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*

July 2001

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July 3, 2001

Mr. Philip A. Leone
Director
Joint Legislative Audit and Review Commission
General Assembly Building
Suite 1100, Capitol Square
Richmond, VA 23219

Subject: Quadrennial Actuarial Audit of VRS

Dear Mr. Leone:

Our findings and comments resulting from a detailed review of the June 30, 2000 actuarial valuation of the Virginia Retirement System performed by Watson Wyatt are presented in the enclosed report.

We are pleased to report that we found Watson Wyatt's work to be reasonable and performed according to generally accepted actuarial standards and principles.

This report includes a detailed discussion of all of the elements of our review. These issues are summarized in the Executive Summary. More detailed commentary on our review process and suggested considerations for refinements in actuarial procedures or presentations are included in subsequent sections of this report.

We wish to express our appreciation for the cooperation provided to us during the course of our work by the actuaries at Watson Wyatt and as well as by the staff of the Virginia Retirement System.

Sincerely,

Stephen T. McElhaney, FSA

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Enclosure

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I. EXECUTIVE SUMMARY

Purpose and Scope of the Actuarial Audit Review:

William M. Mercer, Inc. was engaged by the Joint Legislative Audit and Review Commission (JLARC) to conduct an actuarial audit of the June 30, 2000 actuarial valuation of the Virginia Retirement System (VRS) which was prepared by Watson Wyatt, consulting actuary to VRS. The quadrennial audit is required by §30-81 of the *Code of Virginia*.

The primary purpose of the audit was to perform an independent verification and analysis of the assumptions, procedures, and methods used by Watson Wyatt in preparing the valuation. The reports reviewed were 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:

- Town of Blackstone
- District 19 Community Services Board
- Loudoun County
- City of Chesapeake

Statement of Key Findings:

Based upon a thorough review of the June 30, 2000 actuarial valuation report, we are pleased to report that we found the work to be reasonable and performed in accordance with generally accepted actuarial principles and practices. We found that the actuarial methods and assumptions are reasonable and appropriate and that the work was performed by fully qualified 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.

Primary Actuarial Valuation Report

The following comments relate to the primary report that covers State Employees, Teachers, State Police, Judicial and Law Officers:

Actuarial Cost Method: The actuarial cost method as applied for VRS, uses a new entrant normal cost rate rather than a normal cost rate based upon the entire active population. There are some differences in contribution rates that result from this application. While the method is used for a number of other large public retirement systems, we question whether it is the best available method for VRS.

Actuarial Assumptions: We recommend that gender distinct mortality assumptions be used for State Police. In addition, we believe that a specific actuarial assumption should be developed for all employee groups regarding the purchase of future service.

Actuarial Reports: The primary actuarial report for VRS fully complies with all applicable professional standards, although there are a few actuarial assumptions that are either misstated or omitted in the summaries of actuarial assumptions.

Data review: A few inconsistencies in data counts were observed not affecting the actuarial valuation results.

Actuarial Computations: Watson Wyatt is not valuing service related disabilities in accordance with the VRS' actual procedures for calculating these benefits. We also raise an issue regarding the method of calculating credited service for periods prior to the valuation date.

Local Governmental Employers

With regard to the separate reports prepared for local governmental employers, the comments made above with regard to the actuarial cost method, actuarial assumptions and actuarial computations would similarly apply. In addition, we believe that the individual actuarial reports prepared for local governments are deficient with respect to professional standards in that they do not include plan or assumption summaries and are not signed by a qualified actuary.

II. ACTUARIAL COST METHOD

Audit Conclusion:

The actuarial cost method meets applicable professional guidelines and requirements of state law. However, further investigation may be required on the part of VRS and Watson Wyatt to determine the appropriateness of the method.

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. In a 1996 study published by the Society of Actuaries (*A Study of Public Employee Retirement Systems, SOA Monograph M-RS96-1*), 72% of public retirement systems used Entry Age Normal.

The VRS valuation uses a variation of Entry Age Normal. Rather than calculating a normal cost rate on all active plan participants, the normal cost rate is determined based on a group of new entrants and then this rate is assumed to apply to the entire active population. (This calculation is performed separately for the various classifications of employees such as state employees, state police, etc.). If the characteristics of the new entrant group are similar to the entire active population, then this method would produce reasonable results. However, if the normal cost rates calculated for the entire population were substantially different than the new entrant group, then there is a risk of either understating or overstating the normal cost rate. In addition, understating the normal cost rate overstates the actuarial accrued liability and understating the normal cost rate overstates the actuarial accrued liability. Either situation would change the amount of recommended employer contribution.

Watson Wyatt provided to us comparisons from the last three valuations of the new entrant normal cost rate to the rate that would have been derived by using the complete active member group. These are summarized below, where "New Entrant" is the rate used in the valuation with reference

only to the new entrants in the last experience study and "EAN" is the normal cost percentage that would be derived from using all active employees in the valuation.

NORMAL COST RATES AS A PERCENTAGE OF PAY

	2000		1999		1998	
	New Entrant	EAN	New Entrant	EAN	New Entrant	EAN
State Employees	9.00	8.57	9.24	8.99	9.24	9.50
Teachers	11.03	9.87	10.83	10.00	10.83	9.96
State Police	12.45	12.68	13.92	12.43	13.92	12.97
Judges	N/A	31.11	32.85	27.03	32.85	27.14
VALORS	12.90	13.53	N/A	N/A	N/A	N/A

In some instances the rates are close, for example the rates for State Employees in 1998 and 1999 and for State Police in 2000 are only different by about .25%. However, in other instances the rates vary by one percent or more. The differences occurring in the rates for Judges caused Watson Wyatt to recommend a change in the funding method for 2000 such that the total normal cost rate was used rather than the new entrant rate.

If the actual normal cost rates were used for the 2000 valuation, we have determined that the results would be changed as follows:

- Pooled State Employee and Teacher contribution rates reduced from 4.24% to 3.89%. The derivation of these rates is summarized in the table below:

	New Entrant	EAN
1. Normal Cost Rate		
a. State	9.00%	8.57%
b. Teachers	11.03%	9.87%
c. Pooled	10.23%	9.36%
d. Less member contribution rate	(5.00%)	(5.00%)
e. Pooled employer rate	5.23%	4.36%
2. Rate for amortization of pooled unfunded actuarial accrued liability	(.99%)	(.47%)
3. Pooled contribution rate (1.e. + 2)	4.24%	3.89%

- Contribution rate for State Police increased from 13.52% to 13.62% (however, the actual recommended rate would be unchanged since the board has designated a minimum contribution of 25%).
- Law Officers contribution rate increased from 16.01% to 16.24% (however, again the minimum of 25% would still apply)

It should be emphasized that these are the adjustments that would apply only for the 2000 actuarial valuation. In any future valuation, the difference obtained by a change in method might be either an increase or a decrease from the current method.

For local governments, normal cost is computed based upon the new entrant normal cost rate for the group of state government employees whose plan provisions matches that of the state government. In this instance, it would appear that even greater differences would occur between the contributions derived using the average new entrant normal cost rate for state employees and the actual normal cost rate for each local government.

The use of this methodology is not uncommon for large public retirement systems. Its proponents usually state that it leads to a pattern of more stable contribution rates. However, this raises several questions:

- Does the normal cost stabilization come from keeping the rate constant between experience studies or from using new entrants to derive the rate?
- Wouldn't the normal cost from one experience study to the next be more constant based upon the total population than upon a changing group of new entrants?
- Are the possible differences that may result in contribution rates and funded ratios worth the continued use of the method?
- Does stabilizing normal cost really stabilize contribution rates? Based on the history over the past several valuations, volatility of investment experience and its effect on the unfunded actuarial accrued liability may frustrate attempts to have stable contribution rates.

III. ACTUARIAL ASSET VALUATION METHOD

Audit Conclusion:

The actuarial asset valuation method meets 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. In the 1996 Society of Actuaries study, more than three-quarters of public systems used a smoothing method and most of these used a smoothing period of more than three years. 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.

We have one comment regarding the particular application of the method by Watson Wyatt. In their computation, plan expenses are applied against net external cash flow (such as contributions and benefit payments). However, the investment return assumption is applied net of plan expenses such that expenses would be considered to be negative investment return. It would be more consistent to treat expenses as negative investment return in the development of the actuarial asset value.

IV. 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, 2000 actuarial valuation based upon the results of a four-year experience study performed by Watson Wyatt and presented to VRS in October 2000. 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. The comments below reflect these differing opinions or preferences.

Economic Assumptions:

Interest rate: The assumed actuarial interest rate is 8%, which is the same rate used in previous valuations. Prior to the June 30, 2000 valuation, the 8% rate was considered by Watson Wyatt to be based upon 4% inflation plus a real rate of return of 4%. Effective with the most recent valuation, the inflation assumption was reduced to 3% and the real rate of return increased to 5%, such that the total assumed interest rate remained at 8%. Watson Wyatt noted that the rate is reasonable based upon expected real rates of return for the VRS asset allocation and also that 8% remains the most common rate assumed by large public retirement systems.

VRS' investment policy statement indicates an allocation guideline of 70% domestic equity and 30% fixed income. Using Mercer's own real rate of return assumptions by asset class, we would derive the expected rate of return for VRS as follows:

	(1) Allocation	(2) Real Rate of Return	(1) X (2)
Domestic Equity	70%	6.9%	4.8%
Fixed Income	30%	3.8%	1.1%
Total Real Return			5.9%
Assumed Inflation			3.0%
Expenses			(.3%)
Total net return			8.6%

Since it is typical to allow for some conservatism in the choice of assumed interest rate we conclude that the assumed rate of 8% is reasonable with regard to the VRS asset allocation.

We also reviewed data concerning the interest rate assumption being used by other large public retirement systems. The *2000 Survey of State and Local Government Employee Retirement Systems*, published by the GFOA Research Center, indicated the average assumed interest rate for all systems was 7.9% and for systems with more than $10 billion in assets the assumed rate was 8.1%. Therefore, the VRS assumption of 8% is very near the average.

Salary increases: The current salary increase assumptions are based upon the results of the 2000 experience study. As a result of this study, the salary assumptions were adjusted as follows:

- The inflation assumption was changed to 3%.
- The allowance for productivity was increased generally offsetting the effects of the reduction in the inflation assumption.
- Changes were made in the step-rate/promotional scales.

The experience study results were not presented in sufficient detail that we could verify that these changes are consistent with the experience. However, the assumptions appear reasonable and the changes made are consistent with what we have observed in other large public retirement systems.

Inflation assumption: The underlying inflation assumption for the actuarial interest rate, for salary increases and for the cost of living adjustments for retirees is 3%. This was reduced from 4% in the previous valuation. We believe that the revised assumption is reasonable and more consistent with current expectations of inflation.

Demographic Assumptions:

Death after retirement:

The following assumptions are used for post-retirement mortality:

Non-disabled retirement:

State employees:	1994 Group Annuity Mortality Tables for males and females
Teachers:	1994 Group Annuity Mortality Tables for males and females with males set back two years and females set back one year
State Police:	1994 Group Annuity Mortality Table for males set back three 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

Generally, a mortality assumption is conservative if the experience is resulting in more deaths than assumed. An actual to expected ratio of about 110% to 120% is desirable in order to allow for future mortality improvements. The results of the 2000 experience study generally are within this range. One notable exception is for Police where the actual to expected ratios are approximately 170%. This could indicate an over-conservative assumption for this group, which if changed to more closely match the experience would result in lower required contributions.

Also, with regard to the mortality assumption for State Police and Law Officers, we note 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, for most systems the percentage of female police officers has been increasing steadily and eventually will result in a more significant percentage of female retirees. This would probably be more true with local police departments where the same assumptions are used. We recommend that gender distinct assumptions be adopted for the State Police as has already been done for the other classes.

Pre-retirement death: The 1994 Group Annuity Mortality Tables for males and females is used without adjustment for all classes. As is noted in Watson Wyatt's 2000 experience study report, this assumption does not have a significant effect upon valuation results. Nevertheless, the tables used should be reasonable based upon the expected experience of the group. The results of the 2000 experience study indicate that the actual to expected ratios are less than 30% for all classes except state police males. For pre-retirement mortality, rates under 100% are desirable and conservative. However, these results may indicate that the assumption is overly conservative and should be changed to a more realistic assumption.

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 work related. Watson Wyatt 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 2000 experience study indicated terminations occurring at a greater rate for all classes of members than was previously assumed. The actual to expected ratios were generally in the 140% to 160% range. This would indicate a conservative assumption, since an increase in the assumed rate of termination would lower contribution rates. Watson Wyatt indicated a desirable actual to expected ratio of 110% and recommended rates that would produce ratios in the 125% range until more experience can be measured. We agree with this recommendation and believe that these assumptions are reasonable.

The tables displaying the termination rates in the actuarial report do not accurately describe how the termination rates are applied in the valuation and lead the reader to an incorrect conclusion about the assumptions. Watson Wyatt should change this format to the format used for the display of these rates in the 2000 experience study.

Disability incidence: Based upon the results of the 2000 experience study, Watson Wyatt recommended certain changes to disability incidence assumptions for state employees and teachers. We believe that the resulting assumptions are reasonable. However, since actual to expected ratios of under 100% would be considered to be conservative, we do not understand why incidence rates for female state employees and teachers were changed from rates producing actual to expected ratios of less than 100% to rates producing ratios of greater than 100%.

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. We consider these assumptions to be generally reasonable, although for State Police the assumed service related percentage of 60% is somewhat less than the actual percentage of 81% experienced over the last 10 years. Also, for judges, the assumed service related percentage of 5% is not disclosed in the summary of actuarial assumptions.

VRS provides lower disability benefits to disabled members who qualify for social security disability benefits. Watson Wyatt assumes that zero percent of disabled members qualify for social security, thus conservatively valuing the higher benefit. It may be worthwhile to analyze the actual experience with regard to social security disability benefits in order to determine whether a change in the assumption would be warranted.

Retirement rates (reduced benefits): Based on the 2000 experience study, actual to expected ratios were generally below 75% indicating that more retirements were assumed than actually occurred. Watson Wyatt indicated that a more desirable ratio would be between 80% and 90%. They

recommended changes to Teachers and State Police that would increase the ratios to 89%. For State Employees the assumptions were not changed. Even though the actual to expected ratios were 69% for males and 74% for females for state employees, the ratios at the highest utilization ages of 62-64 were 88%. 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 2000 experience study exceeded 100% for all groups except state employees. Accordingly, Watson Wyatt recommended changes for Teachers and State Police. No change was recommended for Judicial since the actual to expected ratio does not properly measure the assumption. We believe the assumptions as revised are reasonable.

Percent electing a deferred retirement benefit: Prior to the current valuation, it was assumed that 75% of terminating members with a vested benefit would elect a return of contribution with the remaining electing the most valuable benefit. For the current valuation, Watson Wyatt recommended a change in this assumption such that all terminating members would elect the most valuable benefit. This new assumption is conservative but it is not clear whether the change is being made based on experience or for other reasons.

Optional service purchases: VRS provides for purchase of service credit for certain purposes on a subsidized (i.e., not actuarially equivalent) basis. Such purchases would be expected to contribute to actuarial losses. Some large systems have adopted specific assumptions with regard to purchase of service credit. We recommend that this experience be measured at the next experience study and an assumption be implemented appropriate to the experience.

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 are. 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.

V. REVIEW OF ACTUARIAL REPORT

Audit Conclusion:

The primary report meets professional standards and fairly represents the actuarial condition of the system. The reports prepared for local governmental employers do not fully meet professional standards.

Comments:

The communication of actuarial valuation results for pension plans is covered in the Actuarial Standards Board (ASB) Standard of Practice No. 4, *Measuring Pension Obligations*. 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 also indicates specific requirements for content of actuarial reports including:

- The name of the person or firm retaining the actuary and the purpose of the report
- An outline of the benefits being valued
- The effective date of the calculation
- A summary of 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

Watson Wyatt prepares a "primary" actuarial report for VRS that contains the results for State Employees, Teachers, State Police, Judges and Law Officers. Watson Wyatt 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 or exceeds all of the requirements of Standard of Practice No. 4. However, the reports prepared for local participating employers are deficient in these standards 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.

VI. DATA REVIEW

Audit Conclusion:

The membership data used by Watson Wyatt for the June 30, 2000, actuarial valuation is consistent with the data provided by VRS.

Comments:

Mercer requested and received the data file that VRS provided to Watson Wyatt for the 2000 valuation as well as Watson Wyatt's actual valuation database.

We compared the data from three sources:

(a) the data provided by VRS
(b) the data in the Watson Wyatt valuation data file and
(c) the data presented in the report.

Comparisons were done for each of the five groups included in the primary actuarial report as well as for the four selected local governments.

The only significant difference we found was actually an inconsistency within the valuation report. For active judges, Table 1D shows a count of 399 compared to 308 presented in Table 7D. Similarly, for active State Police, Table 1C shows a count of 1,768 compared to 1,761 in Table 7C. In each instance, the correct counts are shown in Table 1D or 1C respectively and these are the counts on which valuation results are based.

We conclude that the data used for the actuarial valuation was accurate and reasonable.

VII. 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. Through this review we found only a few issues, none of which is significant enough to affect our opinion as to the reasonableness of valuation results.

Comments:

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 VRS copies of actual benefit calculations that occurred shortly following the date of the actuarial valuation. We then requested test cases from Watson Wyatt for these same members. We would normally expect to see the benefit in the test case for the first year nearly identical to the actual benefit calculation. In general, we found the test case calculations to be consistent with the actual benefit calculations in our comparison.

We requested from Watson Wyatt test cases of inactive plan members with a wide range of benefit types, 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) as well as from each of the four selected local governments. 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:

- 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. It is our understanding that nearly all of VRS work related disability retirees have offsets for workers compensation. Watson Wyatt assumes that 30% of disability retirees will have this offset and that the offset applies for the total period of the VRS benefit. In addition, Watson Wyatt is applying early retirement reduction factors in instances where an unreduced benefit applies. The effect of these differences in aggregate may have only a minimal affect on valuation results. However, a more precise methodology would be preferred.

- Credited service: VRS provides to Watson Wyatt the accrued credited service for each active plan member. However Watson Wyatt does not use this information but calculates credited service on an elapsed time basis from date of hire. A comparison of the calculated credited service to the actual credited service is as follows:

	State Employees	Teachers	State Police	Judges	Law Officers
Average Calculated Service	16.6	12.0	22.1	19.9	10.8
Average VRS Service	16.1	11.7	23.0	17.2	10.2
Number different	25,702	110,290	401	71	2,057
Total Actives	77,395	123,573	1,761	302	10,542
Percentage different	33%	89%	23%	24%	20%

  It is our understanding that the reason Watson Wyatt has recalculated service is that the credited service provided by VRS has not been considered to be reliable in the past. However, VRS has been correcting this data field and it now is considered to be reasonably accurate. We understand that Watson Wyatt plans on using the credited service provided by VRS for future valuations. It is not clear what affect this will have on valuation results.

- State Police salary projections: For valuation calculations, the current salary is projected forward to derive final average pay at benefit commencement as well as backwards to determine current average pay. For State Police the first backward projection is done for only half a year rather than a full year. Again, this has a very minor effect on overall valuation results.

Our review of the test cases supports our overall opinion concerning the reasonableness of the valuation results.