January 2009

# State Retirement and Pension System of Maryland

## Actuarial Review, Part I – State
## As of June 30, 2008

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January 23, 2008

The State Retirement Agency of Maryland
120 East Baltimore Street
Baltimore, MD 21202

Subject: Actuarial Review - Final

Our findings and comments resulting from a detailed review of the June 30, 2008 actuarial valuation of the State Retirement and Pension System of Maryland performed by Cheiron are presented in the enclosed report.

This report is updated from the draft report dated November 17, 2008 to incorporate our review of Cheiron's valuation report as well as updates to Section III based on an informal discussion with Cheiron after the draft was released. We did not have the opportunity to address these with Cheiron prior to the release of the draft report.

This report includes a discussion of all the elements of our review. These issues are summarized in the Executive Summary. More detailed commentary on our review process is included in subsequent sections of this report.

We wish to express our appreciation for the cooperation provided to us during the course of our work by the SRA and the actuaries at Cheiron.

The information contained in this document (including any attachments) is not intended by Mercer to be used, and it cannot be used, for the purpose of avoiding penalties under the Internal Revenue Code that may be imposed on the taxpayer.

Mercer's calculations are based on employee and financial data which were provided by Cheiron and which are summarized in their valuation report. Our actuarial review and contribution calculations were determined in accordance with generally accepted actuarial principles and procedures.

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The undersigned credentialed actuaries meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report. We are not aware of any direct or material indirect financial interest or relationship, including investments or other services that could create a conflict-of-interest, that would impair the objectivity of our work.

Sincerely,

Douglas L. Rowe, FSA, MAAA, EA

James Baughman, ASA, EA

Enclosure

Copy:
Michael Rubenstein, Department of Legislative Services

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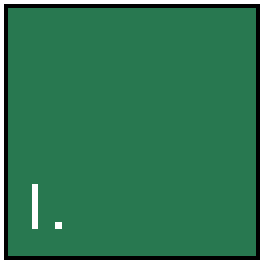

# Executive Summary

The Department of Legislative Services (DLS) engaged Mercer to review the June 30, 2008 actuarial valuation conducted by Cheiron, Inc. (Cheiron) on behalf of the State Retirement Agency of Maryland (SRA). The purpose of the review is to have an independent actuary review the valuation to ensure its accuracy, validity, completeness, appropriateness, and conformance with applicable actuarial standards of practice. The purpose is also to identify any changes in assumptions, methods or communications that, in our opinion, would improve the quality of the actuarial valuation and the understanding of its intended audience.

An actuarial valuation is completed to determine the required employer contribution rates each year, to produce an appropriate pattern of contributions to fund the plan's benefits over time, and to determine the plan's funded status. The valuation report is prepared to communicate the actuary's professional conclusions and recommendations, to record and communicate the methods and procedures, and to ensure that the parties addressed are aware of the significance of the actuary's opinion or findings.

It is important to understand that the actuarial valuation does not determine the actual cost of the benefits, but only the pattern of contributions. The actual cost of benefits is determined by the Systems' benefit structure and investment returns.

## Statement of Key Findings

- Mercer's calculation of the total Corridor contribution for all Systems is $1.2291 billion which differs by less than 0.5% from Cheiron's calculation of $1.2334 billion. This verifies Cheiron's results.
- Cheiron continued Segal's use of two techniques for the entry age normal cost method which Mercer does not ordinarily use, one of which appears to be inconsistent with the manner in which the contribution rates are applied for four of the systems. We believe that these techniques reduce the State's contribution for Judges, Police and LEOPS. One of the techniques increases and the other decreases the contribution for Teachers' and Employees' Systems. Exhibits I-IV quantify the impact on contributions for the technique which decrease the

contributions for all systems. They should at least be discussed, and at least one of these should probably be changed for future valuations.
- Several errors and undisclosed assumptions were uncovered in our review of "test lives." These should be corrected, but their impact on the overall results was de minimus.

### Summary of Process Used

"Test lives" is a term used for sample plan participants whose highly detailed results from an actuarial valuation system can be used by the company's own actuaries to make sure that the valuation system is working properly or by another actuarial firm to audit the ongoing actuary's results.

We requested and reviewed test lives, liabilities, and detailed cost calculations from Cheiron in order to cover the various plans, sub-plans and types of participants (retirees; beneficiaries; young, old, long- and short-service active employees, etc.) in the State Retirement and Pension System (SRPS). Our review of Cheiron's test lives for the June 30, 2008 actuarial valuation revealed mostly minor discrepancies.

Details of these discrepancies are described in Section III of this report. They ranged from shortcuts for low value benefits that apply to a small portion of the plan's participants to the use of assumptions/methods that were not incorporated in the prior year's valuation or communicated to us as differences from the prior year's valuation to probable errors. It does not appear that the differences had a material impact on overall results. The differences were presented in our draft report dated November 17, 2008. We had an informal discussion with Cheiron on November 18, 2008 regarding several of the items. Minor updates were made to the draft report as a result of our discussion.

### Actuarial Review Comments

In selecting and recommending actuarial methods and assumptions, a great deal of professional judgment is involved. In making the above Statement of Key Findings, we have not attempted to substitute our judgment for that of the consulting actuary to the SRA. However, as a part of our review, we have identified several areas which the SRA may want to discuss with Cheiron or a future actuary. These areas are described in each of the sections that follow this Executive Summary and are summarized below.

**Actuarial Cost Method**:
- Amortization method: The current amortization method is a closed 25-year period (13 years remaining for the unfunded actuarial accrued liability at June 30, 2000) with the amortization amounts calculated as a level percent of pay. Both the use of a closed period (in contrast to an open period which restarts the amortization period every year) and the 25-year period, which is shorter than the GASB standard of 30 years, tend to result in slightly higher contributions than the methods used by some systems. In light of other aspects of the actuarial methods and assumptions, we support this conservatism.

**Actuarial Asset Method**:
- We are neutral on the 80-120% of market value limit on the AVA. It has the potential to increase contribution volatility, but also has the potential to reduce over- or

underfunding. If current market conditions continue until June 30, 2009, the 120% limit could have a noticeable impact on the 2009 valuation.

**Actuarial Assumptions and Experience Study**:

- Investment return rate: Mercer's Portfolio Return Calculator suggests that the current assumption of 7.75% net of investment expenses is reasonable. While the assumption falls within a reasonable range for actuarial valuation purposes, SRA should consider whether this rate should be decreased to increase the probability that actual earnings will meet or exceed this assumption.
- Salary increases: The salary increase assumptions may be understated as explained in Section VI.

**Actuarial Report**:

- We believe the completeness of the actuarial valuation report could be improved if the following are incorporated in next year's valuation report.
  1. The employer portion of the normal cost is shown in the valuation report, but the total normal cost and/or the employee portion of the normal cost are not.
  2. The report does not disclose the length of time LEOPS and State Police members are assumed to remain in DROP.
  3. The basis for determining actuarial equivalence for the various payment forms is not disclosed in the valuation report. This is used to calculate the ordinary pre-retirement death benefits for retirement eligible members in all systems other than LEOPS and State Police.
  4. We had slight differences in the mortality rates for LEOPS based on the referenced tables and adjustments. The description of the LEOPS mortality rates in the report led us to believe that the assumption was different from the rates that were actually used.
  5. In the actuarial assumptions, we suggest adding something to the effect that no offset in benefits due to workers' compensation is assumed in projecting future disability benefits.

**Valuation Results**:

- Amortization of unfunded liabilities: In order to determine amortization bases for the June 30, 2008 valuation, Cheiron incorporated the amortization bases used to produce the revised June 30, 2007 valuation results from Segal's February 19, 2008 presentation. While this does avoid incorrect labeling of gains and losses due to demographic changes, it also theoretically assumes that the State would make contributions for FY 2009 based on Segal's revised results instead of the original results in the June 30, 2007 valuation report. We understand that actual FY 2009 contributions are based on contribution rates from the original June 30, 2007 valuation report. Cheiron's method results in a small loss due timing of the contribution increase. It results in Cheiron having a slightly lower contribution rates for FY 2010, which will be made up in future years.

II.

## Process

Mercer's calculations are based on June 30, 2008 census data which Cheiron provided to us directly. We were informed that the plan provisions, actuarial methods, and actuarial assumptions were the same as those in The Segal Company's June 30, 2007 actuarial valuation report, except for some differences in methods and assumptions which Cheiron communicated to us via e-mail on October 11, 2008. We were already provided with full decrement tables and amortization payment schedules for our replication of the revised June 30, 2007 valuation, and assumed no changes from those results. Cheiron also provided additional information to assist us with matching their results at our request.

When we were asked to perform the plan audit, we requested the following information from Cheiron to produce an independent review of their June 30, 2008 valuation results as shown in their October 2008 presentation to the State Retirement Agency.

- Test lives for certain individuals we requested for all plans.
- Information relating to the calculation of costs such as the calculation of the actuarial value of assets.
- Responses to questions regarding the original information.

We reviewed the overall results and the test lives provided by Cheiron to determine whether there were any issues and the magnitude of the issues.

III.

## Test Lives

Our review of the valuation results included checking of test lives provided by Cheiron to determine whether plan provisions and actuarial assumptions were programmed and applied properly.

Through these reviews we found multiple, generally small issues. Although we recommend further review and discussion of some of the issues, none are significant enough to affect our opinion as to the reasonableness of valuation results.

### Checking test lives to determine whether plan provisions and assumptions were programmed properly

We requested from Cheiron test lives of inactive plan members with a wide range of benefit types, and test lives of active plan members with various age and service combinations. Test lives were reviewed for all Systems. For the test lives of active plan members, our review included checking the projected benefits for each member (known as "benefit arrays") as well as a review of the actuarial present values computed from such benefit arrays. From our review we found the following issues:

**Corrections:**

1. DROP Account – in both LEOPS and State Police, the DROP period was not being capped by the age or service limits set by the plans (30 years of service for LEOPS; age 60 or 28 years of service for State Police). Instead, they are being limited only by the duration limit (5 years for LEOPS; 4 years for State Police). This would understate the liability for those who would reach the age or service limits before the duration limit, though by a small amount.

2. Normal costs for the Employees' Retirement System and Teachers' Retirement System did not appear to be calculated using the "open" plan benefits, decrements, and eligibilities. This is fine standing on its own, but is inconsistent with the "replacement life" method which Cheiron appeared to be continuing from Segal.

3. For the LEOPS test case we reviewed, the projected service for ordinary disability benefits and non-line-of-duty death benefits before age 50 appeared to be calculated differently from our result.

4. For LEOPS, no benefit is being valued due to the incidence of ordinary disability or non-line-of-duty death prior to 5 years of service. We believe that a refund of employee contributions should be valued.

5. For the Line of Duty Death benefit for LEOPS, the 75% married assumption does not appear to have been applied.

6. For LEOPS, post termination mortality was based on the Ordinary death portion of the pre-retirement mortality decrement, which is inconsistent with the other systems where the post-termination mortality assumptions were the same as the post-retirement mortality assumptions.

7. For State Police, no benefit is being valued due to the incidence of ordinary disability prior to 5 years of service. It appears that a refund of employee contributions should be valued.

8. We were unable to match the deferred annuity factors being used for terminated vested members of State Police and LEOPS.

9. We were unable to match the post-retirement eligible married death benefits for the Corrections Officers' Retirement System test case.

10. For the test case we reviewed in the Teachers' Pension System, ordinary disability decrements were not being included in determining the survival percentage at each age for active employees.

11. For the test case we reviewed in the Employees' Retirement System (bifurcated, non-contributory, compound/simple COLA), it appeared that the compound COLA was applied to the entire benefit.

12. For the test case we reviewed in the Legislative Pension Plan, the withdrawal decrements do not appear to have been applied consistently with the assumptions from the June 30, 2007 valuation. In the test case, the first turnover rate was applied 10 years after hire rather than 8.

13. For the Teachers' Retirement System, it appears that benefit amounts may have been based on eligibility service rather than benefit service.

For item 1. above, Cheiron has verified the issue. They noted that the impact may not be significant due the small difference in the value of benefit. We brought the other items to Cheiron's attention and have not received a response.

**Adjustments/issues not identified in the valuation report:**

We believe the completeness of the actuarial valuation report could be improved if the following are incorporated in next year's valuation report.

1. The employer portion of the normal cost is shown in the valuation report, but the total normal cost and/or the employee portion of the normal cost are not.

2. The report does not disclose the length of time LEOPS members are assumed to remain in DROP.

3. The basis for determining actuarial equivalence for the various payment forms is not disclosed in the valuation report. This is used to calculate the ordinary pre-retirement death benefits for retirement eligible members in the Teachers' Retirement System, Teachers' Pension System, Employees' Retirement System, Employees' Pension System, Correctional Officers' Retirement System, Local Fire & Police Retirement System and Local Fire & Police Pension System.

4. We had slight differences in the mortality rates for LEOPS based on the referenced tables and adjustments. The description of the LEOPS mortality rates in the report led us to believe that the assumption was different from the rates that were actually used.

5. In the actuarial assumptions, we suggest adding something to the effect that no offset in benefits due to workers' compensation is assumed in projecting future disability benefits.

**Apparent inconsistencies that could be handled more than one way:**

1. Unused sick leave was applied inconsistently in the calculation of ordinary disability and non-line-of-duty death benefits. In some systems it was included, in others it wasn't.

2. Cheiron's method for calculating expected employee contributions for the coming year is based on an "expected employee contribution rate". This rate is developed for the coming year by taking the expected employee contributions at plan entry and dividing these by the present value of future salary at plan entry. For members with prior service, Cheiron's calculation of expected employee contributions appears to have been based partially on a backed-into contribution rate for prior years. The backed-into rate, when projected forward using the system's corresponding salary increase assumption and employee contribution interest rate, would result in the current employee contribution balance. This could lead to unexpected results for members whose pay history differs significantly from the valuation assumptions. It also leads to unexpected results for members who haven't always made contributions at the same rate, such as Employees' Pension System and Teachers' Pension System members. Especially if the "replacement life" method is used for benefits, we recommend a consistent approach for calculating the expected employee contributions. One way to accomplish this would be to assume members' past and future contribution rates are based on the "open" plan provisions when calculating the expected employee contributions. Cheiron's method is likely to overstate costs for Alternate Contributory Pension System members, and could

understate or overstate costs for the other systems depending on members' pay history.

3. Cheiron calculated the expected employee contributions for the coming year based on the "expected employee contribution rate" described above. For the Judges and Legislative Systems, where contributions can cease while a member is still employed after a certain period of service, this results in a slightly lower rate of expected employee contributions for members who are currently contributing and a higher rate of expected employee contributions for members who are no longer contributing. Since expected employee contributions are an offset to the normal cost, this has the reverse impact on the normal cost- thus, it could overstate the normal cost for members currently making contributions to the plan and understate the normal cost for members who are no longer contributing.

4. We confirmed with Cheiron that they did not incorporate the accidental disability benefit during DROP membership for LEOPS and State Police. The probability of accidental disability is less than 1% per year. Including it could increase or decrease plan costs by a very small amount depending on several factors, such as whether the member is in LEOPS or State Police, the age/service of the member, and DROP membership duration. We suggest that in future valuations the System's actuary should consider whether the additional accuracy from including the benefit in the valuation is worth the additional complexity to the valuation.

# IV.

## Actuarial Calculations

As part of our review of Cheiron's June 30, 2008 valuation, we compared the following:

- The calculation of liabilities and normal costs from our valuation system based on Mercer's interpretation of the entry age normal cost method with the amounts from Cheiron's valuation system.
- The calculation of liabilities and normal costs from our valuation system based on Cheiron's interpretation of the entry age normal cost method with the amounts from Cheiron's valuation system.
- The calculation of contribution rates for FY 2010 based on the basic (pre-Corridor) actuarial method.
- The calculation of contribution rates for FY 2010 based on the Corridor method (for Teachers' and Employees' Retirement and Pension Systems).

The main difference between the two sets of contribution rates we produced is the application of decrements to calculate the normal costs. For the "Mercer's interpretation" results, decrements were not applied to the normal costs. For the "Cheiron's interpretation" results, decrements were applied to the normal costs. In both sets of results we incorporated the "replacement life" version of the entry age normal cost method.

Exhibits I and II on the following pages show the comparison of FY 2010 contribution rates based on the basic actuarial method. Exhibits III and IV show similar results based on the Corridor method.

For our calculation of corridor contributions using our normal cost methodology, we assumed that if the change in methodology were adopted, the difference in cost would be reflected in the same manner as changes in other actuarial methods have been reflected. In other words, 100% of the change would be reflected in the Corridor contribution rates. This may be open to interpretation. If the change is adopted it would be up to the SRA to determine whether to recognize 20% or 100% of the change.

After reviewing the results based on Mercer's interpretation of the entry age normal cost method, we decided to match results based on our attempt at Cheiron's interpretation of the entry age normal cost method using our valuation system. For all Systems combined, we found that Mercer's interpretation of the entry age normal cost method produced a higher contribution requirement than Cheiron's methodology.

We believe that our method produces a more reasonable allocation of costs due to the fact that contributions to all systems except for the Teachers' Retirement & Pension Systems are made throughout the year with the contribution rate from the valuation being applied to the payroll at each pay date. Cheiron applied a survival (or continuation in service) decrement to their calculated normal cost, which we believe is theoretically correct if the contributions are not affected by turnover during the year and the System is willing to accept ongoing actuarial losses from new entrants. From our understanding, the State makes contributions for only the Teachers' Retirement & Pension Systems based on beginning of the year payroll.

Any systematic underfunding as a result of the normal cost method would be made up in future plan years as loss amortization payments.

# State Retirement and Pension System of Maryland

**Exhibit I**

Results from Audit of June 30, 2008 Valuation

**June 30, 2008 Valuation Results to Determine Contribution Rates for Fiscal Year 2010**

Pre-Corridor

| Results by Plan: | **Cheiron** *June 30, 2008 Results* | **Mercer** *Based on Mercer Methodology* | *Difference as % of payroll* | **Mercer** *Based on Cheiron's Normal Cost Methodology* | *Difference as % of payroll* |
|---|---|---|---|---|---|
| Teachers' Retirement & Pension Systems (TRPS) | 14.05% | 14.77% | 0.72% | 13.67% | -0.38% |
| Employees' Retirement & Pension Systems (ERPS) | 13.61% | 14.41% | 0.80% | 13.69% | 0.08% |
| State Police | 30.79% | 31.29% | 0.50% | 29.40% | -1.39% |
| Judges | 48.89% | 51.55% | 2.66% | 48.86% | -0.03% |
| LEOPS | 38.63% | 43.21% | 4.58% | 40.50% | 1.87% |

## State Retirement and Pension System of Maryland

**Exhibit II**

Results from Audit of June 30, 2008 Valuation

**June 30, 2008 Valuation Results to Determine Contribution Amounts for Fiscal Year 2010 (in $millions)**

Pre-Corridor

| Results by Plan: | Cheiron *June 30, 2008 Results* | Mercer *Based on Mercer Methodology* | *Difference of Contributions in $millions* | *Difference as % of State Contributions* | Mercer *Based on Cheiron's Normal Cost Methodology* | *Difference of Contributions in $millions* | *Difference as % of State Contributions* |
|---|---|---|---|---|---|---|---|
| Teachers' Retirement & Pension Systems (TRPS) | $ 889.6 | $ 935.2 | $ 45.6 | 5.1% | $ 865.5 | $ (24.1) | -2.7% |
| Employees' Retirement & Pension Systems (ERPS) | $ 438.1 | $ 463.9 | $ 25.8 | 5.9% | $ 440.8 | $ 2.7 | 0.6% |
| State Police | $ 27.6 | $ 28.0 | $ 0.4 | 1.6% | $ 26.3 | $ (1.3) | -4.5% |
| Judges | $ 19.2 | $ 20.2 | $ 1.0 | 5.4% | $ 19.2 | $ - | -0.1% |
| LEOPS | $ 34.3 | $ 38.4 | $ 4.1 | 11.9% | $ 36.0 | $ 1.7 | 4.8% |
| **Total** | **$ 1,408.8** | **$ 1,485.7** | **$ 76.9** | **5.4%** | **$ 1,387.8** | **$ (21.0)** | **-1.6%** |

# State Retirement and Pension System of Maryland

**Exhibit III**

Results from Audit of June 30, 2008 Valuation

**June 30, 2008 Valuation Results to Determine Contribution Rates for Fiscal Year 2010**

Reflecting the Corridor for Teachers' and Employees' Systems

| | **Cheiron** | **Mercer** | | **Mercer** | |
|---|---|---|---|---|---|
| Results by Plan: | *June 30, 2008 Results* | *Based on Mercer Methodology* | *Difference as % of payroll* | *Based on Cheiron's Normal Cost Methodology* | *Difference as % of payroll* |
| Teachers' Retirement & Pension Systems (TRPS) | 13.15% | 14.17% | 1.02% | 13.07% | -0.08% |
| Employees' Retirement & Pension Systems (ERPS) | 9.93% | 10.66% | 0.73% | 9.94% | 0.01% |
| State Police | 30.79% | 31.29% | 0.50% | 29.40% | -1.39% |
| Judges | 48.89% | 51.55% | 2.66% | 48.86% | -0.03% |
| LEOPS | 38.63% | 43.21% | 4.58% | 40.50% | 1.87% |

## State Retirement and Pension System of Maryland

**Exhibit IV**

Results from Audit of June 30, 2008 Valuation

**June 30, 2008 Valuation Results to Determine Contribution Amounts for Fiscal Year 2010 (in $millions)**

Reflecting the Corridor for Teachers' and Employees' Systems

| Results by Plan: | Cheiron *June 30, 2008 Results* | Mercer *Based on Mercer Methodology* | *Difference of Contributions in $millions* | *Difference as % of State Contributions* | Mercer *Based on Cheiron's Normal Cost Methodology* | *Difference of Contributions in $millions* | *Difference as % of State Contributions* |
|---|---|---|---|---|---|---|---|
| Teachers' Retirement & Pension Systems (TRPS) | $ 832.6 | $ 897.2 | $ 64.6 | 7.8% | $ 827.6 | $ (5.0) | -0.6% |
| Employees' Retirement & Pension Systems (ERPS) | $ 319.7 | $ 343.2 | $ 23.5 | 7.4% | $ 320.0 | $ 0.3 | 0.1% |
| State Police | $ 27.6 | $ 28.0 | $ 0.4 | 1.6% | $ 26.3 | $ (1.3) | -4.5% |
| Judges | $ 19.2 | $ 20.2 | $ 1.0 | 5.4% | $ 19.2 | $ - | -0.1% |
| LEOPS | $ 34.3 | $ 38.4 | $ 4.1 | 11.9% | $ 36.0 | $ 1.7 | 4.8% |
| **Total** | **$ 1,233.4** | **$ 1,327.0** | **$ 93.6** | **7.6%** | **$ 1,229.1** | **$ (4.3)** | **-0.3%** |

V.

# Actuarial Methods

## Actuarial Cost Method

We agree with the use of the Individual Entry Age Normal Cost Method. The method is more commonly used by public sector plans and is less likely to produce distortions due to changes in benefits, assumptions, etc. A primary characteristic of the method is that it funds each active member's benefit as a level percentage of pay over the member's working career. This feature correlates well with the idea that pensions are deferred pay and therefore should be funded as a percentage of current pay.

Cheiron used two techniques for its Individual Entry Age Normal Cost Method that Mercer does not ordinarily use. The first technique begins with the assumption that all terminations, deaths, retirements, etc. occur at the beginning of the year starting on the valuation date. Then Cheiron discounted the Normal Cost for each individual so that in essence a Normal Cost is only paid if the individual is assumed to still be employed at the end of the year. Ignoring new entrants during the year, we believe that this technique produces the theoretically correct Normal Cost if the actual contribution is not affected by terminations during the year. However, our understanding is that all SRPS contributions except for the Teachers' Systems are calculated based on the payroll at each pay date. We believe that the combination of the technique that Cheiron employed and the State's contribution practice leads to underfunding. In essence, the Normal Cost is discounted twice, first for assumed terminations and second because actual terminations are not included in the payroll used to determine contributions. Even for the Teachers' Systems, where contributions are based on beginning of year payroll, this technique leads to actuarial losses every year for new entrants.

The second technique involves calculating the Normal Cost rate for a new participant in the plan at the entry age of each current participant and using that Normal Cost rate for the current participant. Mercer's ordinary approach is to calculate the Normal Cost rate for each current participant, not his or her theoretical replacement. For plans like the Employees' or Teachers' Pension System where current benefit levels are higher than previous benefit levels, Cheiron's technique tends to product a higher Normal Cost, but a lower Actuarial Accrued Liability than Mercer's approach. As long as these

consequences are understood, we believe that Cheiron's technique is valid. We used that technique when running our valuation system to verify Cheiron's results.

## Actuarial Value of Assets (AVA)

We are neutral on the 80-120% of market value limit on the AVA. It has the potential to increase contribution volatility, but also has the potential to reduce over- or underfunding. If current market conditions continue until June 30, 2009, the 120% limit could have a noticeable impact on the 2009 valuation.

## Corridor Method

We believe that the continuation of the current Corridor Method combined with other aspects of the actuarial methods and assumptions will make improvements in the Teachers' and Employees' funded ratios difficult. The multi-year modeling that would be necessary to confirm this opinion is beyond the scope of this report.

Notwithstanding these comments, the actuarial cost method meets applicabele professional guidelines and we believe that it is appropriate for performing the SRPS actuarial valuations.

# VI.

## Actuarial Assumptions and Experience Study

The assumptions utilized in the June 30, 2008 valuation were based on the 2002-2006 Experience Study report produced by Segal. Although Cheiron produced the June 30, 2008 valuation, this next section deals in large part with the findings from the experience study and Segal's recommendations, since these recommendations provided the basis for the June 30, 2008 actuarial valuation assumptions.

In its Experience Study report, Segal discussed the "building block" approach for setting economic assumptions. We agree with the value of the building block approach. However, Segal's process for setting the salary scale assumption seemed to be solely based on looking backwards at pay increases for the years ending June 30, 2003 through June 30, 2006. Inflation as measured by the CPI-U during this period was 3.05% per year. Segal's assumption for future inflation was 3.5%. Adjusting past pay increase experience for the difference between expected future inflation and actual past inflation would be consistent with the building block approach and would appear to produce a salary scale assumption of somewhere between 0.25% (allowing for Segal already rounding up some of the assumed rates) and 0.50% higher than the assumptions Segal recommended. A higher salary scale would result in a higher contribution requirement.

The following, relatively minor, assumptions do not seem to be addressed in the Actuarial Experience Study report for July 1, 2002 – June 30, 2006:

- unused sick leave service credit,
- probability of leaving contributions in plan upon withdrawal,
- retirement age for inactive vested participants.

If these assumptions were addressed during the experience study, documenting them in the report might be helpful to the Trustees. If they were not addressed, they should be at some point.

In addition, the valuation assumption for form of payment for future retirees under the Teachers' and Employees' Systems is a single life annuity. Members of these systems can elect other forms of payment. For example, many married participants elect one of

the joint and survivor payment options at retirement. This does not seem to have been addressed in the Actuarial Experience Study report for July 1, 2002 – June 30, 2006. Segal indicated in its February 19, 2008 presentation that adopting an assumption for the percentage of members who elect joint and survivor options would reduce the State's contribution. Alternatively, the Systems' actuarial equivalent factors might be updated to remove this source of actuarial gain.

**Investment return rate:**
The assumed investment return rate is 7.75% net of investment expenses, which is the same rate used in the previous valuation. The discussion of the investment return assumption in Segal's Actuarial Experience Study Report seems to focus on past returns. We believe that looking at what the capital markets tell us about future expected returns is also important.

Mercer's proprietary Portfolio Return Calculator (PRC) uses as inputs the following information:

- Target asset allocation of the pension fund
- Capital market returns for each asset class as developed by Mercer Investment Consulting (MIC). These returns are expressed in nominal terms and also include measures of standard deviations from the expected value and correlations among asset classes. Capital market returns developed by other investment consulting firms can also be used in the PRC.

The output from PRC is a probability distribution of expected asset returns.

The following table shows the December 31, 2007 SRPS asset allocation targets and the assumed nominal rates of return for each asset class as developed by MIC as of June 30, 2008:

| Asset class | Allocation | MIC Return |
|---|---|---|
| U.S. Equity | 40% | 8.36% |
| Global Equity | 10% | 8.42% |
| International Equity (ex-US) | 13% | 8.39% |
| Private Equity | 2% | 9.59% |
| Fixed Income – Core Plus | 28% | 4.96% |
| Fixed Income – Real Return | 2% | 3.69% |
| Real Estate | 5% | 7.34% |

For annual investment expense, we assumed 26 basis points – based upon 6 basis points for administrative expenses and 20 basis points for investment expenses. Our assumption was based on the CAFR reports for the four previous years (June 30, 2004 – June 30, 2007). According to Segal's Actuarial Experience Study Report for July 1, 2002 – June 30, 2006, they used an assumption of 50 basis points for expenses. It is possible that their assumption is based on different source data, and we did not have the opportunity to confirm this assumption with Segal. The investment expense assumption is consistent with expenses associated with index returns as well as the

investment expenses reported in the CAFR reports noted above. The implicit assumption is that any additional return from active management (alpha) is exactly offset by the additional expense for active management. To the extent that returns from active management exceed the additional cost, then such additional return should be added to the returns derived from the PRC. Using the above allocation and the assumptions as noted, the PRC produced the following expected investment returns over a 20 year investment horizon:

| Percentile | MIC Assumptions |
|---|---|
| 25% | 5.68% |
| 40% | 6.81% |
| 45% | 7.15% |
| 50% | 7.48% |
| 55% | 7.81% |
| 60% | 8.15% |
| 75% | 9.28% |

Using MIC's assumptions as of June 30, 2008 and our assumption of 26 basis points for expenses paid from the plan, the median expected return would be 7.48%. The current assumption of 7.75% falls just inside the 55th percentile, meaning that we would conclude that there is slightly more than a 45% probability that the assumed rate of return could be achieved.

Segal's results appear to be slightly higher than ours for total investment return but about the same for investment return net of expenses. Segal allowed 50 basis points for expenses compared to Mercer's 26. Another difference between our development of the expected return and Segal's development in the experience analysis would appear to be the inflation assumption. We would consider that a best estimate of the inflation assumption would be in the range of 2.5% to 3.0%. If Segal's inflation assumption were decreased to 3.0%, combined with their same real rate of return, their assumed rate of return under the "building block method" would be 7.50%, before allowing for expenses.

Most surveys of large public retirement systems indicate an average investment return assumption of about 8.0%.

Generally, Mercer considers that results between the 25th to 75th percentiles are within a reasonable range for the investment return assumption. The current assumption falls within this range.

We agree that the investment return assumption is within a reasonable range.

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