



Cavanaugh Macdonald
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**ACTUARIAL REVIEW REPORT FOR
SOUTH DAKOTA RETIREMENT SYSTEM**

Prepared November 22, 2019





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

November 22, 2019

Board of Trustees
South Dakota Retirement System
Post Office Box 1098
Pierre, SD 57501-1098

Dear Board of Trustees:

Cavanaugh Macdonald Consulting, LLC has performed an independent review of the June 30, 2019 actuarial valuation of the South Dakota Retirement System. As an independent reviewing or auditing actuary, we have been asked to:

- Assess the available data for the preparation of the valuation, the degree to which such data is sufficient to support the valuation conclusions, and the use and appropriateness of any assumptions made regarding the data.
- Comment on actuarial assumptions, funding methods, and procedures used in the valuation.
- Independently replicate the detailed valuation results using the actuarial assumptions, funding methods, and procedures used in the actuarial valuation.
- Reconcile discrepancies between the results determined by the internal Senior Actuary and the results determined by Cavanaugh Macdonald. SDRS intends that, to the extent possible, discrepancies be communicated and resolved with the internal Senior Actuary prior to the completion of the valuation so that adjustments and recommendations may be considered for inclusion in the final valuation report.
- Review the internal Senior Actuary's report for compliance with applicable Actuarial Standards of Practice and Governmental Accounting Standards Board Statements No. 67 and 68.

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Our analysis of the actuarial assumptions and methods was based largely on the most recent experience study covering the time period from July 1, 2011 through June 30, 2016 and implemented effective with the June 30, 2017 actuarial valuation. Our opinion on the valuation results was based on a replication valuation of the June 30, 2019 actuarial valuations. We would like to thank Doug Fiddler, the SDRS Senior Actuary, for his cooperation and assistance in providing the required information to us in a timely manner. **We find the actuarial valuation results to be reasonable and accurate based on the actuarial assumptions and methods used. The valuation was performed by a qualified actuary and was performed in accordance with the principles and practices prescribed by the Actuarial Standards Board.** This report documents the detailed results of our review.

If you need anything else, please do not hesitate to give us a call. The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report.

Sincerely,

A handwritten signature in blue ink, appearing to be 'LL' with a stylized flourish at the end.

Larry Langer, ASA, FCA, MAAA, EA
Principal and Consulting Actuary

A handwritten signature in blue ink that reads 'Patrice Beckham' in a cursive script.

Patrice A. Beckham, FSA, FCA, MAAA, EA
Principal and Consulting Actuary



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1. EXECUTIVE SUMMARY

As an independent auditing actuary, Cavanaugh Macdonald Consulting, LLC (CMC) has been tasked to provide a general overview and express an opinion of the reasonableness and soundness of the work performed by the South Dakota Retirement System's Senior Actuary, Mr. Doug Fiddler. The work to be reviewed includes the June 30, 2019 actuarial valuation, including the actuarial assumptions and methods used to produce the results.

We requested the raw data file that contains census data for members of the SDRS. We also requested the "valuation data", as reconciled for the 2019 valuation, as well as complete descriptions of assumptions, methods and valuation procedures.

It is our belief that an audit should not focus on finding differences between actuarial processes and procedures utilized by two different actuaries, but rather to verify there are no material errors and to find improvements to the process and procedures utilized by the System's Senior Actuary. In performing this audit, we attempt to limit discussions concerning differing opinions and focus more on the accuracy of calculations, the completeness and reliability of reporting, and the compliance with generally acceptable actuarial practices and standards of practice in all of the work reviewed.

The RFP issued by SDRS specified the scope of the audit project as follows:

The Contractor shall prepare an independent replication of the actuarial valuation of SDRS at the end of fiscal year 2019. The Contractor will consult with SDRS staff throughout the process. SDRS staff will supply both raw and finalized data to the Contractor as of the valuation date. Such replication shall include the following at a minimum:

- A. Assessment of the available data for the preparation of the valuation, the degree to which such data is sufficient to support the valuation conclusions, and the use and appropriateness of any assumptions made regarding the data.
- B. Commentary on actuarial assumptions, funding methods, and procedures used in the valuation.
- C. Independent replication of the detailed valuation results using the actuarial assumptions, funding methods, and procedures used by the internal Senior Actuary.
- D. Reconciliation of discrepancies between the results determined by the internal Senior Actuary and the results determined by the Contractor. SDRS intends that, to the extent possible, discrepancies be communicated and resolved with the internal Senior Actuary prior to the completion of the valuation so that adjustments and recommendations may be considered for inclusion in the final valuation report.
- E. Review of the valuation report for compliance with applicable Actuarial Standards of Practice and Governmental Accounting Standards Board Statements No. 67 and 68.



1. EXECUTIVE SUMMARY

Conclusions

Because of the complexity of actuarial work, we would not expect to match the internal Senior Actuary's results exactly, nor would we necessarily expect our opinions regarding the selection of assumptions and methods to be exactly the same as the opinions of Mr. Fiddler. The important point is that any differences of opinion are not material to the valuation results.

Our opinion on the valuation results was based on a replication valuation of the June 30, 2019 actuarial valuation. **We find the actuarial valuation results to be reasonable and accurate based on the actuarial assumptions and methods used. The valuation was performed by a qualified actuary and was performed in accordance with the principles and practices prescribed by the Actuarial Standards Board.**



2. ACTUARIAL ASSUMPTIONS

BACKGROUND ON ACTUARIAL ASSUMPTIONS

The actuarial assumptions form the basis of any actuarial valuation or cost study. Since it is not possible to know in advance how each member's career will evolve in terms of salary growth, future service and cause of termination, the actuary must develop assumptions in an attempt to estimate future patterns. These assumptions enable the actuary to value the amount of benefits earned and to reasonably estimate when and how long these benefits will be paid. Similarly, the actuary must make an assumption about future investment earnings of the trust fund. In developing the assumptions, the actuary examines the past experience and considers future expectations to make the best estimate of the anticipated experience under the plan.

There are two general types of actuarial assumptions:

- Economic assumptions – these include the valuation interest rate (expected return on plan assets), assumed rates of salary increase, price inflation, wage inflation, and increases in total payroll. The selection of economic assumptions should conform to ASOP No. 27 *“Selection of Economic Assumptions for Measuring Pension Obligations”*.
- Demographic assumptions – these include the assumed rates of retirement, mortality, termination, and disability. The selection of demographic assumptions should conform to ASOP No. 35 *“Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations”*.

The discussion on the actuarial assumptions on the following pages is based on the data and recommendations in the 2016 Experience Study report.

Actuarial Assumptions

| | |
|----------------------------------|--|
| Discount rate/investment return: | 6.50%, net of investment expenses. |
| Inflation: | 2.25% |
| Wage inflation: | 3.00% |
| Salary merit/seniority: | Service based, decreasing from 3.4% to 0.0% over 25 years. |
| Retirement: | Age 55 to 80 for non-Public Safety Age 45 to 65 for Public Safety. Rates are generally lower for reduced retirement. |
| Disability: | Rates for non-Judicial members shown through age 65 and vary by class and employment type. None for Judicial members. |



2. ACTUARIAL ASSUMPTIONS

| | |
|--|---|
| Mortality: | |
| Healthy | 97% of RP-2014 Mortality Table, white collar table for females, total dataset table for males, adjusted to 2006 and projected generationally with MP-2016. |
| Disabled | RP-2014 Disabled Mortality Table, adjusted to 2006 and projected generationally with MP-2016. |
| Termination: | Five-year select and ultimate for non-Judicial members. Rates for non-Judicial members shown through age 55 and vary by employment type. None for Judicial members. |
| Marital Status: | 80% of non-retired members assumed to be married with male members three years older than spouses and female members two years younger than spouses |
| Future Social Security Increases: | Future Social Security COLA adjustments assumed to be 2.25% per year; future social security taxable wage base increases assumed to be 3% per year |
| Interest on member contributions: | 2.50% |
| Administrative Expenses: | 2% of projected annual member and employer contributions |
| Election of Portable Retirement Option Benefits: | Percentage of election based on credited service at termination |
| Terminated Vested Member Benefit Commencement: | Three years prior to Normal Retirement Age except age 58 for Class A Members with 20 or more years of Credited Service at termination. |
| COLA: | 2.25% (baseline) 1.88% (restricted maximum based of June 30, 2019, valuation) |



2. ACTUARIAL ASSUMPTIONS

Actuarial Assumptions - Review

No significant changes in actuarial assumptions have been made since the June 30, 2017, actuarial valuation. Actuarial assumptions used in the valuation are based on an experience study covering the time period from July 1, 2011 through June 30, 2016. In general, we believe there are no inherent conflicts in the assumptions now in use with the requirements imposed by applicable Actuarial Standards of Practice.

With respect to the most critical assumptions used in this valuation, we have the following comments:

Discount rate/investment return: ASOP No. 27 requires the selection of a reasonable assumption that may include consideration of a margin for “adverse deviation”.

While we note the rate of 6.50% is below the median return of 7.25% used by most public-sector pension plans and lower than the 20-year historical plan experience of 7.00% shown in Table 5.3 on page 23 of the 2019 Actuarial Report. We have reviewed the development of the in the November 3, 2016 presentation to the Board entitled “Experience Analysis: Economic Assumptions” and we find it to be complete and supportive of the use of the current set of economic assumptions. We believe the current rate of 6.50% is reasonable.

Inflation: We believe the inflation assumption of 2.25% is reasonable and in line with the levels of inflation assumed by other public-sector pension plans, although we would note it is on the lower end of the range.

Wage inflation: We believe the wage inflation assumption is reasonable and within the range of assumptions used by other public-sector pension plans. The wage inflation assumption of 3.00% is 75 basis points higher than the inflation assumption of 2.25%. We recommend noting this difference.

Salary merit/seniority: The salary increase assumption is separated into wage inflation and merit/seniority increase assumptions. The merit/seniority salary increase assumption is a service-based assumption, with smaller increases for longer-service employees. In our experience, salary increases are typically closely correlated with service and most public plans use a service-based merit salary assumption. We concur with this methodology, and the merit/seniority rates appear reasonable when compared to those currently used by other public retirement systems.



2. ACTUARIAL ASSUMPTIONS

Retirement: We concur with separating of the retirement assumptions by occupational categories, and the rates themselves appear to be consistent with those used by other public sector retirement systems. The retirement assumption used in the SDRS valuation reflects lower retirement rates for those who are eligible for reduced retirement benefits which is a pattern commonly observed in other systems. Normal Retirement Age (NRA) is age 65 with three years of service for non-Public Safety members. The highest pre-NRA retirement rate is 30% and rates extend for 15 years after initial unreduced benefit eligibility. For Public Safety, Normal Retirement Age is age 55 with three years of service. The highest pre-NRA retirement rate is 15% with rates extending for 10 years after initial unreduced benefit eligibility.

These assumptions appear to be reasonable based on the findings of the most recent experience study. However, we recommend ongoing, thorough annual review of retirement gains and losses to be sure liabilities are being measured appropriately.

Disability: Since the disability benefit is converted to a Normal Retirement benefit once the member reaches age 65, we agree with the cessation of assumed disability rates at age 65 (first eligibility for unreduced benefit). The assumed disability rates appear to be reasonable, based on those used by other public-sector retirement systems we have worked with.

Mortality: In our opinion, the recommended and adopted mortality assumptions for healthy and disabled members are reasonable and meet the requirements of ASOP No. 35 in that they directly account for future mortality improvement. We note that the Society of Actuaries publishes a new mortality improvement scale each fall.

In addition, in February, 2019 the Society also published a family of mortality tables specifically developed for public-sector retirement systems. These are called the Pub-2010 Mortality Tables. More detail and discussion on these tables is included at the end of this section.

Termination: We agree with the application of assumed termination rates by years of service in the first years of employment and by both service and age for members in later years. The



2. ACTUARIAL ASSUMPTIONS

termination rates incorporated in the valuation appear to be in line with those used by other public-sector plans in our experience.

Interest on member contributions:

Interest is credited at a rate less than or equal to the minimum of 90% of the average 91-day US Treasury rate for the preceding calendar year and the assumed rate of investment return. In our opinion, the contribution interest assumption is reasonable and on the conservative side of the reasonable range.

Terminated member commencement:

The reduction for early retirement is 3% per year for Foundation Members and 5% per year for Generational Members, which appears to reflect a degree of subsidization by the plan. We agree members may likely elect a benefit prior to Normal Retirement eligibility given this subsidy. In our opinion, the stated assumptions are reasonable.

COLA:

The COLA is defined in levels based on the SDRS Fair Value Funded Ratio (FVFR):

- 1) FVFR at least 100% when future COLAs are equal to the baseline COLA assumption:
 - % increase in most recent 3rd calendar quarter CPI-W over the prior year (min 0.5%, max 3.5%)
- 2) FVFR less than 100% when future COLAs are equal to the baseline COLA assumption:
 - Same as above, but restricted maximum COLA is based on a future COLA assumption that results in a FVFR of at least 100%

The baseline assumption is that COLAs will be granted at the assumed inflation rate of 2.25% per year, which is reasonable.

The results of the June 30, 2019 actuarial valuation indicate a 2020 COLA based on the restricted maximum COLA of 1.88%, and the liabilities and normal costs in the valuation are determined on the assumption that future COLAs are equal to 1.88%.



2. ACTUARIAL ASSUMPTIONS

New Public Plan Mortality Tables (Pub-2010 Tables)

The Society of Actuaries (SOA) released a new set of mortality tables in February, 2019 which are based solely on public plan data. This set of tables is the first time mortality tables have been produced using public plan data and the first time that specific tables have been developed based on profession. Now there is a mortality table created for use by pension plans covering teachers (other tables are available for public safety and civilian employee groups). These standard tables will hopefully provide a better overall fit for the mortality observed by public plans as compared to corporate plans where differences in the reasons for retirement can impact the mortality observed at younger retirement ages. If that occurs, we would expect to find less frequent and dramatic adjustments to the standard mortality tables in the future.

We share this information on the Pub-2010 Tables for educational purposes only. The membership of the system is large enough to assign a fair amount of credibility to the actual experience in setting the mortality assumption and, the standard table has been adjusted to reflect the actual observed of the SDRS population. It is important to note that the fit of the mortality assumption to the observed data is more important than the date the table was issued or the data upon which it was based. Just because a new mortality table was issued by the SOA does not mean that SDRS or any other public retirement systems should automatically adopt that table. It does make sense to consider the new set of Pub-2010 Tables when the next experience study is performed to determine if the fit of the new table might be better than the current assumption.

Finally, Generational Members have a different level of benefits and subsidies which could result in different patterns of termination and retirement. As the Generational Members become a larger portion of the active membership, it will be important to establish a separate set of demographic assumptions for this group. While enough actual member experience may not be available in the next experience study in 2022, each assumption should be considered and discussed even if the recommendations are based on professional judgment and future expectations. For example, since Generational Members' retirement eligibility criteria differ from those applicable to Foundation Members, the actuary has used professional judgment to adjust the retirement rates of Generational Members pending the accumulation of sufficient experience among Generational Members to serve as a basis for this assumption.



3. ACTUARIAL METHODS

SDRS is funded by fixed, statutory Member and Employer Contributions that total 12.419% of covered compensation. As stated in the valuation report, the purpose of the valuation is:

- (1) to determine the 2020 COLA for SDRS,
- (2) to measure the funded status of SDRS as of June 30, 2019,
- (3) to confirm that such fixed, statutory contributions are the Actuarially Determined Contributions (ADC),
- (4) to determine if corrective actions must be recommended, and
- (5) to provide accounting information under GASB 67 and 68.

The annual valuation provides the basis for making such determinations based on the actuarial methods described in the report. On this basis, the 2019 Actuarial Valuation of SDRS determines a restricted 2020 COLA of no greater than 1.88%, results in a Fair Value Funded Ratio of 100.0%, confirms that the statutory rates of contribution are the ADC and that no corrective actions recommendations are required.

Actuarial Methods - Review

For all pension plans, whether defined benefit or defined contribution, the basic retirement funding equation is:

$$C + I = B + E$$

Where:

- C = employer and member contributions
- I = investment income
- B = benefits paid
- E = expenses paid from the fund, if any.

As can be seen from the formula, for a given level of contributions and expenses the greater “I” is, the greater “B” can be. This is the underlying reason for advance funding a pension plan, and historically investment income pays for 75% to 80% of the benefit dollars received by plan members. In other words, for every dollar paid to a member only 20 to 25 cents comes from contributions.

Of course, the problem with the formula is that in order to figure out exactly how much benefits can be paid, the plan would have to be closed to new members and allowed to operate until all retirees were deceased. At that point, the benefits and expenses actually paid out, and the investment income actually earned would be known and, using the equation above, the true cost could be determined. Since the vast majority of plans are ongoing and have no intention of closing,



3. ACTUARIAL METHODS

and since even with a closed plan it takes a very long time before all benefits are finally paid out, plan sponsors hire actuaries to estimate the cost of their plans and to determine the amount of benefits that can be paid given a level of contributions.

In order to determine the benefits that can be paid for a current level of contributions, the actuary's first step is to estimate on a given date (the valuation date) the value of all benefits (and expenses) that will be paid to the existing active and retired membership over their remaining lifetimes based on the plan's current benefit structure based on the baseline COLA assumption. This estimation requires the use of assumptions regarding both future events (termination, disability, retirement, death, etc.) and future economic conditions (return on assets, inflation, salary growth, etc.).

By combining the assumptions for future events and the salary growth assumption, the actuary generates an expected benefit payment stream. In other words, a string of annual payments expected to be made to the current active and retired members from the valuation date until all members are no longer living. Then the actuary applies the investment return assumption to discount each year's payments to the valuation date, creating the present value of all future benefits or the total liability of the plan.

The difference between the total liability and the current assets of the plan represents the present value of future contributions (PVFC) that have to be made by either members or the employers. Usually the members and employers cannot contribute the entire difference in one year, but rather desire a relatively smooth contribution pattern over time that also meets any external constraints. In order to budget for the PVFC, the actuary applies an actuarial cost method. There are several acceptable cost methods, but it's important to recognize that they are nothing more than budgeting tools.

Different actuarial cost methods can provide for faster funding earlier in a plan's existence, more level funding over time, or more flexibility in funding. The choice of an actuarial cost method will determine the pattern or pace of the funding and, therefore, should be linked to the long-term financing objectives of the system and benefit security considerations.

The Entry Age Normal actuarial cost method, which is used in the SDRS valuation, satisfies the requirements of Actuarial Standard of Practice (ASOP) No. 4 and is an appropriate method to use for the calculation of System's Actuarial Accrued Liability and Normal Costs. Furthermore:

- Normal Cost is calculated as a level percentage of each member's pay over the member's career.
- The majority of public plans use such cost method for funding.
- GASB Statement Nos. 67 and 68 require the use of the individual version of such cost method for financial accounting and disclosure. For the ADC, the aggregate version is used. Refer to section 5 of this report for more detail on the distinction between the individual and aggregate version of the Entry Age Normal cost method.



3. ACTUARIAL METHODS

- Use of the same cost method for funding enhances consistency between funding and accounting valuations.

The Conference of Consulting Actuaries Public Plans Community (CCA PPC) White Paper entitled “Actuarial Funding Policies and Practices for Public Pension Plans” (dated October 2014) categorizes such cost method as the model actuarial cost method.

In our opinion, the actuarial cost method employed for the SDRS valuation is appropriate and will systematically fund the prospective pension benefits on an actuarially sound basis, if all of the actuarial assumptions are realized.

ASSET VALUATION METHOD

The SDRS actuarial valuation uses the fair market value of assets. We believe this is appropriate given SDRS’ Funding Policy objectives to manage SDRS benefits based on the fixed, statutory member and employer contribution rates. Those objectives include a funded ratio, on the market value of assets, that is at least 100%, and actuarially determined benefits that are variable and supported by the fixed, statutory contributions. To this end, the cost of living adjustment (COLA) granted each year is adjusted to maintain a funded ratio of 100%, subject to certain minimum and maximum limits.

Given the Board’s Funding Policy, we believe the use of market value for an asset valuation method is reasonable. Because Actuarial Standard of Practice Number 44 only applies to the use of asset valuation methods other than pure market value, it does not apply to the SDRS valuation.

AMORTIZATION OF UNFUNDED ACTUARIAL ACCRUED LIABILITY METHOD

Based on the Board’s Funding Policy which maintains a funded ratio of 100%, there is no unfunded actuarial accrued liability and an amortization policy is not needed. We would note that if the Fair Value Funded Ratio is less than 100%, corrective action would be required so any unfunded actuarial accrued liability would be temporary.



4. DATA REVIEW

The System's actuary supplied CMC with the census data used to generate the June 30, 2019 valuation results. In addition, as part of the replication process, CMC was also supplied with the census data used for the June 30, 2018 valuation. As part of our audit of the June 30, 2019 valuation, we analyzed this data for internal consistency and completeness. Our review involved a lengthy series of data checks, involving dozens of data items. While disclosing all the detailed analysis included in our various data reviews would be not be particularly helpful, the list below illustrates some of the highlights of our data review.

1. We were able to match the key membership statistics disclosed in the June 30, 2019 valuation report, including member count by status, average age, average salary and projected payroll.
2. Overall, the benefit amount for those in pay status was generally 2.03% higher than last year which is consistent with the expected increase reflected in the June 30, 2018 valuation results.
3. Overall, members in the June 30, 2019 active data who were not in the June 30, 2018 data (i.e. new entrants) looked reasonable.
4. Changes to standard data items such as age, service and salary amounts were reasonable.

In summary, we found no notable issues during our review of the June 30, 2019 valuation data.



5. ACTUARIAL VALUATION RESULTS REVIEW

REASONABLENESS OF THE ACTUARIAL VALUATION RESULTS

This section of our review discusses the reasonableness and accuracy of the valuation liabilities and costs.

Generally accepted actuarial standards and practices provide actuaries with the basic mathematics and the framework for calculating the actuarial results. When it comes to applying those actuarial standards to complex calculations, differences may exist due to individual opinion on the best way to perform those complex calculations. Differences may also arise from the actuarial software used to perform these calculations, especially in the allocation of liabilities between past and future service for active members. Although these factors may lead to differences in the calculated results, these differences should not be material. Generally, differences in the present value of benefits of 1% to 2% or less and differences in the actuarial liabilities of 3% to 5% or less are considered reasonable. The normal cost rate should generally be within 5% as well, but it is also important that it be consistent with the relationship of the present value of benefits and the actuarial accrued liability.

As part of the actuarial audit, CMC used the data provided by the System's actuary to reproduce the valuation liabilities used for the calculations in the June 30, 2019 valuation. We have presented a summary of our results at the end of this section. While the results are generally a very close match, we also looked at a finer level of detail than is displayed as well as some individual detailed sample lives. This allowed us to identify differences that would not otherwise be apparent from the summarized results. However, the reasonable match of the summarized results emphasizes that the differences discussed in the remainder of this section are indeed minor. ***Based on the results of our review, overall, we find the actuarial calculations in the June 30, 2019 actuarial valuation to be reasonable.***

CMC and the System's actuary discussed the differences in methodology and approach that were identified during the replication process. None of these are materially significant, but we believe there may be some potential theoretical improvements. We believe that the System's actuary should further review these items and determine if any changes are appropriate or may improve the valuation process. The specific items we identified are discussed below.

- 1) For determination of the Actuarially Determined Contribution (ADC), the Entry Age Normal cost method is used. There are two versions of the Entry Age Normal cost method – the individual method and the aggregate method. As the names suggest, the normal cost under the individual method is the sum of the individual entry age normal cost amounts for all active members. This method is mandated under GASB 67/68. Under the aggregate Entry Age Normal cost method, the normal cost is determined as the sum of the present value of future normal costs for all active members, divided by the sum of the present value of future compensation for all members times total salary for all members. It is important to note that the Actuarial Accrued Liability (AAL) is the same under both methods. As a result, there is a small disconnect under the aggregate method between the normal cost amount used to calculate liabilities and the normal cost amount used to fund those



5. ACTUARIAL VALUATION RESULTS REVIEW

liabilities. The consequence of this disconnect is that the System will experience minor gains and losses each year, even if all assumptions are met. In discussions with the Senior Actuary, the aggregate Entry Age Normal cost method provides for more stable costs from year to year. Stable contributions are especially important to SDRS due to the fact that benefit provisions are directly impacted by the ADC. We suggest that the aggregate and individual methods continue to be monitored and consideration be given to using the individual method for all purposes in order to be consistent. That being said, the aggregate method is acceptable, if it is determined to be more stable for ADC purposes.

- 2) For determining the Entry Age normal cost for account balance related benefits, such as refunds upon termination, the normal cost calculation uses the actual current balance. While this approach is not unreasonable, we believe that a better approach would be to utilize the “expected” account balances for this purpose. Under this approach, the expected balance is calculated using the member’s current salary, service and the assumed interest rate credited to the account. Salaries are projected backwards each year all the way to entry age using the salary increase assumption, and the resulting salary arrays are then used to calculate the expected contributions and interest credits thereon, creating the theoretical account balances. The Entry Age cost method calculates normal cost by calculating the present value of future benefits as of the member’s entry age and then spreading that cost over the member’s assumed working lifetime. When members experience irregular salary changes over their career, these irregularities flow through to the calculation of the present value of future benefits at entry age. By using the expected balances for account balance related benefits, the Entry Age normal cost calculation avoids this potential distortion and results in a more appropriate normal cost. If this change is ultimately adopted, it is difficult to say whether it will increase or decrease the normal cost, but the impact is expected to be very minor. As such, after discussing this methodology with the System’s actuary, both parties agreed it would be appropriate to delve deeper into this topic at a later time.
- 3) In the actuarial valuation, the actuarial accrued liability and the present value of the Variable Retirement Account (VRA) benefit are set equal to the sum of the current account balances for active and terminated vested members. In addition, the normal cost rate for this group is set equal to the current contribution rate of 1.50%. While we do not believe the current method for valuing the VRA benefit is unreasonable, it is worth discussing if it might be more appropriate to value this benefit using a method similar to other account balance related benefits, as discussed in item (2) above. Essentially, the normal cost rate would be calculated using the “expected” balance on the valuation date, rather than the actual current balance. This change would impact the normal cost amount, which will in turn would affect the actuarial accrued liability. Currently, the System’s actuary values the VRA benefit using a method similar to our proposal for GASB 67 purposes, so it is clear that such a change would have a very small impact on the System’s liabilities. As such, after discussing this change with the System’s actuary, both parties agreed it would be appropriate to delve deeper into this topic at a later time.



5. ACTUARIAL VALUATION RESULTS REVIEW

In addition to reviewing the funding results, CMC also reviewed assumptions and methodologies used in the valuation for purposes of calculating the required information for GASB 67 reporting. One of the items we discussed with the System's actuary was the method for valuing the Variable Retirement Account benefit and whether or not the method was compliant with GASB standards. Prior to the 2019 valuation, the normal cost for this benefit had been valued for GASB purposes using the same methodology as was used in the funding valuation, i.e., 1.5% of the current valuation pay for members who are eligible for the VRA benefit. After discussing the matter, both the System's actuary and CMC agreed that GASB requires actuaries to use the Entry Age Normal methodology when allocating the value of benefits to years of service, regardless of the applicable benefit structure.

Another item that was discussed during the replication process related to GASB reporting for participants of the Cement Plan Retirement Plan (CPRP). Despite the fact that the CPRP has been closed to new members and accrued benefits have been frozen for current employees since 2001, GASB standards require that the benefit liabilities (for frozen benefits in this case) be spread over the members' expected working career using the Entry Age Normal method. This impacts the calculation of the total pension liability of the System. As a result of our discussions, both of these changes were adopted and implemented in the June 30, 2019 valuation report.

The two aforementioned changes have an insignificant impact on the results.



5. ACTUARIAL VALUATION RESULTS REVIEW

Comparison of June 30, 2019 Liability Measures (Assumes 1.88% COLA in the future)

| | <u>SDRS</u> | <u>CMC</u> | <u>CMC/SDRS</u> |
|--|----------------------|----------------------|-----------------|
| Present Value of Benefits | | | |
| - Active Members | 6,690,531,012 | 6,739,728,575 | 1.007 |
| - Inactives | <u>7,697,593,395</u> | <u>7,697,795,553</u> | 1.000 |
| - Total | 14,388,124,407 | 14,437,524,128 | 1.003 |
| Actuarial Accrued Liability | | | |
| - Active Members | 4,764,227,560 | 4,770,895,218 | 1.001 |
| - Inactives | <u>7,697,593,395</u> | <u>7,697,795,553</u> | 1.000 |
| - Total | 12,461,820,955 | 12,468,690,771 | 1.001 |
| Normal Cost Amount | 238,548,593 | 241,461,036 | 1.012 |
| Present Value of Future Normal Costs | 1,926,303,452 | 1,968,833,357 | 1.022 |
| Present Value of Future Active Member Compensation | 17,602,790,942 | 17,704,926,234 | 1.006 |
| Normal Cost Rate, Beginning of Year | 10.943% | 11.120% | |
| Normal Cost Rate, Adjusted for Mid-Year Payment | 11.293% | 11.476% | |



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CONTENT OF THE ACTUARIAL REPORTS

The American Academy of Actuaries has issued a number of Actuarial Standards of Practice which deal with measuring pension obligations and communicating the results (ASOP No. 4, 23, 27, 35, 41 and 44). Those standards list specific elements to be included, either directly or by reference to other documents, in pension actuarial communications. Some of the elements would not be pertinent in all communications, but since an actuarial valuation report is the most complete picture of the actuarial status of the plan, all of the elements listed should be covered in the report, even if only briefly.

Disclosure of Actuarial Assumptions and Methods

During the replication process, CMC requested additional information from the System's actuary regarding the actuarial assumptions and methods used to generate liabilities. Overall, the assumptions and methods we inquired about were minor and have very little impact on the valuation results. As a result of our discussions, additional disclosures have already been implemented in the June 30, 2019 valuation. These include the assumed decrement timing, duty-related death assumption and the method for valuing the Variable Retirement Account. In addition to these items, we recommend that the following assumptions also be disclosed in the valuation report:

- Benefit payment form election
- Benefit commencement date for deferred beneficiaries
- Actuarial assumptions used to value the Cement Plant Retirement Plan liabilities

Risk Assessment and Disclosure

ASOP No. 51 provides guidance to actuaries with respect to the assessment and disclosure of risk with respect to future actuarial measurements, which may vary significantly from current measurements.

Examples of future measurements noted are pension liabilities, actuarially determined contributions and funded status. The standard applies to actuaries when performing a funding valuation and is effective for any actuarial work product with a measurement date on or after November 1, 2018. The measurement date for this actuarial valuation is June 30, 2019 so the new ASOP applies to this valuation.

In our opinion, the risk discussion included in the June 30, 2019 actuarial report comply with ASOP No. 51. The identification of risk to be assessed appears reasonable and appropriate. The initial risk assessment indicates investment risk is the most significant risk to SDRS funding and benefit levels. Other less significant risks identified were longevity risk, inflation risk, salary increase risk, other demographic risk and covered payroll risk. For each of these less significant risks, scenarios were generally described where departures from expectations would result in a certain general outcome. ASOP No. 51 does not require that the assessment of a risk be based on



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numerical calculations, but the SDRS actuary does a good job of addressing the risks by including some quantitative analysis.

The report included further assessment of investment risk. While many methods of risk assessment are allowed, the choice of scenario testing for investment risk appears reasonable and appropriate. The scenario testing appropriately showed the impact on funding results over a five-year period if actual returns were significantly less than or greater than the assumed investment return of 6.5%. The analysis showed that investment risk most significantly impacts a member's level of benefits since automatic benefit adjustments are required in low return scenarios and ad hoc benefit increases allowed in high return scenarios. As such, the report includes one-, two- and three-year projections of the amount of investment return needed (and the likelihood of such return) to meet certain objectives such as avoiding corrective action or providing a full COLA. The assessment of investment risk as a major risk to the System is appropriate and compliant with ASOP No. 51, in our opinion.

ASOP No. 51 also indicates that the actuary should consider disclosing certain plan maturity measures that the actuary believes are significant to understanding risks to the plan and provide commentary to help the reader understand the significance of the measurement in the assessment of risk. For this requirement, the actuary included historical ratios of assets and liabilities to active member payroll, historical percentages of retired and terminated member counts to total member counts, historical percentages of retired and terminated member liability to total member liability and historical cash flow measurements as a percentage of assets. The actuary generally described the significance of each plan maturity measurement, but we believe some additional commentary to help the user understand their significance might improve this section of the report. For example, while it is clear both the number and portion of liability attributable to retirees has increased over the last 15 years, there is no explanation as to how this creates risk for the System.

Considering this is a new ASOP and actuarial best practices are still developing, we believe the information provided in the 2019 valuation report is very comprehensive and does a good job of communicating the most significant risks to SDRS.

We believe the content and disclosures included in the SDRS valuation report are in compliance with current Actuarial Standards of Practice (ASOPs).