FINAL REPORT TO ORSC

Ohio Retirement Study Council

ACTUARIAL AUDIT
FOR THE
SCHOOL EMPLOYEES
RETIREMENT SYSTEM OF OHIO

William B. Fornia, FSA
Linda L. Bournival, FSA

February 2014

PTA | PENSION TRUSTEE ADVISORS

KMS ACTUARIES LLC

February 21, 2014

Ohio Retirement Study Council

Re: SERS Actuarial Audit

Dear Councilmembers:

We have completed our actuarial audit of the School Employees Retirement System pursuant to R.C. §171.04(E). As shown in the attached findings, we have matched actuarial calculations quite closely, and have several related comments. None of the comments reflects a critical concern. Our audit finds that actuarial calculations were reasonable, consistent and accurate.

The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards to provide this statement of actuarial opinion.

We look forward to presenting these findings to you in April.

Sincerely,

William B. Fornia, FSA   Linda L. Bournival, FSA
President   Consulting Actuary
Pension Trustee Advisors   KMS Actuaries, LLC

cc: School Employees Retirement System

TABLE OF CONTENTS

Section 1 – General Findings

The Ohio Statutes require that the Ohio Retirement Study Council (ORSC) contract for an independent audit of the state retirement systems' actuaries not less than once every ten years. ORSC elaborated that the firm conducting the audit is to express an opinion regarding:

- An overall opinion as to the validity, completeness, and appropriateness of the demographic and financial information used by the consulting actuary to meet SERS' financial objectives,
- An overall opinion as to the reasonableness of the consulting actuary's conclusions and the conformance of the consulting actuary's work with generally accepted actuarial standards and practices, and
- A detailed description of each audit exception and the estimated effects of each exception on SERS, and
- Detailed recommendations for improvement.

Our opinion is that these standards were met, as will be discussed in the following pages.

We have duplicated the actuarial valuations and actuarial experience studies conducted by Cavanaugh Macdonald Consulting (CMC) and the results match quite closely. The primary purpose of an actuarial audit is to confirm that there are no significant errors in the actuarial calculations. Based on our replication, we report that we have found no significant discrepancies and conclude that there are no significant errors.

We make the following recommendations:
- Address health care assumptions more rigorously in the next actuarial experience study
- Correct minor calculations as discussed in the following pages
- Reconsider certain actuarial assumptions in the next experience study, including:
    - Pre-retirement mortality
    - Merit pay increases for those with more than ten years of service
    - Early retirement for those retiring after August 1, 2017
    - Dependent children for those at normal parenting ages

The following table summarizes the actuarial liabilities and normal costs produced by CMC and PTA/KMS actuarial valuations.

Annual Basic Benefits and Retiree Health Care Valuations as of June 30, 2013						
	Actuarial Liability			Normal Cost		
	CMC	PTA/KMS	% Diff.	CMC	PTA/KMS	% Diff.
Retirement						
Basic Benefits	16,826,360	16,864,671	0.23%	304,074	305,327	0.41%
Medicare Part B	386,773	392,159	1.39%	5,768	6,334	9.81%
Death after Retirement	34,029	34,070	0.12%	549	540	-1.77%
Total	17,247,161	17,290,900	0.25%	310,392	312,201	0.58%
Health Care						
Actives	1,761,722	1,760,677	-0.06%	89,482	89,178	-0.34%
Inactives	1,156,578	1,156,295	-0.02%			
Total	2,918,299	2,916,972	-0.05%	89,482	89,178	-0.34%
Grand Total	20,165,461	20,207,872	0.21%	399,873	401,379	0.38%
*All numbers in thousands						

As mentioned above, the grand total actuarial liability calculated by PTA/KMS was within 0.21% of the same calculated by CMC. The grand total normal cost calculated by PTA/KMS was within 0.38% of that calculated by CMC.

<div style="background-color:#7a0000;color:white;padding:10px;border:2px solid black;">

Section 2 – Audit of Actuarial Method, Factors and Assumptions Used in Actuarial Valuations

</div>

The first step in the actuarial audit process is to review the actuarial method, actuarial factors and actuarial assumptions used in the actuarial valuations.

ACTUARIAL METHOD

CMC uses several actuarial methods in determining costs and liabilities for the School Employees Retirement System of Ohio.

— The actuarial funding method is the Entry Age actuarial cost method
— The actuarial asset valuation method is a four year smoothed market value
— The amortization method is a level payroll, closed period method
— The method of developing the health care claims cost assumptions is not clearly described in the reports.

Actuarial Funding Method

The Entry Age Normal actuarial cost method is used for actuarial valuations. This method is designed to maintain constant plan costs throughout each employee's career as a portion of pay. We believe this is a reasonable and appropriate method. It is the most common method used by large public pension systems such as the SERS. CMC is applying the method reasonably, consistently and accurately.

Actuarial Asset Valuation Method

CMC employs a four year smoothed market value actuarial asset valuation method. Unlike actuarial funding methods, actuarial asset valuation methods are not precisely defined. Most actuaries use what could be categorized as a "five [or four] year smoothed market value actuarial asset valuation method" as does CMC, but might use quite different methods. We have reviewed the precise provisions of the method that CMC employs and find it to be reasonable, consistently applied, and accurate.

The CMC method is a very conventional and appropriate application of a four year smoothed method. They spread any investment gains or losses (relative to the actuarial assumption) over four years and apply a 20% maximum disparity from true market value. Health care assets are not smoothed, and subtracted from the total smoothed assets to determine the pension actuarial value of assets. This is a reasonable and appropriate method.

Amortization Method for Determining Funding Amounts

In addition to the Entry Age Normal actuarial cost method, CMC and SERS use a conventional method for amortizing components of unfunded liability. The method was a

closed period, decreased from thirty years as of 6/30/2012 to 29 years as of 6/30/2013. As this period gets shorter in future decades, CMC and SERS may wish to consider a layered method, meaning that each year's unplanned increase or decrease in the actuarial unfunded liability is amortized over a new period. This would still be considered a closed period.

Many if not most statewide pension systems continue to use an open period. The closed period approach tends to be more conservative than the open period approach. As discussed in our 2011 Pension Reform Solutions report, we believe that the closed period is appropriate.

The other amortization feature being used is to amortize the costs as an increasing percentage of payroll. We believe this is an appropriate approach for funding, despite the changes in the GASB rules which will not permit this method for GASB determinations.

In conclusion, we find the amortization method reasonable, consistent and accurate.

Amortization Method for GASB Determinations

The Government Accounting Standards Board (GASB) has very specific requirements for its amortization method. These requirements will be changing with the next actuarial valuation. CMC and SERS are using the same amortization method for GASB determinations as for calculating the pension funding requirement. This will change with next year's actuarial valuation. We find this current practice reasonable and appropriate.

Amortization Factors

CMC developed the 29 year amortization factor for allocating the cost of funding the unfunded liability. We confirmed that these calculations are correct. This is calculated based on the investment return assumption of 7.75% and payroll growth rate of 4.00%.

Cost Factors

CMC uses the Entry Age Normal actuarial cost method to determine actuarial cost factors which assign the liability to appropriate years. These "cost factors" are a natural byproduct of the actuarial valuation process and we confirm that they are being calculated correctly.

ACTUARIAL ASSUMPTIONS

We have reviewed the actuarial assumptions used by the actuary and find them to be reasonable, consistent, and accurate.

The actuary uses a large number of actuarial assumptions, including:

— Demographic Assumptions
  o Mortality During Active Service
  o Mortality After Retirement
  o Mortality After Disability Retirement
  o Withdrawal From Service Before Retirement
  o Retirement
  o Disability Retirement
  o Withdrawal of Contributions at Termination
  o Other Demographic Assumptions

— Economic Assumptions
  o Investment Return Rate
  o Inflation
  o Individual Salary Increases
  o Payroll Growth

— Post-employment Healthcare Assumptions
  o Base Claim Rate Derivation
  o Health Care Cost Trend Rate
  o Morbidity
  o Retiree – Paid Premiums
  o Health Plan Participation Rates and Elections
  o Spouse Coverage Rates
  o Medicare Coverage Rates

Brief comments on each assumption are included below and will be discussed in more detail in Section 4 of this report which focuses on the experience study.

DEMOGRAPHIC ASSUMPTIONS

Rates of Post-Retirement Mortality

CMC uses a static post-retirement mortality table which incorporated a margin of 12% to 15% to anticipate future increases in longevity. We find this approach reasonable. Although the table in use is the 1994 Group Annuity Mortality table (with one year adjustment) – a table that is twenty years old – the experience shows that this table as adjusted is appropriate.

Actuaries are getting more sophisticated in their techniques for anticipating future mortality improvements. CMC is using the traditional method of building in a margin in their static mortality table. This would tend to require that the table be changed every few years to continue to anticipate improved mortality. This approach is very reasonable. The more sophisticated method would be to use a "generational" mortality

table which assigns different mortality probabilities based not only on age but on generation. For example, an 80 year old retiree in 2014 (born 1934) would have higher mortality rates than a future 80 year old retiree born in 1984. At some point, CMC may wish to change methodologies, but because this adds complexities, many actuaries continue to use the "static" mortality table method that CMC now uses.

We also compared the CMC table with a commonly used current table known as "RP-2000" using a projection for improvement to 2013. We found that CMC's assumptions are more conservative than this 2013 table for females for all ages from 55 up through age 95 and for males age 72 to 104. This is a useful comparison that shows that the table being used by CMC is probably still on track in 2013 and still with some margin for future improvement. We expect that CMC will continue to monitor SERS actual mortality experience carefully in each experience study and gradually modify the tables as the margin for mortality improvement erodes.

Rates of Disabled Post-Retirement Mortality

CMC's mortality assumption for those disables appears reasonable, although this data is fairly sparse, with only 1,222 deaths in the five year period.

Rates of Pre-Retirement Mortality

CMC's experience study found an extraordinary low number of pre-retirement deaths. Only 458 were observed, with 733 expected under the prior mortality table. Consequently, they recommended changing the mortality table to one which would produce 419 expected deaths.

The problem we see with this approach is that this would be based on a mortality table which is only 25% of the standard 1994 GAM table. This means that the standard table would predict 1,674 deaths, but only 458 were observed in the experience study. We find this almost impossible to believe that SERS members have four times better pre-retirement mortality than what would be predicted by a standard mortality table. This is even more astonishing because they actually have slightly worse mortality experience once they retire.

We suspect that rather than nearly immortal active SERS members, what is happening is that there is some kind of reporting discrepancy in counting the number of SERS members who die in active service. Perhaps some deaths are simply being reported as individuals quitting.

Although we recommend that CMC reconsider this assumption in the next experience study, and this is an interesting phenomenon, it is important to note that any error is trivial. Many more active members quit than die, so if there is an error in reporting or

setting actuarial assumptions in the pre-retirement mortality, it is likely more than compensated for in the withdrawal assumptions.

Withdrawal from Service before Retirement

We concur that the withdrawal tables used by CMC are reasonable, consistent and accurate. CMC uses a table based on service rather than one based on age. We find that this is a sound methodology because individuals do have higher likelihood of termination during their first few years of employment than later in their career.

Retirement

We concur that the retirement tables used by CMC are reasonable, consistent and accurate. CMC uses different retirement tables based on whether they are eligible for an unreduced retirement benefit. This is a sound method because individuals often are reluctant to retire if the benefit is subject to a reduction for early retirement.

One minor concern is that CMC does not assume that any individuals will retire under an early (reduced) retirement after August 1, 2017 under the new eligibility requirements. While this is not a critical assumption for pensions because the value of such early retirement subsidy is small, the value of early retirements under health care can be significant. Therefore, we would recommend that some future retirees are assumed to retire early. Of course, there is no experience to measure this assumption, as 2017 has not yet arrived. But we would anticipate that indeed some individuals will choose to retire early. Because current actuarial valuations measure liabilities for individuals who will retire later, it is important to predict future retirement incidence as accurately as practical.

Disability Retirement

We concur that the disability tables used by CMC are reasonable, consistent and accurate.

Withdrawal of Contributions at Termination

CMC does not have an explicit assumption for the likelihood of individuals withdrawing contributions at retirement. They use a more robust method of comparing the discounted value of the available annuity with the value of contributions on an individual-by-individual and year-by-year method. This is a sophisticated actuarial valuation method which we support. We did discover that discount rates had not been changed in this calculation, but find the discrepancy virtually immaterial. CMC would probably wish to correct this oversight.

Other Demographic Assumptions

We reviewed the other demographic assumptions which could be analyzed by CMC. We find their study reasonable, consistent and accurate. These assumptions include:

Marriage Rates – CMC assumes 80% of future retirees would be married. Current retirees use actual marriage data at the time of valuation. We support this approach.

Spouse Coverage Rates – CMC assumes 50% of future male retirees would have a covered spouse and 40% of future female retirees would have a covered spouse. Current retirees use actual spouse coverage data at the time of valuation. We support this approach.

Age Difference between Husbands and Wives – CMC assumes husbands are 3 years older than wives. We find CMC's analysis reasonable.

Number of Dependent Children – CMC did not disclose an assumption of dependent children in the actuarial valuation report or the experience study. Based on our analysis of test cases, we learned that CMC assumes that no members have dependent children (for pension and health care purposes). Because the pre-retirement survivor benefit is greater when there are dependent children, we recommend that this assumption be analyzed in the experience study, and that some assumption be made. For example, CMC could assume that members have two dependent children from when they are ages 25 to 47, then one from 47 to 50, then none once they become age 50. Keep in mind, however, that very few members die prior to retirement and collect these benefits. So although we believe some consideration should be made for dependent children, the financial implication is small. Further, no assumption for dependent children is made in the health care valuation, but there are 494 dependent children of retired members receiving health benefits as of the most recent valuation. Many of these dependent children receive health benefits until age 26, but there are a number of them, presumably disabled, who receive health benefits for life. We recommend that a small liability load or explicit assumption be considered for the value of these benefits.

ECONOMIC ASSUMPTIONS

Investment Return Rate

CMC uses a 7.75% investment return rate. This assumption is consistent with that used by most systems. According to the Public Funds Survey as of January 30, 2013, the median assumption for 126 large primarily state systems is 7.90%. In particular:
- 42 of the 126 (33%) use assumptions lower than 7.75%,
- 17 (13%) use a 7.75% assumption, and
- 77 (61%) use an assumption greater than 7.75%, the most common being 8.00%, which is used by 49 (39% of the total).

A 7.75% rate is also used by one other statewide system in Ohio. The other systems' expected rates are:

- Ohio Public Employees Retirement System – 8.00%
- State Teachers Retirement System of Ohio – 7.75%
- Ohio Police and Fire Retirement System – 8.25%
- Ohio Highway Patrol Retirement System – 8.00%

Of course, a simple comparison of what other systems are using is helpful, but not a sufficient criteria for establishing an assumed rate of investment return.

CMC used a very robust forward-looking "building block" method, where they developed an inflation assumption, a real return assumption and an assumption for expenses. Each of these components were calculated independently, then summed (subtracted for expenses) to develop the net investment return assumption. CMC went further and used the standard deviation of returns developed by SERS investment consultants to estimate the 25th, 50th and 75th percentile real return distribution.

Their 7.75% net return assumption is comprised of 3.25% inflation plus 5.25% real return minus 0.75% administrative expenses. Inflation is discussed in the section below, so we will focus on the real return component and the administrative expense component.

To calculate the assumed real rate of return, CMC used the SERS asset allocation along with the capital market assumptions developed by SERS' investment consultant (Summit Strategies Group). This can be illustrated by the following table:

CMC Development of Expected Real Return

Asset Class	Asset Allocation (Weight)	Expected Real Return
Cash	1.0%	0.0%
US Stocks	22.5%	5.0%
Non-US Stocks	22.5%	5.5%
Fixed Income	19.0%	1.5%
Private Equity	10.0%	10.0%
Real Assets	10.0%	5.0%
Hedge Funds / Multi-Asset Strategies	15.0%	7.5%
Total (Weighted Average)	100.0%	5.27%

We have three concerns with this calculation. The first is very minor. SERS reports that it has a 45% allocation to global equities. The analysis above assumed that the global equities were split half US and half non-US. Although we had not reviewed SERS actual

investment allocations, we would have expected that more would be invested in the US than outside of the US. SERS has advised us that they indeed have a 50/50 split of global equity investments between US and non-US. Although this is not material, we recommend that the next experience study explicitly confirm the global equity allocation between US and non-US.

Our second concern is that Summit in June 2010 reported an expected nominal return for private equity of 11.0%, which when combined with an expected inflation rate of 2.5% yields an expected real return for private equity of 8.5%. But instead of 8.5%, 10.0% was used in the experience study development. This was based on a later email from Summit to CMC. This may have been an oversight by Summit. This concern has a somewhat larger effect, reducing the 5.27% calculated weighted average to 5.12%. At this point it is important to point out that these return assumptions are just that – assumptions. Will private equity generate average 8.5% annual real returns or 10.0% average annual real returns? No one knows, of course. Other investment consultants may have more optimistic outlooks for private equity. So while the math suggests 5.12% instead of 5.27%, one should not put undue weight on these calculations.

Our third concern is that SERS appears to have modified its asset allocation between 2010 and 2014. The real estate allocation has been increased from 10% to 15% while the hedge fund (multi-asset strategies) allocation has dropped from 15% to 10%. In addition to this, according to its December 31, 2013 "Economic & Capital Market Review", Summit has decreased its capital market assumptions substantially. For example, it's expectation for US large capitalization stocks has dropped from 7.5% in 2010 to 5.5% in 2013. This is only partially explained by its drop in anticipated inflation from 2.50% to 2.25%. This drop might suggest that the next experience study might recommend much lower assumptions. These three factors might be represented by the following table (changed numbers are **bolded** and *italicized)*:

Possible Development of Expected Real Return – Next Experience Study

Asset Class	Asset Allocation (Weight)	Expected Real Return
Cash	1.0%	*0.75%*
US Stocks	*25.0%*	*3.25%*
Non-US Stocks	*20.0%*	*4.75%*
Fixed Income	19.0%	*1.25%*
Private Equity	10.0%	*7.00%*
Real Assets	*15.0%*	5.00%
Hedge Funds / Multi-Asset Strategies	*10.0%*	*3.75%*
Total (Weighted Average)	100.0%	*3.83%*

This suggests that the next experience study might suggest a more than 1% drop in investment return, all other things being equal. Many other factors may change this conclusion, such as changes in underlying capital market assumptions or asset allocations. We would encourage CMC in its next experience study to look at capital market assumptions of other advisors in addition to Summit.

According to the Public Funds Survey as of January 30, 2013, the median real rate of return assumption for 126 large primarily state systems is 4.50%. Although not specifically asked, this is presumably after reduction for administrative expenses in most responses. In particular:

- 30 of the 126 (24%) use assumptions lower than 4.50%,
- 35 (28%) use a 4.50% assumption, the most common assumption,
- 61 (48%) use an assumption greater than 4.50%, and
- a 5.00% real rate of return is assumed by all four other Ohio statewide systems.

CMC assumed that SERS administrative expenses would be 0.75%, based on the following history of expenses:

History of Administrative and Investment Expenses

Fiscal Year Ending June 30:	Total Expenses ($000)	Expense Ratio (to assets)
2006	68,071	0.66%
2007	76,754	0.63%
2008	95,995	0.86%
2009	86,203	1.01%
2010	95,458	1.02%
Average	84,496	0.84%

We recommend continuing to monitor the expenses and expense ratios. The trend had been that expenses were increasing. With the recent run-up in the market, hopefully the expense ratio has returned to the 0.75% range that CMC assumes. We understand that changes in asset allocation have also recently reduced these administrative and investment expenses since 2010. CMC may wish to incorporate expenses in its table of experience gains and losses by risk area.

In addition to the building block assumption development, CMC analyzed recent SERS historical returns and long term national equity and fixed income returns. We believe a three pronged approach (forward looking, historical, and peer comparison) is appropriate, and that despite our minor concerns, the CMC 7.75% return assumption is reasonable.

CMC uses a 5.25% investment return assumption for the healthcare plan. In order to develop this return assumption, CMC reported in the experience study that it was

based on the short term return of employer assets. We recommend that CMC develop this assumption more rigorously in the next experience study report. Notwithstanding our recommendation for more robust development, we find the assumption to be reasonable, consistent and accurate.

Inflation

We reviewed the confirmation of the 3.25% inflation developed by CMC. We find that the methodology used by CMC is reasonable, consistent and accurate. CMC's use of forward looking data such as the yields on inflation-indexed treasury bonds is particularly robust. The data supported the reduction from 3.50% to 3.25%, and may support an even further reduction in the next experience study.

According to the Public Funds Survey as of January 30, 2013, the median assumption for 126 large primarily state systems is 3.00%. In particular:
- 76 of the 126 (60%) use assumptions lower than 3.25%, the most common being 3.00%, which is used by 52 (41% of the total).
- 11 (9%) use a 3.25% assumption, and
- 39 (31%) use an assumption greater than 3.25%.

A 3.25% rate is also used by one other statewide system in Ohio. The other systems' expected rates are:
- Ohio Public Employees Retirement System – 3.00%
- State Teachers Retirement System of Ohio – 2.75%
- Ohio Police and Fire Retirement System – 3.25%
- Ohio Highway Patrol Retirement System – 3.00%

Payroll Growth

CMC proposes a real payroll growth rate of 0.75%, based substantially on the Social Security Administration's data over the last fifty years. When added to 3.25% inflation, this results in a total payroll growth assumption of 4.00%. We find this to be reasonable, consistent and accurate.

Individual Salary Increases

CMC analyzed individual salary increase rates, and appropriately considered the impact of inflation on the increases. It is a common mistake to improperly attribute low salary increases between inflation and other components. CMC handled this correctly. For example, as CMC mentioned in their experience study, inflation during the experience study period was only 2.3%, while the assumed rate of inflation was 3.5%.

We do have some concerns with CMC's development of merit increase assumptions for individuals with more than ten years of service. This can be illustrated by the following chart.

Merit Increase Assumptions by Years of Service
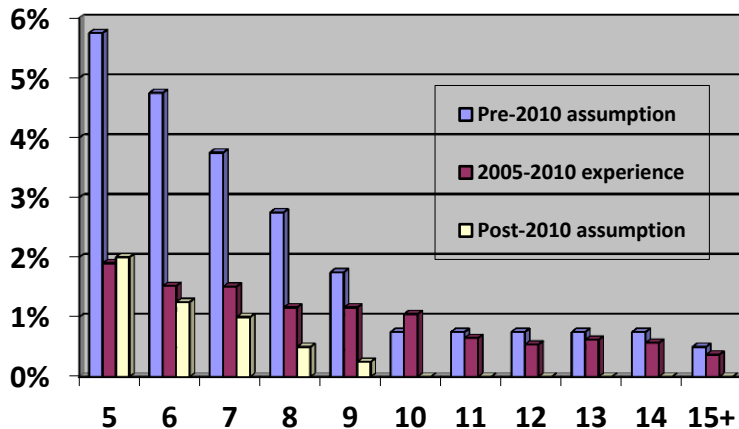
This shows that merit increase experience was lower than expected across most of the spectrum. While CMC's new reduced assumption for up to five years of service seems appropriate, we question whether it is appropriate to assume no merit increase for anyone with ten or more years of service.

Three considerations mitigate our concern, however. First, there have been actuarial gains due to salary in at least the last ten actuarial valuations. This means that while our observation may be appropriate based on the data as of 2010, their assumptions appear to have predicted recent experience more accurately. Second, as mentioned previously, the inflation assumption might be higher than need be. Since salary growth is the sum of payroll growth and merit, and since payroll growth is the sum of inflation plus real wage growth, if merit is slightly understated but inflation is slightly overstated, the total may be right. Third is an even more arcane point. When CMC developed their 2005-2010 experience (red bars above), they subtracted out the prior real payroll growth assumption of 0.50% from the total real salary growth. One could make a case that they could have subtracted out the new real payroll growth assumption of 0.75% instead. This would make each of the red bars lower by 0.25%, which significantly diminishes the disparity between what we might have recommended and what CMC actually did recommend.

The bottom line is that we recommend that CMC study this very carefully in their next experience study. The allocation of salary growth between merit and payroll growth is actually an important distinction in the cost development. This is because higher total

salary growth increases actuarially calculated costs, but higher payroll growth can decrease the current period amortization costs.

POST-EMPLOYMENT HEALTHCARE ASSUMPTIONS

Base Claim Rate Derivation

It is common practice for actuaries to project future claim costs by measuring past experience and adjusting it to reflect the effects of inflation and plan design. It is not well documented in the actuarial report how CMC set the expected claims costs.

Because retiree health care actuarial valuations are a more recent development than pension actuarial valuations, common actuarial practice is less robust in terms of disclosure of methods and assumptions. The CMC disclosure of health assumptions is consistent with general practice, but not as strong as their disclosure of pension assumptions or ideal practice.

Based on discussions with CMC and review of certain calculations, we find that the health care claim cost assumption is reasonable. However we recommend that this be more rigorously documented either in an actuarial experience study for healthcare or through expanded disclosure in the actuarial reports or both.

In order to develop the core health care claims cost assumption, CMC took the following steps.
— Identify the medical cost, or vendor rates, for each plan type and tier (Medicare Mutual PPO, Kaiser HMO, etc.)
— Develop a factor to adjust medical trend by one-half year
— Calculate Aging Factors based on the average of the aging factors of the entire age distribution of the applicable groups
— Utilize assumed participation factors for each plan type
— Calculate weighted average based on all of these factors to arrive at assumed age 65 core health care claims cost

We have reviewed these factors and find them reasonable, appropriately calculated and accurate.

During our initial review, we had a concern with the under-65 spouses of currently retired members. When CMC developed the base claim cost for this group, they averaged expected claims (based on the vendor rates) for this group. But approximately 30% of these under-65 spouses were indicated as subscribed in lower-cost Medicare plans. This was unexpected that a significant number of pre-65 spouses would be on Medicare, so we recommended that SERS review the data for this group. SERS finance staff and healthcare

staff verified that all of the spouses under age 65 were indeed subscribed in the lower-cost Medicare plans as indicated in the data.

Health Care Cost Trend Rate

To properly measure future liabilities, actuaries apply trend rates (health inflation) to the base claim costs described above. Standard practice is to use prevailing national trend rates and grade down to an ultimate trend rate that is slightly higher than prevailing CPI rates. It is reasonable to alter these national rates by applying population-based credibility factors to the Plan's experience and using a blended set of trend rates. CMC did not disclose the process which they used to develop their health care cost trend rates in either the experience study or the actuarial valuation reports. When asked, they replied:

"The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, "Measuring Retiree Group Benefit Obligations", which provides guidance to actuaries in selecting economic assumptions for measuring obligations of postretirement plans other than pensions. As noted in ASOP No. 6, the actuary should consider the following key components in setting the health care cost trend rate: inflation, medical inflation, definition of covered charges, frequency of services, leveraging caused by plan design features not explicitly modeled, and plan participation. The actuary should not consider aging of the covered population when selecting the trend assumption for projecting future costs.

In projecting medical and prescription drug costs, we assume the health benefit plan cost trend rates will decrease from an initial rate to an ultimate level. For the initial trend rate, our methodology includes the use of published annual health care inflation surveys in conjunction with actual plan experience, where credible. Given the volatile nature of medical and prescription drug costs, the initial trend rate assumption is subject to continued update and review with each valuation performed.

As for the decrease to the ultimate trend rate, there are various approaches used to determine the timing and level of the decreases (e.g., multi-year grading period, SOA-Getzen Model). The assumed decrease in medical and prescription drug trend rates reflects the belief that health care inflation cannot indefinitely outstrip the growth rate of employer budgets and the overall economy. As a standard of practice, we typically assume a grading period of five to ten years, depending on the level of change (i.e., larger differences between the initial trend rate and the ultimate trend rate are assumed to require a longer reduction period).

For the ultimate trend rate assumption, we believe the use of an assumption of price inflation plus 1.0% to 2.0% is reasonable for an ultimate rate of medical trend as healthcare costs have historically risen at higher rates than general price inflation.

We typically assume an ultimate trend rate of 5.0%. Although in our last experience study we lowered the Ohio SERS price inflation assumption from 3.50% to 3.25%, we decided to keep the ultimate trend assumption at 5.0% since it still fell in the range of 1.0% to 2.0% above price inflation. As with any standard of practice, the specifics of each plan are reviewed to ensure there is nothing unusual that would necessitate a long-term trend rate that is either higher or lower than what is typical. It appears to be reasonable to use an ultimate rate of 5.0% as there appears to be nothing unusual about Ohio SERS's medical plans that would necessitate a long-term trend that is either higher or lower than what is typically used for this type of calculation."

We find this approach reasonable, and the trend rates which it produces reasonable. It is possible that the ultimate trend rate will be closer to the price inflation assumption of 3.25%, but CMC's conservative assumption of 5.00% provides some cushion for higher than anticipated health care costs. As mentioned previously, we recommend that this process be documented more rigorously in the next experience study report, the actuarial valuation report or both

Morbidity

In a health insurance valuation, morbidity is sometimes defined as the difference in claims costs at different ages. Morbidity rates are also known as aging factors. They are used to transform average health cost assumptions to health care cost assumptions which vary by age. CMC did not disclose what data was used for development of aging factors in the reports. Upon request, they did disclose to us that:

"Our first OPEB valuation for Ohio SERS was as of June 30, 2008. The prior actuary had completed an OPEB valuation as of 1/1/2008 and had adjusted the age related morbidity factors, using them for the 1st time as of 1/1/2008. Since the factors had been recently analyzed and updated, we retained them for our 6/30/2008 valuation. We have since that time closely monitored all publications and research projects undertaken by the SOA regarding age related morbidity and have seen no indication that these factors are no longer appropriate."

We encourage CMS to review these factors in the next experience investigation to the extent data is available. At the very least, we would recommend that the experience study report disclose the process used for choice of these aging factors. We reviewed the aging factors developed by CMC and found them appropriate.

Retiree – Paid Premiums

The true measure of a plan's liability is the difference between total claims costs and the amount that retirees contribute to offset those total costs. For Retiree-Paid Premiums, CMC used actual retiree contribution percentages by class under the current provisions of the plan. CMC does not assume any increases to the share of the costs

covered by premiums. This means that they would increase by the same health care trend factors as underlying health costs. These are beginning at 8.50% (6.75% for Medicare) and grading down to 5.0%. This is a reasonable approach.

Health Plan Participation Rates

The actuary assumes that 94.4% of future retirees elect coverage under the PPO versus HMO. No supporting documentation is provided for this assumption, although it appears to be consistent with the actual coverage selection for the current retiree population. Upon further questions to CMC as to the elections, they responded:

> *"The basis for the participation assumptions include: consideration of the prior actuary's assumptions, general rules of thumb for anticipating participation based on employer subsidy levels, and actual plan experience. Our general rule of thumb for anticipating participation based on subsidy levels is 1.0 minus the square of the retiree's (or spouse's) percentage contribution. At some contribution levels, the assumed "rule of thumb" participation percentages were higher than the prior actuary's assumptions and, after analyzing actual plan experience, we found the prior actuary's assumptions to be more appropriate. We plan to do a more robust analysis of plan participation in our next experience study now that we have creditable experience on the post 8/1/2008 service retirees, keeping in mind that it will have to be closely monitored, particularly for pre-Medicare eligible retirees due to the ACA (subsidized coverage on the Exchanges and the expansion of Medicaid)."*

We find this to be a reasonable and appropriate approach, and agree with their intention of performing a more robust analysis.

Section 3 – Audit of Compilation of Actuarial Valuations

The cornerstone of an actuarial audit is a replication of the actuarial valuation. As mentioned above, we matched quite closely the costs and liabilities developed by CMC for the retirement system. Consequently, we conclude that the valuation results are reasonable, accurate and consistent.

The following table summarizes the actuarial liability and normal cost for the Annual Basic Benefits produced by CMC and PTA/KMS actuarial valuations.

Annual Basic Benefits Valuation as of June 30, 2013							
	Actuarial Liability				**Normal Cost**		
	CMC	**PTA/KMS**	**% Diff.**		**CMC**	**PTA/KMS**	**% Diff.**
Active Members							
Retirement	6,870,958	6,938,189	0.98%		184,037	207,876	12.95%
Death	93,779	99,480	6.08%		4,395	4,734	7.72%
Disability	270,826	267,066	-1.39%		21,151	20,490	-3.12%
Termination	-204,730	-220,735	7.82%		94,491	72,227	-23.56%
Medicare Part B	131,656	136,417	3.62%		5,768	6,334	9.81%
Death after Retirement	7,512	7,553	0.54%		549	540	-1.77%
Total	7,170,002	7,227,969	0.81%		310,392	312,201	0.58%
Retirees							
Retirement	7,752,714	7,738,283	-0.19%				
Disability	822,617	822,617	0.00%				
Beneficiaries	654,406	653,983	-0.06%				
Medicare Part B	243,515	244,140	0.26%				
Death after Retirement	25,246	25,246	0.00%				
Total	9,498,497	9,484,268	-0.15%				
Deferred Vested							
Retirement	281,639	281,639	0.00%				
Medicare Part B	11,602	11,602	0.00%				
Death after Retirement	1,272	1,272	0.00%				
Total	294,512	294,512	0.00%				
Inactive Members	284,150	284,150	0.00%				
Total	17,247,161	17,290,900	0.25%		310,392	312,201	0.58%
*All numbers in thousands							

The following table summarizes the actuarial liability and normal cost for the Retiree Health Care Benefits produced by CMC and PTA/KMS actuarial valuations.

Retiree Health Care Valuation as of June 30, 2013						
	Actuarial Liability			Normal Cost		
	CMC	PTA/KMS	% Diff.	CMC	PTA/KMS	% Diff.
Active Members						
Service Retirements	1,573,760	1,572,362	-0.09%			
Disability	121,019	121,071	0.04%			
Termination	65,651	66,030	0.58%			
Death	1,293	1,215	-6.00%			
Total	1,761,722	1,760,677	-0.06%	89,482	89,178	-0.34%
Retirees						
Service Retirements	943,175	943,099	-0.01%			
Disability	177,343	177,343	0.00%			
Spouses	15,155	15,178	0.15%			
Children	6,570	6,346	-3.41%			
Total	1,142,243	1,141,965	-0.02%			
Deferred Vested	14,335	14,330	-0.04%			
Total	2,918,299	2,916,972	-0.05%	89,482	89,178	-0.34%

*All numbers in thousands

Summary of Deviation of Results

	Basic Benefits Valuation Results	Retiree Health Care Valuation Results
Accrued Liability	0.25%	0.05%
Normal Cost	0.58%	0.34%

Actuaries generally use a 5% deviation as an acceptable range of error. As the total actuarial liabilities and normal costs deviations calculated by PTA/KMS were well within this "margin of error", we are quite satisfied that numbers are appropriate.

Although we did match quite closely, there are several areas which we would encourage CMC to explore further:

— In valuing the Pension benefits, the following are a few items we uncovered that could be corrected, but overall would be immaterial to the valuation results:

o Value deferred vested Post-Retirement Death Benefit coverage at retirement. The death benefit is available to each recipient of a service or disability benefit. While the benefit is correctly valued for retirees and disabled members, the benefit is not correctly valued for deferred vested members.

o Make minor correction to the early retirement factors table. CMC provided us with the table of early retirement factors. For retirements before August 1, 2017, there are two entries at age 65 of "0" (at 23 and 24 years of service) which should be "1".

o Develop the lump sum annuity conversion factors using a 7.75% discount rate. We asked CMC to provide the parameters used to develop these factors, and they replied,

"The lump sum factors are developed using ProVal. These are internal calculations used to compare the value of the member contributions vs. the accrued benefit to select the benefit of greater value. We looked at what the basis that is loaded for these and note that the interest rate used was 8.0% rather than 7.75%. This item did not get updated after the last experience study which changed the discount rate. We have looked at the impact of correcting this and find it would be immaterial to the valuation results."

o The Medicare Part B benefit is valued as a Joint & Survivor payment form when the retired member turns 65. This benefit could be valued separately for the member and the spouse so that the benefit is payable at age 65 for each.

— We recommend that CMC incorporate the following in the Pension Valuation Report:

o Include the chart or comment about the health care fund expected solvency period, which had been included in prior valuation reports.

o The breakout of liabilities and employer contribution rates provided in "Required Contribution Rates" on page 9 and Appendix A should be consistent.

o Indicate that the Medicare Part B reimbursement continues to the spouse upon the death of the retiree only if the retiree elects a Joint & Survivor payment form.

- We recommend that CMC incorporate the following in the Health Care Valuation Report:

  o Include in Schedule C information regarding the $35 monthly surcharge.

  o Provide greater detail on the determination of the Monthly Expected Medical/Prescription Drug Premiums and Claims.

  o Include blended claims costs for Children.

  o Describe the blended claims costs as "Annual".

  o Service Retirement eligibility requirements should be described the same as Pension report.

  o An assumption regarding the Health Care Premium Discount Program should be stated regarding future eligible retirees.

  o Include an assumption regarding valuation of future children's benefits.

Section 4 – Review of Retiree Health Care Premium Rates

We performed an assessment of whether SERS/CMC appropriately, consistently, and evenly determines retiree contributions to health care and whether the implementation of the system's health care policies differ from those determinations.

For our review, we relied on the Board's funding policy, Board meeting minutes, Health Care Actuarial reports, Health Care Enrollment Guides, Comprehensive Annual Financial Reports (CAFR) and other documents as provided by SERS staff. We compared the total vendor costs, and in the case of self-funded plans, the actuarial costs, to the actual premiums charged. Our analysis took into account changes to plan design, reimbursements, and employer contributions available to fund health care and the projected health care trust solvency period.

The Board's funding policy (most recently reviewed January, 2013) describes the funding philosophy and objectives regarding pension and health care benefits. The funding policy states as its purpose the following:

> "The purpose of this Statement of Funding Policy is to describe the funding philosophy and objectives of the Retirement Board of the School Employees Retirement System of Ohio (Board). This Statement sets forth policy and describes the organization and division of responsibilities to prudently implement the Board philosophy and objectives in accordance with sections 3309.21 and 3309.211 of the Ohio Revised Code. It also establishes the framework and specific objectives to monitor the System's funded status and to promote effective communication between the Board and SERS staff."

The funding policy includes the following statement regarding access to health care:

> "Access to health care is provided in accordance with section 3309.69 of the Ohio Revised Code, and is financed through a combination of employer contributions and retiree premiums, copays and deductibles on covered health care expenses, investment returns, and any funds received as a result of SERS' participation in Medicare programs. The System's goal is to maintain a health care reserve account with a twenty-year solvency period in order to ensure that fluctuations in the cost of health care do not cause an interruption in the program. However, during any period in which the twenty-year solvency period is not achieved, the System shall manage the Health Care Fund on a pay-as-you-go basis.
>
> The Ohio Revised Code permits SERS to offer access to health care to eligible individuals receiving retirement, disability, and survivor benefits and to their eligible dependents. Health care coverage may be changed at any time, resulting in adjustments in the required funding of the health care program.

Included within the aforementioned employer contribution is a surcharge determined in accordance with Ohio Revised Code section 3309.491. The surcharge is levied against employers whose employees earn less than a specified minimum salary. In order to avoid shifting an onerous financial burden to our members and retirees, the employer surcharge will continue to be an important source of health care revenues."

SERS staff provided Board policies that relate to health care, however none of the policies provided dictate a precise method or specific guidelines on setting premium rates. These would be consistent with the SERS funding policy for health care which is Pay-As-You-Go. We believe the Board has discretion in setting premium rates and is not bound by any formal policy.

Actuarial calculations are performed each year to determine the annual cost to pre-fund retirement, disability and survivor benefits. The Board then determines how much of the total contribution will be allocated for these benefits, and how much is allocated for health care benefits. Based on the amount allocated for health care, the Board also determines the amount of health care benefits that are currently provided, balancing long-term solvency of the health care program with the desire to provide current health care benefits.

Currently, resources available to provide health care benefits to SERS retirees include:

- Dedicated employer funding of health care benefits (after retirement benefits are funded)
- Additional 1.5% of payroll premium surcharge for lower-paid employees
- Health care trust fund investment earnings
- Retiree premiums
- Federal subsidies and reimbursements

Section 3309.49 of the Ohio Revised Code limits the total employer contribution rate for retirement benefits and health care to 14% of pay. Employer contributions in excess of those required to support the basic retirement system benefits are allocated to the retiree health care fund. The following table shows a five-year history of the employer contribution rates allocated to health care.

Valuation as of June 30	Employer Contribution
2013	1.64%
2012	1.66%
2011	2.05%
2010	2.93%
2009	1.96%

The employer contribution rates shown above include the 1.5% payroll surcharge that is levied against employers whose employees earn less than a specified minimum salary.

The following analysis focuses on the most common medical and prescription drug plan available to Medicare-eligible retirees – the Aetna Medicare Advantage Plan and the self-insured prescription drug program - for years 2008 through 2014. The following table and chart show the actual costs and premiums for the Aetna Medicare Advantage plan and prescription drug program for years 2008 through 2014.

Calendar Year	Medical Cost	Rx Cost	Total Cost	Actual Premium
2014	$86.52	$131.00	$217.52	$253.00
2013	65.07	131.00	196.07	248.00
2012	74.43	107.00	181.43	291.00
2011	87.61	100.00	187.61	291.00
2010	87.61	128.00	215.61	221.00
2009	71.00	122.00	193.00	221.00
2008	57.00	164.00	221.00	221.00
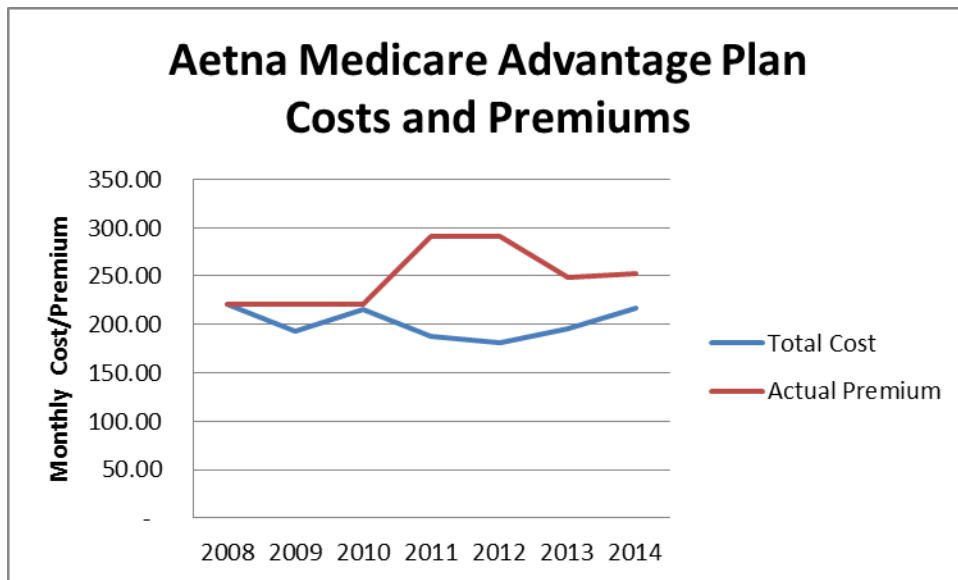
A summary of the major Board actions with respect to Health Care as well as our observations for years 2009 through 2014 follows:

2009 Health Care Premiums

SERS Actions
- Move Medicare recipients enrolled in Medical Mutual Medicare Advantage Plan to the Aetna Medicare Advantage Plan creating a single vendor model and an additional savings of $2 PMPM
- Apply the savings from Medicare Part D Retiree Drug Subsidy (RDS) to the Medicare rates as was done in prior years
- Maintain 2008 premium rates for 2009

PTA/KMS Observations
- 2008 CAFR reports Health Care Fund solvency extends to fiscal year 2019
- Prescription drug costs reduced by 26% Medicare (with RDS credit) and 10% for non-Medicare
- Prescription drug costs increased by 2% Medicare (without RDS credit)
- Although cost for Aetna Medicare Advantage Plan increased $14 and prescription drug cost decreased $42, SERS Board elected to maintain the 2008 premium rates for this plan
- Given concerns with solvency, we believe this was a prudent and reasonable approach

2010 Health Care Premiums

SERS Actions
- Apply the savings from Medicare Part D Retiree Drug Subsidy (RDS) to the Medicare rates as was done in prior years
- Maintain 2009 premium rates for 2010

PTA/KMS Observations
- 2009 CAFR reports Health Care Fund solvency extends to fiscal year 2014
- Prescription drug costs increased by 5% (Medicare with RDS credit) and 17% (non-Medicare)
- Although cost for Aetna Medicare Advantage Plan increased over $16 and prescription drug cost increased $6, SERS Board elected to maintain the 2008 premium rates for this plan
- Given concerns with solvency, we believe this was a prudent and reasonable approach

2011 Health Care Premiums

SERS Actions
- Apply the savings from Medicare Part D Retiree Drug Subsidy (RDS) to the Medicare rates as was done in prior years
- Offer additional wellness program incentives
- Approve plan changes, including increased deductibles for non-Medicare plans
- Approve subsidy changes
- Implement Prescription Drug Plan (PDP)
- Assess a $35 PMPM premium surcharge designed to balance health care expenses with annual resources
- Retain savings from plan changes to further balance health care expenses with annual resources
- Set premium rates to include cost plus savings from plan changes plus premium surcharge

PTA/KMS Observations
- 2010 CAFR reports Health Care Fund solvency extends to fiscal year 2018
- Prescription drug costs increased by 13% (Medicare with RDS credit) and 21% (non-Medicare - prior to plan changes)
- CMS reimbursements decreased by 1.7% from 2010 rates
- Total cost for Aetna Medicare Advantage Plan remained the same while prescription drug costs decreased $28
- Premium rates increased 16%, but now includes $35 premium surcharge
- Given concerns with solvency, we believe this was a prudent and reasonable approach

2012 Health Care Premiums

SERS Actions
- Apply the savings from Medicare Part D Retiree Drug Subsidy (RDS) to the Medicare rates as was done in prior years
- Maintain 2011 premium rates for 2012

PTA/KMS Observations
- 2011 CAFR reports Health Care Fund solvency extends to fiscal year 2023
- SERS received federal reimbursement for Early Retiree Reimbursement Program (ERRP)
- Prescription drug costs increased by 7% (Medicare with RDS credit) and 22% (non-Medicare)
- Implemented discount program on brand name prescription drugs, generating estimated savings of $15 million to $17 million a year
- No employer contributions available in 2012 for health care beyond the 1.5% health care payroll surcharge

- Total cost for Aetna Medicare Advantage Plan decreased $13 and prescription drug costs increased $7
- Premium rates remained level from prior year
- Given concerns with solvency, we believe this was a prudent and reasonable approach

2013 Health Care Premiums

SERS Actions
- Apply the savings from Medicare Part D Retiree Drug Subsidy (RDS) to the Medicare rates as was done in prior years
- ERRP funds have been exhausted
- Utilized Aetna and Medicare reimbursement to offer premium support to Aetna Medicare enrollees

PTA/KMS Observations
- 2012 CAFR reports Health Care Fund solvency extends to fiscal year 2020
- Minimal employer contributions available in 2013 for health care beyond the 1.5% health care payroll surcharge
- No further funds from ERRP
- About 50% of new retirees in 2011 did not enroll in SERS
- Total cost for Aetna Medicare Advantage Plan decreased $9 and prescription drug costs increased $24
- Premium rates decreased 16%; rate includes $35 premium surcharge
- Given concerns with solvency, we believe this was a prudent and reasonable approach

2014 Health Care Premiums

SERS Actions
- Apply the savings from Medicare Part D Retiree Drug Subsidy (RDS) to the Medicare rates as was done in prior years
- Remove $300 deductible from Medicare Advantage plan
- Implement Silver Sneakers benefit
- Change Medicare co-pays
- Renegotiated Express Scripts contract resulting in 8% savings

PTA/KMS Observations
- Prescription drug costs did not change (Medicare) and decreased 3.6% (non-Medicare)
- PDP savings passed on to Medicare-eligible retirees only
- Total cost for Aetna Medicare Advantage Plan increased $21 and prescription drug costs remained the same as 2013
- Premium rates increased 2%; rate includes $35 premium surcharge

- Given concerns with solvency, we believe this was a prudent and reasonable approach

Overall, we believe that the premium rates established for the years 2009 through 2014 are reasonable and align with the costs of the underlying benefits offered. As stated in the Board's funding policy, health care coverage may change at any time, resulting in adjustments in resources of the required funding of the health care program. Premiums should not only be based on current costs, but also take into account the many factors discussed above, including maintaining the health care trust fund with a twenty year solvency period, changes to plan design, reimbursements, future enrollment of younger, healthy retirees and available employer contributions to fund health care.

To summarize, we find that the rates were accurate, consistent and reasonable.

Section 5 – Other Considerations

We found CMC's work to be strong. It was reasonable, consistent and accurate. We do not believe that any methods, assumptions, or calculations are erroneous to the level of necessary recalculations.

As indicated above, our primary recommendations are:

— Document the development of health care claim costs more rigorously either in the actuarial reports or in the experience study or both
— Examine several minor actuarial assumptions (discussed above) more rigorously in the next experience study
— Correct minor discrepancies in the next actuarial valuation

For the most part, we found the CMC actuarial valuation reports and experience study reports to be very well written, and focusing on important issues. Actuarial Standard of Practice (ASOP) No. 41 provides extensive guidance to actuaries regarding actuarial communications. We find that the CMC reports complied with the guidance of ASOP 41.

Additionally, the reports generally are consistent with Government Finance Officers' guidelines for reporting. The CMC signers of the reports are qualified actuaries.

Cavanaugh Macdonald, the Ohio Retirement Study Council and particularly the School Employees Retirement System of Ohio staff were fully cooperative and responsive, which assisted in the process. Finally, we wish to reaffirm that the work done by CMC was reasonable, consistent and accurate.