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July 1, 2009 Actuarial Review  
of the Retirement Systems under the  
**Minnesota Legislative Commission  
on Pensions and Retirement**

February 11, 2010

Prepared by:

**Milliman, Inc.**

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February 11, 2010

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February 11, 2010

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

ATTN: Mr. Lawrence A. Martin, Executive Director

**RE: Actuarial Review of the July 1, 2009 Actuarial Valuation Reports**

Ladies and Gentlemen:

The enclosed report presents the findings and comments resulting from a review of the July 1, 2009 actuarial valuations of the retirement systems administered by the Duluth Teachers Retirement Fund Association (DTRFA), the Minneapolis Employees Retirement Fund (MERF), the Minnesota Public Employees Retirement Association (PERA), the Minnesota State Retirement System (MSRS), the Minnesota Teachers Retirement Association (TRA), and the St. Paul Teachers Retirement Association (StPTRFA). An overview of our major findings is included in the Executive Summary section of the report. More detailed commentary is provided in the sections devoted to each fund individually.

We pursued this 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 is prepared for use by the Minnesota Legislative Commission on Pensions and Retirement (LCPR) in their appropriate oversight role with regard to the above mentioned retirement systems. It has been prepared using multi-faceted review techniques. These techniques include specific validation of a sampling of calculations. A complete duplication of the July 1, 2009 Actuarial Valuations has not been performed.

In preparing this report, we relied, without audit, on information (some oral and some in writing) supplied by both the relevant actuarial firms who prepare the formal valuations and the relevant staff at each of the administrative systems. This information includes, but is not limited to, statutory provisions, employee data and financial information. It should be noted that if any data or other information provided to us is inaccurate or incomplete, our calculations and recommendations 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.

I, Patrice A. Beckham, 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, 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.

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.

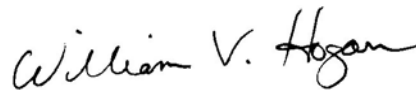
Respectfully submitted,

Milliman, Inc.



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Principal & Consulting Actuary



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William V. Hogan, FSA  
Principal & Consulting Actuary

PAB/WVH/bh

**July 1, 2009 Actuarial Review  
of the Retirement Systems under the  
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## Section 1: Executive Summary

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### Purpose and Scope of the Actuarial Audit Review

In accordance with Minnesota Statutes, Section 356.214, Subdivision 4, the Minnesota Legislative Commission on Pensions and Retirement (LCPR) has engaged Milliman, Inc. to perform an actuarial review of the July 1, 2009 actuarial valuations prepared for the various statewide and major local Minnesota public employee pension plans. In this first year, our reviews have been limited in scope and do not reflect a full replication of any individual retirement system.

The actuarial review of each of the valuations was performed using a methodology known as a “**limited scope**” or “**peer review**” audit. Such a review is intended to provide assurance that the liabilities and costs of the system are reasonable. The review is not a full replication of the actuarial valuation results, but is a review of the key components in the valuation process that encompass the derivation of the liabilities and costs for the system. These key components are the data, the benefits valued, application of the actuarial assumptions, application of the asset valuation method and the actuarial cost method employed. The receipt of detailed valuation output for a select group of test lives provides the detail necessary to validate each of these key components. The test lives reviewed are not randomly selected, but rather are specifically chosen to include members that will cover the various benefit provisions and actuarial assumptions used in the valuation process. For example, test lives generally will include:

- Members in various status categories such as active, terminated vested, retired, and survivors.
- Retiree test lives are selected with different forms of payment to ensure all payment forms are accurately valued.
- Active members who are covered by different benefit structures are included to make sure the benefits valued for all benefit structures are appropriate.
- Members of different gender and age/service combinations to test the application of different actuarial assumptions.
- Active members are selected that will test differences within one set of actuarial assumptions, e.g.: Rule of 90, early retirement and normal retirement.

We reviewed all of the information provided to us from the fund administrators and the retained actuaries. We also requested and reviewed additional information provided by the retained actuaries. Because we will be reviewing the 2004-2008 Experience Studies for PERA, MSRS, and TRA, we did not specifically comment on the reasonableness of the assumptions, but rather focused on the application of the assumptions in the valuation process.

A limited scope audit may identify areas of concern, but it generally cannot quantify the impact of any issues identified, other than in general terms. In our report, we comment on several findings where we feel the issue identified is immaterial or within a reasonable degree of tolerance. For the most part, these comments are couched in terms of an expected percentage impact on the actuarial liability and normal cost rate. Given that the actuarial accrued liability of some of the plans is a very large number, a small percent change may result in a dollar amount judged to be “large” depending upon your point of view (0.50% of \$23 billion is \$115 million). However, as a percentage, the difference may be considered small and within acceptable levels of variance.

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. A good example of differences in actuarial software is the decrement timing (mid year vs. end of year). In this case both approaches fall within acceptable actuarial practices and both approaches produce reasonable results even though they may vary by several percentage points. For this reason, we believe the comparison of valuation results should be evaluated in terms of percentage differences. To provide some context for 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.

Due to the short time period from contract execution to delivery date we have focused our attention on substantive actuarial questions and issues that we encountered. We will continue to review in more detail any other open questions that may not have appeared significant at this time.

### Statement of Key Findings

Our conclusions concerning the primary issues of the audit are as follows:

In general, we have found the actuarial calculations to be accurate, appropriate, and consistent with the standards of work issued by the LCPR. While there are some exceptions noted throughout this report, we do not believe that any of these would substantively alter the results presented by the various retained actuaries.

There are seven issues identified for one or more systems in the report. We summarize them as follows:

1. For MERF, the supplemental contribution is determined using an “old” actuarial value of assets methodology which significantly overstates the value relative to market. The use of this method lowers the supplemental contribution by approximately \$73 million. Oral statements from Fund personnel indicate their belief that this method is authorized by statute. We are not qualified to provide a legal opinion on this matter. We believe that the overall strategy for funding MERF should be reviewed as well as what the statutes actually require. It may also be appropriate to add a cash flow solvency test to the actuarial valuation process.
2. For MERF, the actuary reports a market value of assets which is larger than the amount reported by the Fund. The difference equals the amount of transfer from the RBF to the Non-RBF as a result of the post-retirement mortality gain and is approximately \$6.5 million. This appears to be in error. The amount involved is reasonably small relative to the total fund value. We estimate that the supplemental contribution would be increased by approximately \$165,000 if this were corrected (approximately 1.07% of the Old Asset Method Supplemental Contribution provided in the report).
3. Standards for Actuarial Work issued by the LCPR require certain technical assumptions regarding the assumed timing of demographic events such as withdrawing from employment, retiring, etc. We have identified some situations in which those do not appear to be strictly followed, although the method used is well within normal actuarial practice. We anticipate addressing this issue when we review the Standards later this spring.
4. The Standards for Actuarial Work issued by the LCPR require additional detail on sources of actuarial gain or loss when the “other” category meets certain size thresholds. We have identified two situations (DTRFA and TRA) in which the additional detail does not appear to have been supplied.
5. Actuarial Standards of Practice promulgated by the American Academy of Actuaries require the disclosure of certain assumptions and methods. We have identified some cases where we believe the disclosure is inadequate.
6. We have identified some instances in which we have not yet matched calculations of individual member liabilities. These are typically on benefits that are not very valuable, so the potential impact is expected to be negligible.

7. While there is no short-term concern with DTRFA's funded status, it is a mature fund with almost 40% of its membership in pay status representing more than 60% of the Actuarial Accrued Liability. Due to this maturity, we believe that it may be appropriate to add a cash flow solvency test to the actuarial valuation process. In addition, the DTRFA still provides a post retirement adjustment mechanism that pays a large percentage of the excess earnings on invested assets to annuitants. This limits the ability of the fund to recover investment losses during years when there are investment gains, particularly in a mature fund environment such as this.

## Conclusions and Recommendations

While the actuarial results presented in the reports are generally correct, we believe that there are some key issues facing most of these systems.

Due to the asset smoothing method, there are significant investment losses yet to be recognized. Absent large investment gains over the next few years, these losses will flow through the asset smoothing method and be recognized. If the assumed rate of return of 8.5% is met on a market value basis, it will result in investment losses on the actuarial value of assets and the actuarial contribution rate will increase.

In understanding the impact of the deferred losses, one consideration is where the systems would be if the market value of assets were used now. Many of the reports by the retained actuaries contained such an analysis. Another way to look at this is to consider that future returns would be required to "undo" the current deferred losses. For illustration, we have calculated the approximate return on market value of assets required over the next several years so the resulting market value would equal the 7/1/09 actuarial value increased with an 8.50% rate of return each year. Our calculations make some simplifying assumptions and are applicable for those systems where the ratio of actuarial to market value is approximately 130%. The table below summarizes the required return over various time horizons.

Years of Higher Return	Required Return
3	19%
5	15%
10	12%
15	11%

We also note that many of the Systems have a combined contribution rate (member and employer) that is not much larger than the normal cost rate and expenses. Because of this, very little of the contributions coming in to the funds can be used to pay down – or even pay the interest – on the outstanding Unfunded Actuarial Liability amounts. The assumption changes that result from the experience studies recently completed may exacerbate this problem. We believe that projections of long-term funding trends in future years are important information for the LCPR to have in evaluating the long-term sustainability of these plans. Information, such as that presented at the January 13, 2010 LCPR meeting, is invaluable in assisting the LCPR in evaluating the financial health of the plans.

## Section 2: Standards for Actuarial Work

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### American Academy of Actuaries Actuarial Standards of Practice

The Actuarial Standards Board of the Academy of Actuaries establishes and improves standards of actuarial practice. These Actuarial Standards of Practice (ASOPs) identify what the actuary should consider, document, and disclose when performing an actuarial assignment. Standards of practice are in place to assure the public that actuaries are professionally accountable. At the same time, the standards provide practicing actuaries with a basis for assuring that their work will conform to appropriate practices. Written standards of practice, coupled with written provisions for disciplining members, show that the profession governs itself and takes an active interest in protecting the public.

There are ASOPs for each area of specialty (Casualty, Health, Life, Pension) and also general standards that apply to all practice areas. The specific pension ASOPs that apply to the actuarial work reviewed by Milliman include:

- ASOP 4: Measuring Pension Obligations
- ASOP 27: Selection of Economic Assumptions for Measuring Pension Obligations
- ASOP 35: Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations
- ASOP 44: Selection and Use of Asset Valuation Methods for Pension Valuations

Since ASOPs 27 and 35 provide guidance in the selection of actuarial assumptions, they will be addressed when we review the Experience Study reports later this year. No specific comments are included with respect to those ASOPs in this discussion. However, ASOP 4 and 44 do apply to the valuation work we were asked to review so comments regarding those standards are included in this report.

ASOP 44, Selection and Use of Asset Valuation Methods for Pension Valuations, provides that the asset valuation method, which is used to develop the actuarial value of assets, should bear a reasonable relationship to the market value. It further provides that the asset valuation method should be likely to satisfy both of the following:

- Produce values within a reasonable range around market value AND
- Recognize differences from market value in a reasonable amount of time.

In lieu of both of the above, the standard will be met if either of the following requirements is satisfied:

- There is a sufficiently narrow range around the market value OR
- The method recognizes differences from market value in a sufficiently short period.

We believe the methodology in statute meets the requirements of ASOP 44 because it recognizes the difference between market value and actuarial value in a sufficiently short period.

The asset valuation method for all of the valuations is set in statute and all of the plans we reviewed followed the methodology in calculating the actuarial value of assets as of the valuation date. Some public retirement systems utilize the concept of a “corridor”, which provides that once the initial determination of the actuarial value of assets is made it is compared to a corridor around market value. There is no required range for the corridor, but the most common corridor has been 80% to 120% of market value (at least prior to 2009). Using this corridor as an example, if the initial actuarial value lies above 120% of market value or below 80% of market value, the final actuarial value of assets is set equal to the boundary of the corridor. Please see the example below:

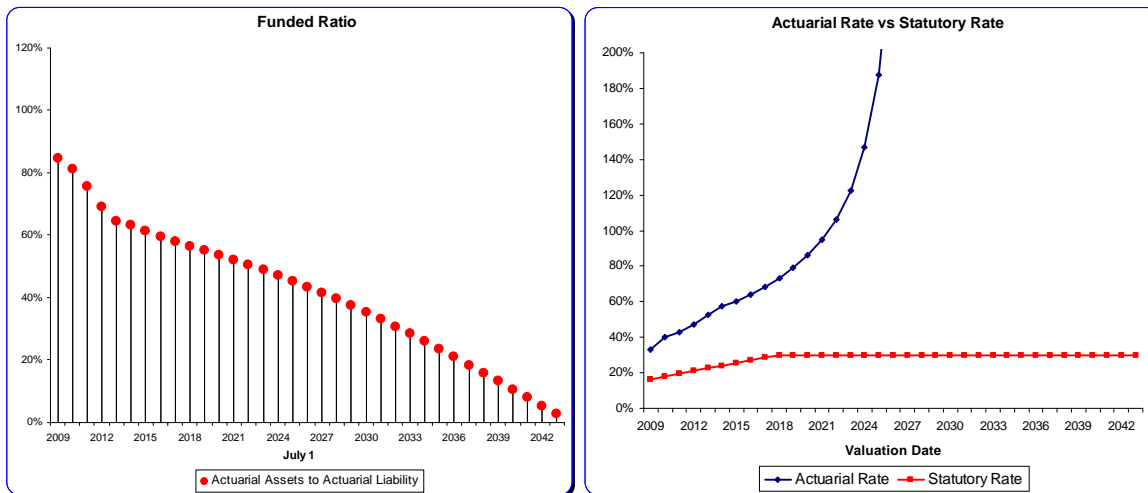


1. 7/1/09 Market value of assets: \$6,897,118
2. 7/1/09 Initial Actuarial Value of Assets: \$9,030,401
3. Corridor Values
  - A. 120% of Market Value \$8,276,542
  - B. 80% of Market Value \$5,517,694
4. 7/1/09 Final Actuarial Value of Assets: \$8,276,542  
(2) but not more than (3A) nor less than (3B)

We are not necessarily recommending the use of a corridor, but rather introducing the concept. We expect to discuss this further with the Commission when we review the LCPR's Standards for Actuarial Work later this year. We would note, however, that due to the absence of a corridor the actuarial value of assets varied significantly from the market value of assets for most systems as summarized below:

	Actuarial Value	Market Value	Ratio
MSRS General	\$ 9,030,401,000	\$ 6,897,118,000	131%
MSRS Correctional	590,339,000	456,783,000	129
State Patrol	584,501,000	450,060,000	130
Elective State Officials	213,165	213,165	100
Legislator	28,663,000	28,663,000	100
Judges	147,120,000	114,690,000	128
PERA General	13,158,490,000	10,116,852,000	130
PERA Correctional	217,577,000	167,300,000	130
PERA P&F	5,239,855,000	4,001,046,000	131
TRA	17,882,408,000	13,813,826,000	129
DTRFA	279,255,559	179,933,200	155
SPTRF A	1,049,954,000	781,432,000	134
MERF	880,133,155	859,895,146	102

The purpose of an asset valuation method is to reduce volatility in the value of assets that is used in the valuation process thereby creating more stable contribution rates. However, it is important to recognize the difference between the actuarial and market value of assets and the impact the deferred investment experience will have on future valuations. Most of the valuation reports point out the difference between actuarial and market value of assets, and provide the funded ratio and actuarial contribution rate on a market value basis. While this is very useful information, it doesn't fully disclose the long-term funding trend of the System. In our work with other public plans, we have found the use of computer models to be valuable, particularly when certain parameters like investment return and contribution rates can be varied. Projections using these models and showing alternate investment scenarios can provide the Commission with a better understanding of the long-term financial health of the system and allow for more proactive analysis. This type of information was provided to the Commission in a presentation by PERA, MSRS and TRA on January 13, 2010. We believe this is critical information for the Commission to have in evaluating the long-term sustainability of each Plan. Sample screen shots from some of the models Milliman has produced for our public plan clients are shown below just to illustrate the value of this type of information.



ASOP 4 governs the calculation of pension obligations and the communication of those results. In general, the report should contain sufficient information such that:

- It would be properly interpreted and applied by the person to whom the communication is directed, and
- Another actuary in the pension practice could form an opinion about the reasonableness of the conclusion.

Standard of Practice No. 4 also indicates specific requirements for content of actuarial reports including:

- The name of the person or firm retaining the actuary and the purpose of the report,
- An outline of the benefits being valued,
- The effective date of the calculation,
- A summary of the participant data,
- A summary of asset information,
- A description of the actuarial methods and assumptions, and
- A statement of the findings, conclusions or recommendations necessary to satisfy the purpose of the communication.

We believe that all of the reports meet these requirements.

There is one provision of ASOP 4 that we believe applies to the Duluth Teachers and St. Paul Teachers Plans. These plans provide for an additional cost of living adjustment (COLA) when the five year average rate of return of the fund exceeds the assumed rate of return. Presumably, the potential benefits to be derived from this provision have not been valued. ASOP 4 requires the actuary to disclose this fact. We believe the retained actuary for these systems should add this disclosure to their actuarial certification and clarify in the assumptions section of the report that the impact of this particular provision has not been reflected in the valuation results.

### Standards for Actuarial Work (Legislative Commission on Pensions and Retirement)

The Legislative Commission on Pensions and Retirement (LCPR) has adopted standards for actuarial work. The purposes of the standards are:

1. To ensure that sound actuarial procedures are utilized in developing actuarial assumptions, actuarial valuations, and cost estimates for proposed legislation for each retirement plan.

2. To establish sufficient uniformity of actuarial procedures that financial comparability of the retirement plans of the State of Minnesota is maximized.
3. To facilitate the development of sound public policy decision making in the pension area by the Legislature and the Legislative Commission on Pension and Retirement.

These standards are updated periodically, most recently as of August 20, 2007. All actuarial work for retirement plans subject to Minnesota Statutes, Section 356.215 and not subject to Minnesota Statutes, Section 356.216 must be prepared in accordance with the appropriate standards in effect as of the date of the valuation. Specific comments regarding the Commission's Standards are included in our discussion of each Plan.

## Section 3: Duluth Teachers Retirement Fund Association

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### Audit Conclusion

The Duluth Teachers Retirement Fund Association (DTRFA) is made up of one fund. The fund covers the public school teachers employed by Duluth public schools (except charter school teachers).

In general, the fund suffered significant declines in the funded ratios and an increase in the contribution rate deficiency. In addition, the DTRFA is a mature fund with almost 40% of its membership in pay status representing more than 60% of the Actuarial Accrued Liability. Due to this maturity, we believe that it may be appropriate to add a cash flow solvency test to the actuarial valuation process. We should also point out that the DTRFA still provides a post retirement adjustment mechanism that pays a large percentage of the excess earnings on invested assets to annuitants. This limits the ability of the fund to recover investment losses during years when there are investment gains, particularly in a mature fund environment such as this.

In general, we believe that the July 1, 2009 actuarial valuation is accurate and the report is complete with a few exceptions as noted below.

### Comments

<u>Membership Data</u>	We received the original data file prepared by the Fund and supplied to the actuary. We found that the data elements were being used in a consistent manner by the retained actuary. We also noted that the number of records and other summary values listed in the report were reasonable. Based upon this, we believe the data used by the actuary to prepare the actuarial valuation is appropriate and reasonably accurate.
<u>Actuarial Value of Assets</u>	We have reviewed the application of the asset smoothing method. It is the method defined in statute and we believe that this method has been applied correctly.
<u>Actuarial Valuation</u>	We reviewed 16 sample life calculations (10 active including one detailed trace life, 4 in-pay, 2 deferred vested). We reviewed calculated values by decrement and matched the values provided by the actuary to within a reasonable degree of tolerance. Based upon this limited review, we believe the actuarial calculations summarized in the actuary's report are reasonably accurate.
<u>Funding Method</u>	We believe that the actuary has correctly applied the Entry Age Normal funding method as provided in the statutes. This has been verified on a limited basis by the sample life calculations reviewed in the Actuarial Valuation section. In addition, the total required contribution follows the methodology provided in Minnesota Statutes 356.215
<u>Actuarial Assumptions</u>	We have reviewed the actuarial assumptions as summarized in the actuarial valuation. We have confirmed that the sample life calculations from the Actuarial Valuation section have applied these assumptions as summarized in the report. We have also confirmed the appropriate use of assumptions required by Chapter 356.215 however we note the use of a 6.5% post-retirement interest rate while Chapter 356.215 specifies an 8.5% post-retirement interest rate. We believe the 6.5% post-retirement interest rate implicitly values the 2% COLA and is an acceptable alternative to using the 8.5% post-retirement interest rate with an explicit valuation of the COLA. All other assumptions were selected by the Fund and the actuary and appear to be reasonable at this time.

Plan Provisions

We have reviewed the sample life calculations for compliance with Chapter 354A of the Minnesota statutes. We believe that these calculations reasonably reflect the benefits provided under the statute. In addition, the Actuarial Valuation Report contains a summary of the plan provisions. We believe this summary reasonably reflects the benefits provided under the statute.

Actuarial Report

The information provided in the Actuarial Valuation Report appears to meet all of the requirements of the Standards for Actuarial Work established by the State of Minnesota Legislative Commission on Pensions and Retirement with one exception. The actuarial gain or loss exhibit provides a breakdown of different sources of the gain or loss. Sources of gain or loss that are not specifically identified are then aggregated into a source labeled "Other". For the July 1, 2009 Actuarial Valuation, the Other Gain equals \$8,868,451 which is 2.43% of the Actuarial Accrued Liability. The actuarial standards require a more detailed breakdown of the components of the Other Gain when it exceeds 2% of the Actuarial Accrued Liability. This breakdown does not appear to be provided in the July 1, 2009 Actuarial Valuation. In addition, the report commentary mentions some "technical improvements" to the programming of the actuarial calculations as a source for some of this gain. We believe that the report should quantify the amount of gain resulting from the technical correction.

As mentioned above, the COLA for DTRFA is implicitly calculated using a 6.5% post-retirement interest rate. In accordance with ASOP 44 as mentioned in Section 2 above, we believe the report should disclose the use of a lower post-retirement interest rate to value the COLA.

In any event, the information contained in the report appears to be accurate.

## Section 4: Minneapolis Employees Retirement Fund

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### Audit Conclusion

As the LCPR knows well, the funding status for this Fund is seriously deficient. The actuarial valuation report prepared by Gabriel Roeder Smith & Company clearly shows this. We believe the core actuarial calculations which support this conclusion are accurate. However, as the actuary notes, there are questions regarding what the statutes require as the correct actuarial calculation. Clearly, we have concern with statements provided in the actuarial valuation with respect to funding calculations based upon the "Old Asset Method." The use of this method is significant in that it lowers the supplemental contribution by approximately \$73 million. Oral statements from Fund personnel indicate their belief that this method is authorized by statute. We are not qualified to provide a legal opinion on this matter. We believe that the overall strategy for funding MERF should be reviewed as well as what the statutes actually require. It may also be appropriate to add a cash flow solvency test to the actuarial valuation process.

### Comments

#### Membership Data

We received the original data file prepared by the Fund and supplied to the actuary. We found that the data elements were being used in a consistent manner by the retained actuary. We also noted that the number of records and other summary values listed in the report were reasonable. Based upon this, we believe the data used by the actuary to prepare the actuarial valuation is appropriate and reasonably accurate.

#### Actuarial Value of Assets

We have reviewed the application of the asset smoothing method. It is the method defined in statute and we believe that this method has been applied correctly. However, we note that the actuary reports a market value of assets which is larger than the amount reported by the Fund by about \$6.5 million. The difference equals the amount of transfer from the RBF to the Non-RBF as a result of the post-retirement mortality gain. This appears to be in error. The amount involved is reasonably small relative to the total fund value. We estimate that the supplemental contribution would be increased by approximately \$165,000 if this were corrected (approximately 1.07% of the Old Asset Method Supplemental Contribution provided in the report).

#### Actuarial Valuation

We reviewed 10 sample life calculations (4 active, 4 in-pay, 2 deferred vested). We reviewed calculated values by decrement and matched the values provided by the actuary to within a reasonable degree of tolerance. Based upon this limited review, we believe the actuarial calculations summarized in the actuary's report are reasonably accurate.

We have identified some items where we may need to ask GRS for additional detail or clarification when we perform a complete replication of the July 1, 2010 valuation. We believe that the items will be fully explained or immaterial. Items that might be of issue include:

For one of the active sample lives, we were not able to completely tie to some of the calculations related to the pre-retirement death decrement liability. Because the average active participant is less than two years from the assumed retirement age of 61, the pre-retirement death decrement liability is a small proportion of the total active liability. Furthermore, the active liability is a small proportion of the overall liability of the Fund. Therefore, we do not expect any material change.

In addition, the calculations assume retirement at the beginning of the year while all the other decrements are assumed to occur at mid-year. The Actuarial Standards require mid-year decrement for retirements as well except for the teacher plans.

Funding Method

We believe that the actuary has correctly applied the Entry Age Normal funding method as provided in the statutes. This has been verified on a limited basis by the sample life calculations reviewed in the Actuarial Valuation section. In addition, the total required contribution follows the methodology provided in Minnesota Statutes 356.215. However, we note that the actuary has applied a funding calculation using the “Old Asset Method” which assumes that the RBF market value equals the actuarial reserve for annuitants. It is the position of the Fund that statutory requirements require the supplemental contribution determination to be made this way. This results in an assumed fund value for the RBF equal to \$1,356,965,523 when the reported market value equals \$783,496,379. This distinction clearly has significant implications.

Actuarial Assumptions

We have reviewed the actuarial assumptions as summarized in the actuarial valuation. We have confirmed that the sample life calculations from the Actuarial Valuation section have applied these assumptions as summarized in the report. We have also confirmed the appropriate use of assumptions required by Chapter 356.215. All other assumptions were selected by the Fund and the actuary and appear to be reasonable at this time.

Plan Provisions

We have reviewed the sample life calculations for compliance with Chapter 422A of the Minnesota statutes. We believe that these calculations reasonably reflect the benefits provided under the statute. In addition, the Actuarial Valuation Report contains a summary of the plan provisions. We believe this summary reasonably reflects the benefits provided under the statute.

Actuarial Report

The information provided in the Actuarial Valuation Report appears to meet all of the requirements of the Standards for Actuarial Work established by the State of Minnesota Legislative Commission on Pensions and Retirement. The information contained in the report appears to be accurate and provides the information in a logical progression.

## Section 5: Minnesota Public Employees Retirement Association

### Audit Conclusion

The Minnesota Public Employees Retirement Association (PERA) is made up of three funds. The funds cover the general membership (General), police and fire members (P&F), and local correctional members (Correctional), reflecting the distinct benefit provisions and contribution rate requirements of each group. Because of market returns, the July 1, 2009 valuations show that each fund suffered deterioration in funded ratio compared to the prior year. Both the General and P&F funds continue to have a deficiency in the contribution rate. While the Correctional fund still has a surplus in contribution rate, if the assets were valued at market value, there would be a deficiency instead. As the past two years' market losses are recognized, the Correctional fund will also show a deficiency unless substantial market gains occur. Our specific comments on each fund's valuation results follow:

Due to the asset smoothing method, there are significant investment losses yet to be recognized. Absent large investment gains over the next few years, these losses will flow through the asset smoothing method and be recognized. If the assumed rate of return of 8.5% is met on a market value basis, it will result in investment losses on the actuarial value of assets and the actuarial contribution rate will increase. The following chart illustrates the significant difference in key valuation measurements based on market instead of actuarial value of assets.

	Funded Ratio		Required Contributions	
	AVA	MVA	AVA	MVA
General	70%	54%	15.55%	19.61%
P&F	83%	64%	29.99%	39.13%
Correctional	95%	73%	14.03%	16.77%

### General

Even with the scheduled increases in the contribution rates it is likely that the statutory contribution rate will continue to be less than the required contribution rate. Absent significantly favorable actuarial experience, the funded status of the plan is expected to decline.

### P&F

There is nearly a 7% of pay deficiency using the actuarial value of assets, but this amount rises to 15.63% when the market value of assets is used. This is a significant funding deficiency. In addition, the current statutory rate of 23.50% is just slightly larger than the normal cost for the Plan (22.07%). As a result, very little of the contribution is available to pay off the UAAL. Without increases in the contribution rate the plan's funded status is expected to drop dramatically absent favorable actuarial experience.

### Correctional

Based on the actuarial value of assets, the Plan is 95% funded and the statutory contribution exceeds the required contribution by 0.55%. However, results are very different if the market value of assets is considered. The funded ratio drops to 73% and there is a contribution deficiency of 2.19% of pay. The statutory contribution rate of 14.58% is only 1.19% higher than the normal cost rate (including expenses). Therefore, the current contribution rate cannot finance an UAAL of any size.

Absent significant favorable actuarial experience in the next few years (which would likely have to come from investment experience to be large enough), the funded status of the Plan is expected to decline.

Unless otherwise noted, the following comments apply to all three funds.



## Comments

### Membership Data

We received the original data file prepared by the Fund and supplied to the actuary. We found that the data elements were being used in a consistent manner by the retained actuary. We also noted that the number of records and other summary values listed in the report were reasonable. Based upon this, we believe the data used by the actuary to prepare the actuarial valuation is appropriate and reasonably accurate.

### Actuarial Value of Assets

We have reviewed the application of the asset smoothing method. It is the method defined in statute and we believe that this method has been applied correctly. We note that for the General and P&F fund, the reconciliation of market value contains an item labeled "Interest and dividends". We believe that this should actually be all investment income including both realized and unrealized gains/(losses). This has no effect on any calculation.

### Actuarial Valuation

We reviewed 26 sample life calculations (5 active, 12 in-pay, 9 deferred vested). We reviewed calculated values by decrement and matched the values provided by the actuary to within a reasonable degree of tolerance. Based upon this limited review, we believe the actuarial calculations summarized in the actuary's report are reasonably accurate.

We have identified some items where we have asked Mercer for additional detail or clarification. While we have not yet received a full response, we will continue to look into these items and make sure they are resolved when we perform a complete replication of the July 1, 2010 valuation. We believe that most of the items will be fully explained or immaterial. Items that might be of issue include:

- For the P&F fund, we had one active life to review. We were not able to completely tie to some of the calculations related to the withdrawal decrement liability. Because this liability is less than one-half of 1% of the total liability, we do not expect any material change.
- The Standards for Actuarial Work specify that demographic events are to be assumed to occur at the middle of the year. We believe that general actuarial practice would understand this to mean the midpoint between valuation anniversaries. The way in which Mercer is calculating liabilities and normal cost reflects that the events occur at the end of the year which they note is the middle of the calendar year. Throughout the actuarial profession, the election of this timing is often a matter of the actuarial firm's software capabilities. We do not know if Mercer has the ability to adjust this in their software. This is a fairly technical item that we have not attempted to quantify at this time. Due to the size of the liabilities, it is possible the dollar amount of the impact may appear significant even if the percentage impact is relatively small. Mercer's approach is within the mainstream of the actuarial profession and apart from the LCPR's specific requirements, would not usually be noted as an issue during an audit.

### Funding Method

We believe that the actuary has correctly applied the Entry Age Normal funding method as provided in the statutes. This has been verified on a limited basis by the sample life calculations reviewed in the Actuarial Valuation section. In addition, the total required contribution follows the methodology provided in Minnesota Statutes 356.215.

Actuarial Assumptions

We have reviewed the actuarial assumptions as summarized in the actuarial valuation. We have confirmed that the sample life calculations from the Actuarial Valuation section have applied these assumptions as summarized in the report. We have also confirmed the appropriate use of assumptions required by Chapter 356.215. All other assumptions were selected by the Fund and the actuary.

After the July 1, 2009 valuation was prepared, an actuarial experience study was conducted for General, and we will be reviewing that study later. Because of this, we did not perform an exhaustive review of the assumptions used in the valuation.

Plan Provisions

We have reviewed the sample life calculations for compliance with Chapter 353 of the Minnesota statutes. We believe that these calculations reasonably reflect the benefits provided under the statute. In addition, the Actuarial Valuation Report contains a summary of the plan provisions. We believe this summary reasonably reflects the benefits provided under the statute.

Actuarial Report

The information provided in the Actuarial Valuation Report appears to meet all of the requirements of the Standards for Actuarial Work established by the State of Minnesota Legislative Commission on Pensions and Retirement. The information contained in the report appears to be accurate and provides the information in a logical progression. The reports list the assumptions relating to the election of optional forms of payment. We note that these assumptions only apply to those members retiring from active status. Those who terminate employment and then retire later (including current deferred vested members) are assumed to elect a straight life annuity. This distinction should be clarified.

## Section 6: Minnesota State Retirement System

### Audit Conclusion

The Minnesota State Retirement System (MSRS) is made up of six funds. The funds cover the state employees (General), state patrol, correctional members (Correctional), judges, and certain grandfathered elected officers and legislators. Each fund reflects the distinct benefit provisions and contribution rate requirements of each group. As the LCPR is aware and Mercer notes in its reports, the two grandfathered plans face significant funding challenges. However, because they have few members, it is anticipated that the state will not be significantly impacted in making the required benefit payments

In general, the four on-going funds suffered significant declines in the funded ratios and an increase in the contribution rate deficiency. Mercer has also shown many of these results on a market value of assets basis to help the LCPR understand the implications as the deferred asset losses are recognized over the next five years.

Additional discussion of the four main groups follows:

Due to the asset smoothing method, there are significant investment losses yet to be recognized. Absent large investment gains over the next few years, these losses will flow through the asset smoothing method and be recognized. If the assumed rate of return of 8.5% is met on a market value basis, it will result in investment losses on the actuarial value of assets and the actuarial contribution rate will increase. The following chart illustrates the significant difference in key valuation measurements based on market instead of actuarial value of assets.

**Minnesota State Retirement System\***

	Funded Ratio		Required Contributions	
	AVA	MVA	AVA	MVA
General	86%	66%	14.85%	24.58%
Correctional	72%	56%	24.85%	28.57%
State Patrol	81%	62%	38.16%	50.21%
Judges	61%	47%	31.53%	36.30%

\*Excludes Legislators and Elective Officers

### General

Even with scheduled increases in the statutory contribution rates, it is likely to fall far short of the required contribution rate. However, the amortization period is fairly short (July 1, 2020) so if the period were extended, the required contribution would be lower. If a 30-year amortization period is used the required contribution using AVA drops to 11.47%. Of key interest is the trend of the funded ratio given the current funded status, the deferred investment losses and a fixed contribution rate that only permits 1.4% of pay to be used to fund the UAAL.

### Correctional

The statutory contribution rate increased in July, 2009 and is scheduled to increase again to 20.70% in July, 2010. Even with the increases, the statutory rate is only 2.28% higher than the normal cost rate and expenses. This situation makes it difficult for the Plan to finance a UALL that is large. The deficiency on a market value basis is nearly 10% of pay and that is with an amortization period that extends to 2038. Again, it is difficult to evaluate the long-term health of the System without a modeling tool. We expect that without contribution increases or significant favorable experience the funded status will steadily decline.

## State Patrol

The deferred losses are similar in magnitude, as a percent of actuarial liability, to the other plans and the funded status is expected to decline over the next four years, absent favorable experience which might occur to offset the losses. The statutory contribution rate is 26.00% while the normal cost rate plus expenses is 25.53%. Nearly all of the contributions are needed to cover the ongoing cost of benefits in the current year (normal cost plus expenses). Therefore, any unfunded actuarial accrued liability would be expected to increase. As the deferred investment losses flow through the smoothing method and the UAAL increases, this will likely become an issue. Absent higher contribution rates or significant actuarial gains the funded status of the Plan is expected to continually decline.

## Judges

The Judges plan has a statutory contribution rate that is more than 10% over the normal cost rate. However, its funded status is very weak (47% on a market value basis) so the UAAL contribution is nearly as high as the normal cost rate. The Plan has significant deferred investment losses like the other plans which will decrease the funded status and increase the contribution deficiency over the next four years.

Unless otherwise noted, the following comments apply to all six funds.

## Comments

### Membership Data

We received the original data file prepared by the Fund and supplied to the actuary. We found that the data elements were being used in a consistent manner by the retained actuary. We also noted that the number of records and other summary values listed in the report were reasonable. Based upon this, we believe the data used by the actuary to prepare the actuarial valuation is appropriate and reasonably accurate.

### Actuarial Value of Assets

We have reviewed the application of the asset smoothing method. It is the method defined in statute and we believe that this method has been applied correctly. (The two grandfathered systems use market value for the actuarial value of assets instead of a smoothed value.)

### Actuarial Valuation

We reviewed 41 sample life calculations (6 active, 24 in-pay, 11 deferred vested). We reviewed calculated values by decrement and matched the values provided by the actuary to within a reasonable degree of tolerance. Based upon this limited review, we believe the actuarial calculations summarized in the actuary's report are reasonably accurate.

We have identified some items where we have asked Mercer for additional detail or clarification. While we have not yet received a full response, we will continue to look into these items and make sure they are resolved when we perform a complete replication of the July 1, 2010 valuation. We believe that most of the items will be fully explained or immaterial. Items that might be of issue include:

- For the state patrol fund, the surviving spouse death benefit changes from 50% of pay to a 100% J&S annuity when the member would have reached 55. We are not sure that Mercer is reflecting this change. The impact will be very minimal.
- The Standards for Actuarial Work specify that when a vested member terminates employment, they are presumed to elect a refund of contributions and interest or a deferred annuity, depending upon which has greater value. For the legislative fund, it appears that Mercer is assuming the annuity is always elected. This should have very little impact.

- The Standards for Actuarial Work specify that demographic events are to be assumed to occur at the middle of the year. We believe that general actuarial practice would understand this to mean the midpoint between valuation anniversaries. The way in which Mercer is calculating liabilities and normal cost reflects that the events occur at the end of the year which they note is the middle of the calendar year. Throughout the actuarial profession, the election of this timing is often a matter of the actuarial firm's software capabilities. We do not know if Mercer has the ability to adjust this in their software. This is a fairly technical item that we have not attempted to quantify at this time. Due to the size of the liabilities, it is possible the dollar amount of the impact may appear significant even if the percentage impact is relatively small. Mercer's approach is within the mainstream of the actuarial profession and apart from the LCPR's specific requirements, would not usually be noted as an issue during an audit.

Funding Method

We believe that the actuary has correctly applied the Entry Age Normal funding method as provided in the statutes. This has been verified on a limited basis by the sample life calculations reviewed in the Actuarial Valuation section. In addition, the total required contribution follows the methodology provided in Minnesota Statutes 356.215.

Actuarial Assumptions

We have reviewed the actuarial assumptions as summarized in the actuarial valuation. We have confirmed that the sample life calculations from the Actuarial Valuation section have applied these assumptions as summarized in the report. We have also confirmed the appropriate use of assumptions required by Chapter 356.215. All other assumptions were selected by the Fund and the actuary.

After the July 1, 2009 valuation was prepared, an actuarial experience study was conducted for MSRS General (state employees), and we will be reviewing that study later. Because of this, we did not perform an exhaustive review of the assumptions used in the valuation.

Plan Provisions

We have reviewed the sample life calculations for compliance with Chapter 352 of the Minnesota statutes. We believe that these calculations reasonably reflect the benefits provided under the statute. In addition, the Actuarial Valuation Report contains a summary of the plan provisions. We believe this summary reasonably reflects the benefits provided under the statute.

Actuarial Report

The information provided in the Actuarial Valuation Report appears to meet all of the requirements of the Standards for Actuarial Work established by the State of Minnesota Legislative Commission on Pensions and Retirement. The information contained in the report appears to be accurate and provides the information in a logical progression. The reports list the assumptions relating to the election of optional forms of payment. We note that these assumptions only apply to those members retiring from active status. Those who terminate employment and then retire later (including current deferred vested members) are assumed to elect a straight life annuity. This distinction should be clarified.

## Section 7: St. Paul Teachers Retirement Fund Association

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### Audit Conclusion

The St. Paul Teachers Retirement Fund Association (StPTRFA) is made up of one fund. The fund covers the public school teachers employed by St. Paul public schools (except charter school teachers).

In general, the fund suffered modest declines in the funded ratios and an increase in the contribution rate deficiency using the actuarial value of assets. GRS has also provided a brief summary paragraph of the funded ratio and contribution sufficiency on a market value of assets basis to help the LCPR understand the implications as the deferred asset losses are recognized over the next five years.

### Comments

#### Membership Data

We received the original data file prepared by the Fund and supplied to the actuary. We found that the data elements were being used in a consistent manner by the retained actuary. We also noted that the number of records and other summary values listed in the report were reasonable. Based upon this, we believe the data used by the actuary to prepare the actuarial valuation is appropriate and reasonably accurate.

#### Actuarial Value of Assets

We have reviewed the application of the asset smoothing method. It is the method defined in statute and we believe that this method has been applied correctly.

#### Actuarial Valuation

We reviewed 9 sample life calculations (5 active, 2 in-pay, 2 deferred vested). We reviewed calculated values by decrement and matched the values provided by the actuary to within a reasonable degree of tolerance. Based upon this limited review, we believe the actuarial calculations summarized in the actuary's report are reasonably accurate.

We have identified a sample life calculation involving an active Basic Plan Member where the calculated benefit does not apply the years of service cap of 40 for early retirement or disability. Since the number of Members involved is small (potentially 66 out of 3,940) and the amount of service involved is likely to be less than 2 years per affected Basic Plan Member (teachers hired at age 22), we expect the impact to be immaterial to the total liability of this fund.

#### Funding Method

We believe that the actuary has correctly applied the Entry Age Normal funding method as provided in the statutes. This has been verified on a limited basis by the sample life calculations reviewed in the Actuarial Valuation section. In addition, the total required contribution follows the methodology provided in Minnesota Statutes 346.215.

#### Actuarial Assumptions

We have reviewed the actuarial assumptions as summarized in the actuarial valuation. We have confirmed that the sample life calculations from the Actuarial Valuation section have applied these assumptions as summarized in the report. We have also confirmed the appropriate use of assumptions required by Chapter 356.215. All other assumptions were selected by the Fund and the actuary and appear to be reasonable at this time.

Plan Provisions

We have reviewed the sample life calculations for compliance with Chapter 354A of the Minnesota statutes. We believe that these calculations reasonably reflect the benefits provided under the statute. In addition, the Actuarial Valuation Report contains a summary of the plan provisions. We believe this summary reasonably reflects the benefits provided under the statute.

Actuarial Report

The information provided in the Actuarial Valuation Report appears to meet all of the requirements of the Standards for Actuarial Work established by the State of Minnesota Legislative Commission on Pensions and Retirement. The information contained in the report appears to be accurate and provides the information in a logical progression. We have noted what appears to be a typing error on page 4, second paragraph where it states that the actuarial value of assets was 13.6% of market value.



## Section 8: Teachers Retirement Association

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### Audit Conclusion

The Minnesota Teachers Retirement Association (TRA) is made up of one fund. The fund covers the state public school teachers except for those teachers employed by St. Paul or Duluth public schools (except charter school teachers) or the University of Minnesota. Effective July 1, 2006, the Minneapolis Teachers Retirement Fund was merged into this fund.

In general, the fund suffered significant declines in the funded ratios and an increase in the contribution rate deficiency. Mercer has also shown many of these results on a market value of assets basis to help the LCPR understand the implications as the deferred asset losses are recognized over the next five years.

### Comments

#### Membership Data

We received the original data file prepared by the Fund and supplied to the actuary. We found that the data elements were being used in a consistent manner by the retained actuary. We also noted that the number of records and other summary values listed in the report were reasonable. Based upon this, we believe the data used by the actuary to prepare the actuarial valuation is appropriate and reasonably accurate.

#### Actuarial Value of Assets

We have reviewed the application of the asset smoothing method. It is the method defined in statute and we believe that this method has been applied correctly.

#### Actuarial Valuation

We reviewed 16 sample life calculations (10 active including two detailed trace lives, 4 in-pay and two deferred vested). We reviewed calculated values by decrement and matched the values provided by the actuary to within a reasonable degree of tolerance. Based upon this limited review, we believe the actuarial calculations summarized in the actuary's report are reasonably accurate.

We have identified one item where we have asked the retained actuary for additional detail or clarification. While we have not yet received a full response, we will continue to look into this item and make sure it is resolved when we review the July 1, 2010 actuarial valuation.

This issue involves one sample life for a disabled in-pay Member. It appears that the participant was valued as receiving a Joint & 100% Survivor Annuity even though the retiree data file does not contain any spousal information or form of benefit payment information. We do not necessarily disagree with the retained actuary's assumption for the form of payment however we believe such an assumption should have been disclosed in the Actuarial Valuation Report.

#### Funding Method

We believe that the actuary has correctly applied the Entry Age Normal funding method as provided in the statutes. This has been verified on a limited basis by the sample life calculations reviewed in the Actuarial Valuation section. In addition, the total required contribution follows the methodology provided in Minnesota Statutes 356.215.



### Actuarial Assumptions

We have reviewed the actuarial assumptions as summarized in the actuarial valuation. We have confirmed that the sample life calculations from the Actuarial Valuation section have applied these assumptions as summarized in the report. We have also confirmed the appropriate use of assumptions required by Chapter 356.215. All other assumptions were selected by the Fund and the actuary.

After the July 1, 2009 valuation was prepared, an actuarial experience study was conducted for the state teachers, and we will be reviewing that study later. Because of this, we did not perform an exhaustive review of the assumptions used in the valuation.

### Plan Provisions

We have reviewed the sample life calculations for compliance with Chapter 354 of the Minnesota statutes. We believe that these calculations reasonably reflect the benefits provided under the statute. In addition, the Actuarial Valuation Report contains a summary of the plan provisions. We believe this summary reasonably reflects the benefits provided under the statute.

### Actuarial Report

The information provided in the Actuarial Valuation Report appears to meet all of the requirements of the Standards for Actuarial Work established by the State of Minnesota Legislative Commission on Pensions and Retirement with one exception. The actuarial gain or loss exhibit provides a breakdown of different sources of the gain or loss. Sources of gain or loss that are not specifically identified are then aggregated into a source labeled "Other". For the July 1, 2009 Actuarial Valuation, the Other Loss equals \$98,169,000. The actuarial standards require a more detailed breakdown of the components of the Other Loss when it exceeds \$50,000,000. This breakdown does not appear to be provided in the July 1, 2009 Actuarial Valuation.

In any event, the information contained in the report appears to be accurate and provides the information in a logical progression.

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