	13497
75-79	0	0	0	14799	14295	15501	10575	14351
80-84	0	0	0	0	12347	14246	13842	13461
85+	0	0	0	0	0	10202	13410	13186
ALL	13515	13950	12353	12620	13925	11352	12923	12975