June 2006

Quadrennial Actuarial Audit of the Virginia Retirement System

Prepared for the Joint Legislative Audit and Review Commission in Compliance with Section 30-81 of the *Code of Virginia*

MERCER
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Executive Summary

Purpose and Scope of the Actuarial Audit Review

Mercer Human Resource Consulting, Inc. was engaged by the Joint Legislative Audit and Review Commission (JLARC) to conduct an actuarial audit of the June 30, 2005 actuarial valuation of the Virginia Retirement System (VRS) which was prepared by Palmer & Cay, consulting actuary to VRS. The quadrennial audit is required by §30-81 of the *Code of Virginia*.

The audit also includes a review of the valuations for the Health Care Credit Program, the Group Life Insurance Program, and the Virginia Sickness and Disability Program (VSDP).

The primary purpose of the audit was to perform an independent verification and analysis of the assumptions, procedures, and methods used by Palmer & Cay in preparing the various actuarial valuations. For VRS pension benefits, the report reviewed was the report to VRS covering State Employees, Teachers, State Police, Judicial and Law Officers as well as separate reports for a sample group of local government employers. The local government employers included were:

- City of Fairfax
- Augusta County Service Authority
- Loudoun County
- Chesterfield County School Board

Statement of Key Findings

Based upon a thorough review of the June 30, 2005 actuarial valuation report, we believe that the work regarding the VRS Pension Trust Funds, Health Care Credit Program, and Group Life Insurance Program is reasonable and performed in accordance with generally accepted actuarial principles and practices using reasonable actuarial

assumptions and methods. However, we have identified certain deficiencies in the valuation of VSDP which need to be addressed.

All of the work was performed by fully qualified actuaries meeting the Qualification Standards of the American Academy of Actuaries.

Audit Exceptions

It is important to understand that in selecting and recommending actuarial methods and assumptions, there is a great deal of professional judgment involved. In making the above Statement of Key Findings, we have not attempted to substitute our judgment for that of the consulting actuary to the Fund. However, as a part of our review, we have identified a number of areas where VRS and its consulting actuary should undertake further investigation or study. These areas are described under the "Comments" within each of the sections that follow this Executive Summary and are summarized below. Some of our comments for this valuation were also made in our review of the June 30, 2000 valuation, and we have noted where this has occurred.

Actuarial Cost Method: The actuarial cost methods for the Health Care Credit Program, the Group Life Insurance Program and VSDP will need some modifications after GASB Statement No. 43 becomes effective on July 1, 2006. We have also made recommendations with regard to VSDP funding methodology, which include the projection of future plan liabilities.

Actuarial Assumptions: No documentation was provided regarding the change in the assumptions with regard to future pay growth in VRS for persons in a disability status under VSDP.

We recommend that gender-distinct mortality assumptions be used for State Police. This comment was also made in our review of the 2000 actuarial valuation.

The discount rate used for the valuation of VSDP is 4.5% while for all other plans it is 7.5%. Since the asset allocation of VSDP is the same as VRS, we would have expected the discount rate to be determined in a comparable manner. We believe that the disability table used for VSDP (the 1987 Commissioners Group Disability Table) should be replaced with a more appropriate table. In addition, explicit assumptions should be implemented regarding Social Security disability awards.

Actuarial Reports: In the primary actuarial report for VRS there are several actuarial assumptions that are either misstated or omitted in the summaries of actuarial assumptions.

For the separate reports prepared for local governmental employers, we believe that they should be expanded to include plan and assumption summaries and be signed by a qualified actuary. This comment was also made in our review of the 2000 actuarial valuation.

The report on the actuarial experience study is not presented in sufficient detail for us to be able to form an opinion on all of its conclusions.

Data Review: A few inconsistencies in data counts and compensation were observed, fairly minor in nature, and not affecting the actuarial valuation results.

Actuarial Computations: For work-related disabilities, there appears to be no consideration of the offset of workers compensation benefits.

In the valuation of retirement benefits for Judges, the calculations do not appear to be consistent with the stated actuarial assumptions with regard to retirement incidence rates.

In the valuation of the Group Life Insurance Program, the projections of benefit decreases are not consistent with plan provisions.

For VSDP, we recommend that the valuation calculations be modified such that all assumptions are applied on an individual basis rather than aggregate basis.

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Actuarial Cost Methods

Audit Conclusion

VRS: The actuarial cost method meets applicable professional guidelines and requirements of state law.

Health Care Credit Program: The valuation report provides results under both the Entry Age Normal Method as well as the pay-as-you-go method. The Entry Age Normal Method meets applicable professional guidelines. However, the pay-as-you-go method is not a recognized acceptable actuarial cost method.

Group Life Insurance Program: The actuarial cost method meets applicable professional guidelines, but additional calculations will be required to comply with GASB Statement No. 43.

VSDP: The valuation does not use a pre-funding actuarial cost method and we have made a number of recommendations with respect to the methodology used. In addition, a pre-funding actuarial cost method will need to be adopted to comply with GASB Statement No. 43.

Comments

The actuarial cost method used by VRS is the Entry Age Normal Cost Method. The Code of Virginia §51.1-145 specifies the following:

> The total annual contribution for each employer, expressed as a percentage of the annual membership payroll, shall be determined in a manner so as to remain relatively level from year to year.

We agree that the Entry Age Normal method complies with this requirement of state law, although it is not the only method that has this characteristic.

Use of the Entry Age Normal Method is extremely common for public employee retirement systems. The *2004 Wilshire Report on State Retirement Systems* showed that 72% of state retirement systems used Entry Age Normal.

The application of the Entry Age Normal Method was changed effective with the June 30, 2005 actuarial valuation such that a normal cost rate is determined separately for all active plan participants. Under the prior method, a variation of Entry Age Normal was used. Rather than calculating a normal cost rate on all active plan participants, the normal cost rate was determined based on a group of new entrants and then this rate was assumed to apply to the entire active population. We had questioned use of this methodology in our prior actuarial audit report and agree with the change to the revised methodology. However, it should be noted that the valuation report still describes the cost method as using the previous approach.

Health Care Credit Program

The report calculates the results using two methods, pay-as-you-go and the Entry Age Normal Method. The pay-as-you-go costs have historically been used for determining the contributions to the plan even though the recommendation from VRS and its actuary have been to fund using the Entry Age Normal Results. It should be recognized that pay-as-you-go is not a funding method that meets actuarial standards of practice for funding of benefits after retirement. Also, effective for the year beginning July 1, 2006, the plan will be subject to the requirements of Governmental Accounting Standards Board Statement No. 43 (GASB 43) which will require disclosures of the unfunded liability and annual required contribution using a recognized actuarial funding method. Therefore consideration should be given to changing the budgeting of contributions to be aligned with the accounting disclosures.

Group Life Insurance Program

The postretirement group life insurance program is funded using the Aggregate Funding Method. This method, while different than the method used to value retirement benefits, is a recognized cost method under actuarial standards of practice. This plan will similarly become subject to the requirements of GASB 43 for the year beginning July 1, 2006. Since the aggregate method does not determine an amount of unfunded actuarial accrued liability, such liability will need to be disclosed under the Entry Age Normal Method.

Virginia Sickness and Disability Plan

The VSDP uses a funding method known as terminal funding. No funding is done prior to the point of disability, but at the point of disability a reserve is established for the expected future costs of disability.

With respect to determining funding needs, the VRS actuary needs to better clarify underlying claims experience trends and demographic changes in order to manage the rate changes which may be necessary in the future. Specifically, the following actions are recommended:

1. The actuary should prescribe what a stable five-year rate scenario would be. That is, what rate would be necessary for the next five years to fully fund the claims and expenses which are incurred during the time period regardless of when the claims are actually paid? This would be a measure of what the likely short-term rate actions are likely to be.
2. An explicit measure of how to account for any current deficiencies or surpluses ought to be adopted. This would dictate how any historical losses or surplus would factor into future rate changes.
3. A summary of financials by incurred year which highlights cumulative actuarial losses and contrasts that with revenue received should be constructed and reported upon each year. Significant deviations from reported results or projections from year-to-year should be clearly explained by the actuary.
4. It would be prudent to perform a valuation of all future expected liabilities versus expected future revenues to determine the long-term funding requirements of the program and to measure the inherent deficits or surpluses embedded in the current rate structure and claims experience levels.

Similar to the Health Care Credit Program and the postretirement Group Life Insurance Program, the VSDP will become subject to GASB 43 at July 1, 2006 which will require using a pre-funding actuarial cost method (such as Entry Age Normal) for accounting disclosures. VRS and the legislature will need to determine whether to use GASB 43 methodology for funding the benefits or whether to continue the use of terminal funding.

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Actuarial Asset Valuation Method

Audit Conclusion

The actuarial asset valuation methods for all plans meet applicable professional guidelines.

Comments

The actuarial asset valuation method calculates the actuarial value of assets equal to the market value of assets less a five year phase in of the excess (shortfall) between expected investment return and actual income (both based on market value) with the resulting value not being less than 80% or more than 120% of the market value of assets.

The use of a smoothing method to remove volatility in investment experience is very common for public retirement systems. The *2004 Wilshire Report on State Retirement Systems* showed more than 90% of state retirement systems used an asset valuation method other than market value. The particular method used by VRS is very common for both public and private retirement plans.

Using a smoothing method mitigates the effect of short-term changes (market fluctuations) in the fair market value of plan assets. This produces a smoothing effect on the value of plan assets and thereby reduces the volatility of annual funding contribution requirements, thus making it easier to budget contributions and expense.

The calculation is done separately for State Employees, Teachers, State Police, Judges and Law Officers based upon the separate accounting for their share of fund assets. For local government plans, the calculation is done on a pooled basis and then the resulting ratio of actuarial value of assets to market value is applied to each employer's share of the market value. We consider this approach to be very reasonable and appropriate.

Health Care Credit Program

The asset valuation method for the Health Care Credit Program is market value. This method is acceptable under actuarial standards of practice. Due to the current relatively low funded ratio for this program, little would be gained by introducing an asset smoothing method.

Group Life Insurance Program

The asset valuation method for the Group Life Insurance Program is market value. This method is acceptable under actuarial standards of practice. At some point VRS may want to consider adoption of an asset smoothing method would better meet annual budgeting requirements, but we have no objection to the continued use of market value.

Virginia Sickness and Disability Plan

This valuation does not specify an actuarial asset method. When calculations begin under GASB 43, an asset valuation method will need to be selected.

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Actuarial Assumptions

Audit Conclusion

The actuarial assumptions are reasonable on both an individual and aggregate basis.

Comments

The current actuarial assumptions were adopted for the June 30, 2005 actuarial valuation based upon the results of an experience study performed by Palmer & Cay for the period 1999-2004 and presented to VRS in May 2005. It must be recognized in the setting of actuarial assumptions that there is not one answer that reflects the best estimate of future experience. Rather there is a best-estimate range, within which reasonable assumptions lie. We believe that all of the actuarial assumptions lie within this range. However, there are a number of areas in the analysis of actuarial assumptions where we have different opinions concerning the interpretation of the underlying experience data or different preferences with regard to the assumption selected. Some of the comments below reflect these differing opinions or preferences.

Economic Assumptions

Investment Return Rate: The assumed investment return rate is 7.5%, which was reduced from the 8.0% rate used in the previous valuation. A reduction from 8.0% to either 7.75% or 7.5% was recommended by Palmer & Cay in the 2005 Experience Study.

In order to assess the reasonableness of this assumption, we have used Mercer's proprietary Portfolio Return Calculator (PRC). The PRC uses as inputs the following information:

- Asset allocation of the pension fund
- Annual investment and administrative expenses expressed as a percentage of plan assets

- Capital market returns for each asset class as developed by Mercer Investment Consulting (MIC), generally referred to as "forward looking assumptions". These returns are expressed in nominal terms and also include measures of standard deviations from the expected value and correlations among asset classes. Alternative capital market return assumptions can also be used in the PRC.

The output from PRC is a probability distribution of expected asset returns based upon the forward looking assumptions and average returns based upon historical assumptions.

The following table shows the current VRS asset allocation weightings, the assumed nominal rates of return for each asset class as developed by MIC, and the assumed nominal rates of return used internally by VRS:

Asset class	Allocation	MIC Return	VRS Return
Domestic Equity	41%	8.16%	7.07%
Non-US Equity	21%	8.19%	6.71%
Hedge Funds	4%	5.10%	Same as domestic equity
Fixed Income	19%	4.93%	5.40%
Credit Strategies	4%	Same as fixed income	6.66%
Real Estate	5%	7.27	6.25% (public) 9.15% (private)
Private Equity	5%	9.38	9.32%
Cash	1%	3.29	3.15%

For annual expense, we assumed 25 basis points, which is based upon 5 basis points for administrative expenses and 20 basis points for investment expenses. The administrative expense assumption is derived from VRS's own experience. The investment expense assumption is consistent with expenses associated with index returns. The implicit assumption is that any additional return from active management (alpha) is exactly offset by the additional expense for active management. To the extent that returns from active management exceed the additional cost, then such additional return should be added to the returns derived from the PRC. Using the above allocation and the assumptions as noted, the PRC produced the following expected investment returns over a 20 year investment horizon:

Percentile	MIC Assumptions	VRS Assumptions
25%	5.66%	5.46%
40%	6.90%	6.63%
50%	7.65%	7.33%
60%	8.39%	8.04%
75%	9.63%	9.20%

Using MIC's assumptions, the median expected return would be 7.65%. The current assumption of 7.50% falls just below the 50th percentile, meaning that we would

conclude that there is at least a 50% probability that the assumed rate of return could be achieved. The VRS results are slightly lower than MIC's.

Generally, Mercer considers that results between the 25th to 75th percentiles are within a reasonable range for the investment return assumption. The current assumption of 7.5% falls well within this range whether we use the MIC or VRS assumptions.

Most surveys of large public retirement systems indicate an average investment return assumption of about 8.0%. In fact, the *2006 Wilshire Report on State Retirement Systems* showed an average assumed investment rate of 8.0%. Therefore, VRS's 7.50% assumption is somewhat more conservative than the average rate.

We therefore conclude that the 7.5% assumption is reasonable for use in the VRS actuarial valuation.

Salary Increases: The current salary increase assumptions are based upon the results of the 1999-2004 experience study. As a result of this study, the salary assumptions were adjusted from the prior assumptions as follows:

- The inflation assumption was changed to 2.5%.
- For State Employees, no changes were made in the productivity component or in the step rates. Therefore, the net effect was a decrease in all rates of 0.5% from the prior rates.
- For Teachers, increases were made in the step-rate/promotional scale which offset the reduction in the inflation assumption and caused small net increases in the salary scale except for service greater than 15 years, where there were small decreases. The productivity component shown in the report (1.00%) is inconsistent with the productivity component actually used (1.25%).
- For Judges, the flat salary scale of at all ages and service was reduced from 5.0% to 3.5%.
- For State Police and VALORS, no changes were made in the step rates. However, the productivity component was decreased from 1.50% to 1.00% so that the net effect (including the .50% reduction in inflation) was a reduction in all rates by 1.00%. It should be noted that the productivity component shown in the report's summary of actuarial assumptions does not reflect the change actually made in this assumption.

The experience study results were not presented in sufficient detail that we could verify that these changes are consistent with the experience. For example, the step rate assumptions are based upon years of service. However, the experience study results were presented by age without regard to years of service. Yet, the assumptions appear reasonable and the changes made are generally consistent with the overall pattern of experience.

For persons covered by VSDP an assumption is made for future increases in the pay used to determine benefits from the System. For State Employees this rate is 3.75%. For State

Police and VALORS this rate is 3.50%. It is not clear to us how this assumption was determined and how it relates to the overall inflation assumption.

Inflation Assumption: The underlying inflation assumption for the actuarial interest rate, for salary increases and for the cost of living adjustments for retirees is 2.5%. This was reduced from 3% in the previous valuation. We believe that the revised assumption is reasonable and more consistent with recent levels of inflation.

Payroll Growth Assumption: A payroll growth assumption of 3% is used based upon a zero growth in the active covered population. This assumption is used in determining the current year amortization amount of the unfunded actuarial accrued liability which is amortized as a level percentage of future payroll. This assumption is unchanged from the prior valuation. It would seem as though the decrease in the inflation assumption should also have decreased this assumption as well, which would cause an increase in the current year amortization amounts. However, we understand that a decision was reached to set this assumption at 0.5% in excess of the actual inflation rate. We agree that this assumption is reasonable.

Demographic Assumptions

Death After Retirement:

The following assumptions are used for postretirement mortality:

Non-Disabled Retirement:

State employees:	1994 Group Annuity Mortality Tables for males and females with a one year set back in age for males and females.
Teachers:	1994 Group Annuity Mortality Tables for males and females with a three year set back in age for males and females
State Police:	1994 Group Annuity Mortality Table for males set back four years
Judicial:	Same as state employees
Law Officers:	Same as state police

Disabled Retirement:

All classes:	70% of PBGC Disabled Mortality Table 5a for males
	90% of PBGC Disabled Mortality Table 6a for females

The 1999-2004 Experience Study showed that the actual mortality experience for all groups was lower than assumed reflecting improvements that have occurred generally in mortality. Therefore, it was recommended to reduce the mortality rates by assuming additional age set-backs. We believe that all of these adjustments in the mortality assumptions are reasonable. However, it is not clear from the experience study report whether sufficient margin has been included in the mortality rates for future improvements in mortality. Any additional margin for future improvements would cause an increase in actuarial liabilities.

Also, with regard to the mortality assumption for State Police and Law Officers, we note (as we did in our actuarial audit report of the 2000 actuarial valuation) that all members are valued using identical assumptions for males and females. This treatment probably began when there were very few females employed within this group. However, the percentage of active female police officers has been increasing steadily and eventually will result in a more significant percentage of female retirees. This trend will probably be even more pronounced in local police departments where the same assumptions are used as for State Police. As in our review from five years ago, we recommend that gender distinct assumptions be adopted for the State Police and VALORS.

The disabled mortality assumption is unchanged from prior valuations. The 1999-2004 experience study appeared to show lower mortality than assumed, similar to the experience for non-disabled retirees. We do not understand the recommendation to continue with the previous assumption and feel that there should have been some reduction in disabled mortality rates which would result in some increase in actuarial liabilities.

Preretirement Death: The 1999-2004 experience study report showed that mortality rates pre-retirement were significantly below the assumed rates. In response, Palmer & Cay recommended an additional one year age setback for all tables. Our review of the experience indicates that additional reductions in the rates could have been justified. However, this assumption does not have a significant effect upon valuation results. Nevertheless, consideration should be made to reduce the rates further to be more reasonably related to the actual experience.

VRS provides a special death benefit of 50% of average final compensation (33 1/3% if the beneficiary qualifies for social security survivor benefits) and offset by Worker's Compensation. When death is service related, Palmer & Cay assumes that zero percent of deaths of active workers will be service related. It would seem that some deaths would be service related and that an assumption should be made accordingly. Even if it is determined that the assumption should remain at zero, this should be disclosed in the summary of actuarial assumptions.

Termination Rates (Non-Vested and Vested): The results of the 1999-2004 experience study indicated terminations occurring at a greater rate for all classes of members than was previously assumed. As a result, increases were made in all of the assumed termination rates. The assumed rates vary by both age and years of service. However, since the experience study only shows results aggregated by age, we are not able to determine whether the new assumptions are completely consistent with plan experience. However, we agree that recommending increases in the termination rates was reasonable.

Disability Incidence: Based upon the results of the 1999-2004 experience study, Palmer & Cay recommended changes to disability incidence assumptions for all groups except Judicial. The resulting rates generally seem to be consistent with the experience.

A greater disability benefit is provided for service-related disabilities. For each of the groups, an assumption is made regarding the percentage of disabilities that will be service-related. No changes were made in the service-related percentages and no data was shown within the experience study for us to determine whether continuation of these assumptions is reasonable. Also, for judges, the assumed service-related percentage of 5% is not disclosed in the summary of actuarial assumptions, but appears to be applied when looking at individual test cases.

VRS provides lower disability benefits to disabled members who qualify for social security disability benefits. Palmer & Cay assumes that zero percent of disabled members qualify for social security, thus conservatively valuing the higher benefit, but no experience study data has been presented for us to determine whether this assumption is reasonable.

Retirement Rates (Reduced Benefits): Based on the 1999-2004 experience study, higher than expected retirements were observed generally for all groups for ages below 60. As a result, Palmer & Cay recommended increases in rates at these ages.

We believe the revised reduced retirement assumptions for all groups are reasonable.

Retirement Rates (Unreduced Benefits): For unreduced retirement, actual to expected ratios in the 1999-2004 experience study varied somewhat by group:

State and Teachers: Actual to expected ratios exceeded 100% for ages 60 and under.
State Police and VALORS: Actual to expected ratios were less than 100% for ages 61 and under.

Judges: Actual to expected ratios exceeded 100% for all age groups.

In response to these results, Palmer & Cay recommended changes affecting all groups, some increased rates and some decreased rates. We believe the assumptions as revised are reasonable compared to the experience. However, for State Police and VALORS, the retirement rates shown in the report do not include rates for ages over 60 even though these are used in the valuation calculations.

Percent Electing a Deferred Retirement Benefit: Terminating members may elect a deferred retirement benefit or a return of their contributions. The valuation assumes that all such members will elect the most valuable of these benefits. This assumption is conservative and we believe it to be reasonable.

Beneficiary Age: An assumption is made that beneficiaries are the same age as plan participants. This assumption is necessary for the valuation of certain survivor benefits. We believe that the assumption is reasonable, although since most beneficiaries are spouses, a more typical assumption would be to assume that female spouses are two to three years younger than male spouses. In any event, the assumption is not disclosed in

the statement of actuarial assumptions and we recommend that it be added to the statement of assumptions at the next valuation.

Actuarial Assumptions for Health Care Credit Program

The Health Care Credit Program uses the same assumptions as those for the valuation of retirement income benefits. Any comments above regarding these assumptions would also apply for purposes of the Health Care Credit Program.

Actuarial Assumptions for Group Life Insurance Program

The postretirement Group Life Insurance Program uses the same assumptions as those for the valuation of retirement income benefits. Any comments above regarding these assumptions would also apply for purposes of the Group Life Insurance Program.

Actuarial Assumptions for VSDP

The following assumptions are used in determination of reserves for incurred disability benefits under VSDP:

Discount rate: 4.5%.

The asset allocation of the fund is the same as for VRS. Therefore, the same methodology used above to evaluate the assumed investment return rate for VRS would equally apply for VSDP. Since the asset allocations are identical, we do not understand why VSDP does not use an assumption determined comparable to the 7.5% discount rate used for VRS.

Disability termination rates: 1987 Commissioner's Group Disability Table.

The table selected for the valuation is generally considered to be flawed with respect to several critical elements, including but not limited to, accounting for behavioral health claims, the lack of incorporating Social Security awards, and early duration claims termination rates. All significant insurers with material amounts of business have significantly modified the 87CGDT table to make the valuation results more realistic and generally producing much lower valuation liabilities.

Actual VRS terminations experience should be used to modify the base termination rates for the valuation. Adjustments to the table should be age, gender and duration specific. A policy should be established for periodically updating the termination rates experienced by VRS claimants and making the changes in the valuation table.

Cost-of-living increases: 2.7%

This assumption appears to be reasonable based upon plan history and other economic assumptions. The annual amount of the COLA increase should be embedded in the valuation program such that no ad hoc adjustments would be required.

Social Security Award

For those claimants without a Social Security award, explicit assumptions should be established with respect to the probability of a Social Security award and the expected amount of the Social Security Award. These assumptions should be built into the valuation table.

Other assumptions

Other assumptions needed are based on the VRS assumptions for retirement income benefits. Any comments previously made regarding these would equally apply for VSDP as applicable.

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Review of Actuarial Reports

Audit Conclusion

All valuation reports (except for the local government reports) meet professional standards and fairly represent the actuarial condition of the various plans. The reports prepared for local governmental employers do not fully meet professional standards.

We do not believe that the report for the actuarial experience study is presented in sufficient detail to meet actuarial standards of practice.

Comments

The communication of actuarial valuation results is covered in the Actuarial Standards Board (ASB) Standard of Practice No. 41, *Actuarial Communications* (ASOP 41). Generally, sufficient information should be presented such that:

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

Standard of Practice No. 4, *Measuring Pension Obligations* (ASOP 4), also indicates specific requirements for content of pension actuarial reports including:

- The name of the person or firm retaining the actuary and the purpose of the report
- An outline of the benefits being valued
- The effective date of the calculation
- A summary of participant data
- A summary of asset information
- A description of the actuarial methods and assumptions

- A statement of the findings, conclusions or recommendations necessary to satisfy the purpose of the communication

Palmer & Cay prepares a "primary" actuarial report for VRS that contains the results for State Employees, Teachers, State Police, Judges and Law Officers. Palmer & Cay also prepares a separate actuarial report for each local government employer participating in VRS. The results of the local governments are not included in the primary report either individually or in aggregate.

The primary report meets the requirements of ASOPs 4 and 41. However, it should be noted that the VRS report contained several discrepancies within the summary of actuarial assumptions and methods when compared to the tables provided by Palmer & Cay. These include (a) retirement decrement differences for State Employees, Teachers, SPORS, and VALORS; (b) the productivity component and total annual compensation increase for State Employees, Teachers, SPORS, and VALORS; and (c) the post-employment mortality table for SPORS and VALORS.

The reports prepared for local participating employers are somewhat deficient with regard to ASOPs 4 and 41 as follows:

- The reports do not include an outline of the benefits being valued.
- The reports do not include a description of the actuarial methods and assumptions.
- The reports are not signed by an actuary.

References in the reports to where a reader could find summaries of the benefits and actuarial assumptions might also be acceptable.

Review of Funding Levels

The table below shows the calculation of the funded ratios of VRS for the last six years (excluding local plans) compared to the funded ratios for all state retirement systems as shown in the *2006 Wilshire Report on State Retirement Systems*:

Year	(Billions) Actuarial Value of Assets	(Billions) Actuarial Accrued Liability	Funded Ratio VRS	Funded Ratio All State Systems
2000	$28.6	$28.0	102%	103%
2001	31.5	30.1	105%	100%
2002	32.2	32.4	99%	93%
2003	32.3	34.2	95%	89%
2004	32.6	36.8	89%	88%
2005	33.0	41.3	80%	85%

From 2000 through 2004, the decrease in the VRS funded ratio paralleled the decreases in the average for all state systems and in fact remained slightly more favorable than the average. One of the factors causing the VRS funded ratio in 2005 to drop below the average funded ratio is that VRS changed the assumed rate of return from 8.0% to 7.5% whereas the average state plan still has an assumption of 8.0%. It is difficult to make direct comparisons to other systems due to the wide variation of actuarial assumptions and methods. However, we would consider the current funded status of VRS to be somewhat "in the middle" when compared to other comparable systems, that is, not significantly better or worse funded than the average system.

Report for Health Care Credit Program

The report for the Health Care Credit Program incorporates either directly or by reference all of the information required to meet requirements of ASOP 41.

Report for Group Life Insurance Program

The report for the Group Life Insurance Program meets or exceeds all of the requirements of ASOP 41.

Report for VSDP

The report for the VSDP incorporates either directly or by reference the information required to meet requirements of ASOP 41. However, the report will need to be modified if our recommendations regarding methodology and assumptions are implemented.

Report of Actuarial Experience

We do not believe that the report of the actuarial experience study is presented in enough detail that permits another actuary to assess the reasonableness of the conclusions. For example:

- The results for salary experience are shown by age group while the assumptions being used vary by years of service.
- There is no commentary in the report that reflects the actuary's interpretation of the results.
- There were a number of assumptions not covered by the experience study where a measurement of experience could have been useful.

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Data Review

Virginia Retirement System

Audit Conclusion

The membership data used by Palmer & Cay for the June 30, 2005, actuarial valuation is consistent with the data provided by VRS except with regard to accrued credited service. Significant differences were observed in credited service which will need to be investigated.

Comments

Mercer requested and received the data file that VRS provided to Palmer & Cay for the 2005 valuation as well as Palmer & Cay's actual valuation database.

A summary of our data review is shown in the tables below, which compares the data provided by VRS, to the data used by Palmer & Cay in the valuation. Only minor differences in compensation were noted.

State Employee	VRS Data File	Palmer & Cay Valuation File/Report
Active Members	76,833	76,833
Average Service	12.9	12.9
Average Age	46.9	46.8
Average Pay	40,106	40,353

Teachers	VRS Data File	Palmer & Cay Valuation File/Report
Active Members	140,030	140,030
Average Service	11.3	11.3
Average Age	44.2	44.2
Average Pay	41,670	41,740

State Police	VRS Data File	Palmer & Cay Valuation File / Report
Active Members	1,811	1,811
Average Service	13.6	13.6
Average Age	39.6	39.6
Average Pay	50,174	50,174

Judges	VRS Data File	Palmer & Cay Valuation File / Report
Active Members	414	414
Average Service	10.6	10.6
Average Age	56.1	56.1
Average Pay	125,300	125,300

Law Officers	VRS Data File	Palmer & Cay Valuation File / Report
Active Members	9,828	9,819
Average Service	8.5	8.4
Average Age	40.4	40.4
Average Pay	31,246	31,222

Active membership for selected local plans provided in the VRS data file matched headcounts provided by Palmer & Cay. Average service, age, and pay information was also confirmed for these plans.

Health Care Credit Program

The membership data used by Palmer & Cay for the June 30, 2005 valuation is consistent with the data provided by VRS. Membership data is same as used for VRS retirement system valuation.

Group Life Insurance Program

The membership data used by Palmer & Cay for the June 30, 2005 valuation is consistent with the data provided by VRS. Membership data is same as used for VRS retirement system valuation plus 9,564 life insurance only participants from four political subdivisions that do not participate in VRS.

Virginia Sickness and Disability Program (VSDP)

The membership data used by Palmer & Cay for the June 30, 2005 valuation of the VSDP was consistent with the data provided by VRS indicating 65,287 individuals enrolled in VSDP as of June 30, 2005.

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Review of Actuarial Computations

Audit Conclusion

Our review of the actuarial computations included the following:

- Review of the calculations presented in the actuarial report for consistency and accuracy. We found no issues to report on this review.
- Checking of test cases to determine whether plan provisions and actuarial assumptions were programmed properly.

Comments

Virginia Retirement System (VRS)

Review of the calculations presented in the actuarial report for consistency and accuracy

For this review, we mathematically checked a number of report exhibits for consistency within the exhibit and for consistency with other exhibits. Amortization amounts were checked, as were calculations of actuarial asset value. We found the report accurate in all respects based on this review.

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

We requested from Palmer & Cay test cases of inactive plan members, and test cases of active plan members selected from among various age and service combinations. Test cases were received from all groups (i.e., State Employees, Teachers, State Police, Judges and Law Officers). It is important to realize that test cases are carefully selected to check all of the plan provisions rather than being selected randomly. For the test cases of active plan members, our review included checking closely the projected benefits for each member (known as “benefit arrays”) as well as a review of the actuarial present values computed from such benefit arrays.

From our review we found the following issues to report:

Virginia Retirement System

- Death Benefit: The summary of actuarial assumptions in the valuation reports does not mention the service related death assumption of 14% for service related deaths or the 86% applied to non-service related deaths, but these factors are applied to the death decrements. This should be added to actuarial assumptions.
- Disability calculations: For work-related disabilities, there is an offset of VRS benefits for workers compensation benefits. This offset applies only for the period of time that workers compensation benefits are payable, i.e., for 10 years or less. During the previous audit it was determined that 30% of the disabilities were assumed to have a worker's compensation offset. It now appears that no offsets are assumed for worker's compensation. This assumption should be reviewed to see if experience suggests the offset should be applied for valuation purposes.
- Judicial Retirement Rates: Judges are able to retire with an unreduced benefit at age 60 if they have 30 years of service, or at age 65 with 5 years of service. The retirement decrements indicate that they are applied only for those eligible for unreduced retirement. They appear to be applied beginning at age 60 regardless of eligibility for unreduced retirement and the initial rate of 50% doesn't seem to be applied in the test cases reviewed.
- SPORS and VALORS retirement decrements: Decrements exist beyond age 62, though they do not appear in the prior valuation, or the recommendations from the last experience study.

Healthcare Credit Program

Review of the calculations presented in the actuarial report for consistency and accuracy

For this review, we mathematically checked a number of report exhibits for consistency within the exhibit and for consistency with other exhibits. We found the report accurate in all respects based on this review and the results looked consistent with prior year results.

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

Individual calculations were consistent with provisions of plan and incorporated the current assumptions of the plan. No issues to report.

Group Life Insurance Program

Review of the calculations presented in the actuarial report for consistency and accuracy

For this review, we mathematically checked a number of report exhibits for consistency within the exhibit and for consistency with other exhibits. We found the report accurate in all respects based on this review. Results looked consistent with prior year results.

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

The method of reducing the value of the death benefit from the initial level down to the 25% level seems inconsistent with provision. Individual calculations indicated that the initial amount was reduced by 75% in the second year. This second year amount was then reduced by 75% in year 3. In year four the year three value was reduced by 75%, then in year five 25% of the initial amount was valued. Based on the provisions of the plan, we would have expected the step down amounts to be 25% reductions from the initial death benefit rather than 75% reductions of the prior year amounts. Since they ultimately value 25% of the initial benefit, the impact may not be that severe, but it will overstate benefits in those step-down years. All other calculations were consistent with provisions of plan and incorporated the current assumptions of the plan.

VSDP

For this review, there were not many computations within the report to review, rather exhibits which appeared to be consistent with prior year exhibits.

Based upon our review of the data provided and the global summary of assumptions provided, we are concerned that the valuation results may be distorted and consequently that the premium rating for the VSDP might also be distorted. We had previously in this actuarial audit report expressed concerns regarding the actuarial assumptions and methods being utilized. Without running a full valuation on every open claim, our best estimate of the potential liability and rate distortion is in the vicinity of 10% (either plus or minus).

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