

NORTH CAROLINA RETIREMENT SYSTEMS

ACTUARIAL AUDIT OF THE DECEMBER 31, 2007
ACTUARIAL VALUATIONS

FALL 2009

TABLE OF CONTENTS

	Page
Transmittal Letter	
Executive Summary	2-4
Phase One Review Results	
TSERS Review	5-12
LGERS Review	13-18
CJRS Review	19-22
FRSWPF Review	23-25
RODPF Review	26-28
NGPF Review	29-32
DIP Review	33-35
DBP Review	36-38
Phase Two Review Results	
TSERS Replication	39-45
LGERS Replication	46-51
Appendix	52-55

January 8, 2010

Retirement Systems Division
North Carolina Department of Treasurer
325 N. Salisbury Street
Raleigh, North Carolina 27603

Attention: Mr. David Vanderweide

Re: Actuarial Audit

Gabriel, Roeder, Smith & Company (GRS) is pleased to present this report of an Actuarial Audit of the December 31, 2007 (June 30, 2008 for Fire and Rescue) Actuarial Valuations of the retirement systems administered by the North Carolina Retirement Systems (NCRS). We are grateful to NCRS Staff for their cooperation throughout the actuarial audit process. In addition, we wish to thank Richard Mackesey of Buck Consultants (retained actuary) for his assistance with this project.

The actuarial audit has several related objectives:

- Review of assumptions used by the retained actuary;
- Review of the retained actuary's data collection process;
- Review of the Systems' current actuarial funding methods and funding policies;
- Review of the benefits modeled in the valuations as they compare to the benefits actually provided by Statute and described in the member handbooks;
- Review of the reasonableness of results of the most recent actuarial valuations;
- Review of the successfulness and completeness of the presentation of the valuation results (as contained in the valuation reports);
- A statement of the professional qualifications and overall performance of the retained actuary with regard to the practices prescribed by the Actuarial Standards Board.

The actuarial audit was conducted in two phases. Phase One was a review of the valuation reports for the 8 retirement plans administered by the NCRS. Phase Two was a full replication for the two largest of these plans. Phase One encompassed a review of the valuation reports, experience studies, member handbooks and state statutes only. It is possible for critical or material issues that are not apparent in the Phase One review to be identified in the Phase Two replication. It is also important to keep in mind that an actuarial audit is not guaranteed to find all existing material issues.

In Phase One we categorized our findings as follows:

- Critical – those findings which indicate a serious error or unreasonable method or assumption;
- Questionable – findings that recommend certain aspects be researched further by staff, the auditing actuary or the retained actuary;
- Best Practices – recommendations that we believe will improve the content and/or understandability of the valuation reports.

January 8, 2010

Page 2

Phase One of our review found no critical issues. We have, however, identified several questionable or best practices issues for NCRS and the retained actuary to consider. The results of Phase One, which begin on page 5, are divided into sections representing the systems reviewed. Each section is further subdivided into the following categories:

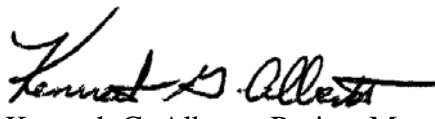
- Member Data
- Summary of Benefits
- Member Handbook
- Experience Study (for TSERS and LGERS only)
- Actuarial Methods
- Actuarial Assumptions
- Other Report Content
- Valuation Results

Phase Two is the replication phase and the results of this phase begin on page 39. In this section we divided our findings between issues that could have a material effect on results and issues that most likely would not have a material effect on results.

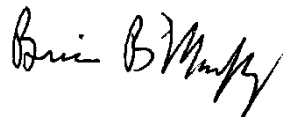
In our opinion, the retained actuary's work provides a fair and reasonable assessment of the financial position of NCRS. We are pleased to report that we have found no critical issues in the retained actuary's work during the review phase. We are also pleased to report that we found no material issues in the LGERS replication valuation and the issues that we have identified in the TSERS replication valuation as material are believed to collectively have less than a 5% effect on total TSERS liabilities and total TSERS normal costs.

The actuaries submitting this report are Members of the American Academy of Actuaries (MAAA) as indicated, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

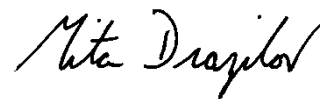
Respectfully submitted,



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KGA:sac

EXECUTIVE SUMMARY

Background

Gabriel, Roeder, Smith & Company (GRS) was asked to perform an actuarial audit of the work performed by Buck Consultants (retained actuary) for the North Carolina Retirement Systems (NCRS). The actuarial audit was conducted in two phases. Phase One was a review of the valuation reports for the 8 retirement plans administered by the NCRS. Phase Two was a full replication for the two largest of these plans.

The eight valuation reports that were reviewed as part of Phase One of the actuarial audit were:

- The December 31, 2007 Actuarial Valuation of the Teachers and State Employees' Retirement System (TSERS);
- The December 31, 2007 Actuarial Valuation of the Local Governmental Employees' Retirement System (LGERS);
- The December 31, 2007 Consolidated Judicial Retirement System (CJRS);
- The June 30, 2008 Firemen's and Rescue Squad Workers' Pension Fund (FRSWPF);
- The December 31, 2007 Register of Deeds' Supplemental Pension Fund (RODPF);
- The December 31, 2007 National Guard Pension Fund (NGPF);
- The December 31, 2007 Disability Income Plan (DIP);
- The December 31, 2007 Teachers' and State Employees' Benefit Trust (Death Benefit Plan or DBP).

The two valuations that were fully replicated as part of Phase Two of the actuarial audit were:

- The December 31, 2007 Actuarial Valuation of the Teachers and State Employees' Retirement System (TSERS);
- The December 31, 2007 Actuarial Valuation of the Local Governmental Employees' Retirement System (LGERS).

In short, our findings can be classified in the following categories:

- Documentation/Disclosure;
- Suggested Improvements in Presentation;
- Assessment of Methods and Assumptions;
- Valuation Results and Replication Findings.

Documentation/Disclosure

For all of the reports, we found that the documentation and disclosure in the reports could use improvement. We have detailed suggestions in the Phase One Review section for each of the retirement systems, including suggested presentation alternatives for the results page and the two experience studies (TSERS and LGERS).

In reviewing the documentation we considered the Actuarial Standards of Practice Statement No. 41 (ASOP 41), *Actuarial Communications*, which states, in part:

“3.3.3 Actuarial Report—In addition to the actuarial findings, an actuarial report should identify the data, assumptions, and methods used by the actuary with sufficient clarity that another actuary qualified in the same practice area could make an objective appraisal of the reasonableness of the actuary’s work as presented in the actuary’s report. To the extent the data, assumptions, and methods used have been described in a previous actuarial report that is available to the intended audience, the actuary may, if appropriate under the circumstances, incorporate this information by reference into the actuarial report.”

In practice, there were several assumptions and methods that were not disclosed in the reports that GRS discovered through communication with staff or the retained actuary or through reviewing the detail lines of the test cases for TSERS and LGERS. We recommend that the documentation/disclosures in the valuation reports be expanded in light of ASOP 41.

Our specific recommendations for each report are detailed in the Phase One Review section under each System.

Suggested Improvements in Presentation

In general, we found the reports generally easy to read. One specific area that generated confusion was the relationship between the Computed Contribution Rate, the Annual Required Contribution (ARC for Governmental Accounting Standards Board purposes), and the Appropriation Contribution Rate. On pages 11 and 21 we recommend a different format that is intended to present these relationships more clearly for both TSERS and CJRS. We recommend showing how the prior year’s ARC rate is converted to a required dollar contribution for each of the reports. On pages 7 and 15 we show a recommended presentation of experience study results.

Assessment of Methods and Assumptions

In general, we found the methods and assumptions to be within generally acceptable ranges of practice. The review section goes into more detail on specific issues that we recommend be reviewed. The major points are:

- Consideration of a closed asset smoothing period;
- Consider performing experience studies for all of the plans;
- Consideration of including a projection in the development of the contribution rate to account for the delay between the valuation date and the contribution effective date;
- Consideration of directly funding the COLA;
- Using the same mortality rates for members and survivors;
- Using separate early and normal retirement rates that coincide with reduced and unreduced benefits;
- Reviewing how the entry age normal cost method is applied for the NGPF in light of the fact that members are not reported until they obtain 7 years of service;
- Review the change in normal cost rates for NGPF between 2006 and 2007;
- Review the calculation of the IBNR for the DIP and consider basing the IBNR on historical claims;
- Review the investment return assumption for consistency between plans given the differences in investments (for example the DIP and the DBP are invested 100% in bonds and the other systems are invested 50% in bonds and 50% in equities, yet they all use the same investment return assumption);

- Clarifying the actuarial cost method for the DBP (stated to be based on one-year term cost, but looks more like aggregate normal cost in the disclosures);
- Review reserves to ensure enough margin for a catastrophic event in the DBP;
- Review the methods used to value the current and future LTD members in the TSERS valuation;
- Review the handling of back to work retirees in TSERS and LGERS to ensure all are included in the valuations.

Valuation Results and Replication Findings

Although it can be very difficult to determine the accuracy of results in a review, the valuation results looked generally reasonable from the review standpoint. There are several recommendations and comments throughout this report. Presented below are the main recommendations/comments that we would like to draw your attention to:

- The normal cost for the CJRS was lower than we expected based on our experience with similar judicial systems. NCRS should consider having a full replication audit performed of this plan;
- We recommend that Buck review the DIP plan results for stability between the average annuity factors from 2005 to 2007 because there was no explanation in the reports for the significant decreases in the values over the two year period;
- We recommend strengthening the relationship between the current reserves and the annual claims in the DIP by incorporating a test into the development of the annual contribution rate that bases a minimum contribution for the year on a projected asset reserve that is a minimum percent of expected annual claims (such as 150%);
- We believe that the current method used to value the LTD members in the TSERS valuation materially understates the liabilities for these members and we recommend that this method be changed, even though the liabilities for these members are a small portion of the total TSERS system liabilities;
- We believe that the current method of ignoring future disabilities in the TSERS valuation may understate the normal cost;
- We believe that the current method of aggregating the individual normal cost results in the TSERS valuations has the potential to skew the total result;
- We recommend that the mortality table used for the entry age normal cost in TSERS be based on mortality with all improvements incorporated (based on the valuation date) so that the normal cost does not change if a person exits the group and is replaced by a new entrant with the same entry age.

Conclusion

After completing the replication audits, GRS believes that the results of TSERS and LGERS 2007 actuarial valuations fairly represent the costs and funding status of the plans within generally acceptable tolerances. After completing the reviews of the other plans, GRS believes that the valuation results are based on generally acceptable methods and assumptions.

GRS has made several recommendations throughout the report. The major recommendations are repeated in the executive summary, but we suggest that NCRS review the entire report with the retained actuary and determine what changes should be made for future valuations.

PHASE ONE REVIEW RESULTS

TEACHERS' AND STATE EMPLOYEES' RETIREMENT SYSTEM (TSERS)

Member Data

All relevant data appears to be included in the valuation. We understand that data submitted annually does not give the actuary enough detail to value deferred benefits, so liabilities are estimated at 150% of accumulated contributions. We also understand that the value of the members' accumulated contributions at retirement are not provided on the beneficiary file. Buck has to match the retiree file to the active file from the previous year to obtain this data item.

We recommend:

- The data be changed to give the actuary the necessary data to value deferred members more explicitly;
- Include Social Security Numbers (or, preferably, another unique identifier) of both the pension recipient and the original member to facilitate file matching, particularly in the case of a recipient who is both a member and a survivor (we understand that this issue has been addressed by NCRS for the 2008 data file);
- That NCRS supply the value of each retired member's accumulated contributions (at retirement) on the beneficiary file;
- Include a combined age and service schedule for actives (instead of a separate age schedule and a separate service schedule);
- Include a schedule of deferred members valued (age and member accumulated contributions or age and service and accumulated contributions, if service is available);
- Include historical schedules of number counts and average age & service.

One other issue that arose in the replication process relates to the back to work retirees. For these members, Buck seems to correctly try to ignore their active records and value their retiree records. However, there may be a couple hundred cases that have no retiree record on the Buck retiree data file and that could, therefore, have been missed in the valuation.

Summary of Benefits

The Summary appears to be consistent and relatively complete when compared to the handbook and statutes with the exception of the following:

- The summary seems to mix the descriptions of Service and Early retirements – essentially all the conditions are described, but not all in the same place. We would expect the distinction to be related to whether or not a reduction is applied to the benefit, but this does not appear to be the case in the summary. We recommend keeping the unreduced and reduced descriptions of eligibility and amounts completely separate;
- The Disability Income Plan (DIP) is not mentioned in the summary. We recommend referencing that plan and describing what potential retirement benefits TSERS members are eligible for after the LTD benefit ends due to eligibility for unreduced benefits;

- We recommend describing what benefits a member is entitled to if their DIP benefit ends and they are not yet eligible for unreduced retirement benefits;
- We recommend describing the group that is eligible to receive disability benefits directly from TSERS (those with 5 or more years of service by 7/1988);
- We recommend stating that there may be benefits payable on death in service from the Death Benefit Plan (details are not necessary);
- We recommend describing the service reciprocity and that there are several ways in which members can purchase service (most at full actuarial cost);
- We recommend stating the interest rate currently paid on member contributions (or alternatively including this in the assumption section);
- Rules regarding how future COLAs will be determined do not appear in the statute. The COLAs granted in the past are described in detail in the statute. The proviso that COLAs are only granted in the event that the increased liabilities do not increase the employer rate does not appear to be in the statute, however the handbook makes a reference to the availability of funds. There is a strong history of granting past COLAs annually since 1983 with two exceptions (1984 and 1991 – the 1984 COLA seems to be covered by the 1985 COLA);
- We recommend discussing how lump sums at retirement and unused sick leave affect benefits;
- We recommend adding a statement regarding the ability of members on STD/LTD to be eligible for the Survivors Alternate death benefit;
- We recommend adding a statement regarding terminated members' eligibility for death benefits (if death occurs within a short time window of the termination).

Member Handbook

The handbook indicates that the early retirement percentage for a member age 53 with 20 years of service is 52% -- the formulae seem to suggest that this number should be 50%. We understand that there is a closed group of members to whom the 52% rate applies. However, the handbook makes it appear that it applies to all current members. We recommend that, at a minimum, a footnote be added to the handbook to disclose that the 52% may not be applicable to all members.

Experience Study

We found the experience study to be difficult to analyze due to the lack of detail provided. In general, we prefer a level of detail that shows exposure, expected activity, actual activity and crude rates by decrement, separately for service based rates and age based rates. The chart below is an example of this.

Withdrawal Experience of SOMHSPRS Members 200x-200y

Age	Service	Withdrawal	Exposure	RATES			EXPECTED WITHDRAWALS	
				Crude	Old	New	Old	New
	0	4,645	31,101	0.1494	0.1600	0.1500	4,976	4,665
	1	2,240	22,774	0.0984	0.1200	0.1100	3,644	2,505
	2	1,494	19,226	0.0777	0.0900	0.0800	2,307	1,538
	3	909	17,051	0.0533	0.0750	0.0700	1,535	1,194
	4	638	15,368	0.0415	0.0700	0.0600	1,153	922
20-24	5&UP	5	70	0.0714	0.0800	0.0600	5	4
25-29		304	2,936	0.1035	0.0780	0.0600	229	176
30-34		713	10,963	0.0650	0.0570	0.0600	625	658
35-39		663	19,359	0.0342	0.0420	0.0350	813	678
40-44		786	24,348	0.0323	0.0330	0.0300	803	730
45-49		781	26,870	0.0291	0.0300	0.0280	806	752
50-54		581	21,540	0.0270	0.0280	0.0260	603	560
TOTALS		13,759	211,606	0.0650	0.0827	0.0680	17,499	14,383

This type of presentation has several advantages.

1. A reader can judge if the “exposure” is approximately correct. For a four year study, for example, each person is exposed once each year, so the exposure at each age should be similar to about 4 times the number of people in the current valuation. We note that exposure is never shown at all in the retained actuary’s experience study. This exposure number is fundamental to the entire process, and we believe that it should be shown.
2. Special care is required in deriving assumed rates for ages when the exposure is low. Revealing the exposure allows the reader to tell if this is being done.
3. The “crude rates” in the above chart are simply the ratio of the actual number of withdrawals to the exposure. By viewing the crude rates, the present rates, and the proposed new rates, the reader can gain an insight into the actuary’s smoothing techniques and into the judgments that were made.
4. The presentation allows verification that the “expected” figures in the experience study are derived from the assumption rates being used in the valuation.
5. It is easy to see if the proposed new rates match the final assumptions, and the assumptions used in the valuation reports.
6. It clearly separates the service based period from the age based periods. In the current experience study, the service based periods/rates are addressed by a footnote, making it very difficult to determine how the actual table relates to experience and how similar tables in different groups compare.

In addition, we have the following recommendations for the experience study:

- The study should include both economic (investment return, price inflation and salary increases related to overall productivity growth) and demographic assumptions -- the published report only covers the demographic assumptions (we understand that the Board sets the economic assumptions after consultation with their investment consultants, however, we recommend that the Actuary be more involved in the review);
- Separate the retirement pattern based on eligibility for reduced and unreduced benefits (the current patterns are separated on what appears to be an arbitrary distinction);
- Combine men and women in the Law enforcement group for non-mortality decrements to add credibility to results due to the relatively low number of women;
- Review the loads/processes for lumps sums payable at retirement that are includable in the computation of Average Final Compensation and the effect that unused sick leave has on service;
- Review the margin for mortality improvement in the female teacher post-retirement healthy mortality table before projections (this margin seems to be greater than the other tables and may not be necessary if the margin is contained in the projection);
- Study the marital assumption (100% seems intuitively high);
- Study the unisex percentages for members electing optional forms of payment and add a comment on whether or not options are based on valuation assumptions or if a subsidy exists in the option factor basis;
- Add a comment on how service purchase factors are determined;
- Develop an overall summary of demographic experience showing current expected, proposed expected and actual activity by decrement.

Actuarial Methods

The funding method is Entry Age Normal Cost (EANC) which is acceptable under the Actuarial Standards of Practice and the Governmental Accounting Standards Board (GASB). This is also the most commonly used method in the public sector. However, the North Carolina Statute discusses the method of funding in section 135-8. We found this section of the statute difficult to follow, but we think it might require EANC so long as there is an unfunded actuarial accrued liability. However, 135-8(d)(2) seems to require the use of the Aggregate Normal Cost method once the unfunded actuarial accrued liability is funded (like it was for the 2007 actuarial valuation). The statute seemed to be silent on the required funding method if an unfunded actuarial accrued liability develops again, after having been funded. However, there is a section that indicates that the Board has the authority to develop and choose any administrative or accounting methods it deems necessary. We understand that the Board's legal counsel has indicated that this section also allows the Board to use any actuarial method it deems appropriate. We have the following recommendations with regard to the Actuarial Methods:

- Consider the use of a closed period in the asset smoothing method along with a corridor around the market value of assets;
- Consider using a level percent of payroll amortization method (can adjust the period to maintain the current level of contributions);
- Consider including a projection in the amortization method to account for the contribution delay between the valuation date and the starting date of the computed rate.

The Appendix contains an example of the computation with and without such a projection. The main purpose of the projection is to account for changes in required contributions that occur after the contribution rate has been established, but before the contribution period begins to which the established rate applies.

Actuarial Assumptions

Assumptions appear to be generally reasonable. We recommend:

- Directly fund the COLA (this might mean increasing the interest rate assumption and introducing a COLA assumption that gets reviewed in the experience study). We believe that this would generally add transparency to the calculations, but would need to be approached carefully so as not to inadvertently increase the occurrence (or amount) of granting COLAs;
- Use the same mortality rates for survivors as for retired members;
- Show sample mortality rates;
- Disclose timing of decrements and pay increases;
- Disclose how liabilities are calculated for deferred members;
- Disclose the mortality table used for post retirement impaired mortality (and show sample rates);
- Use separate early and normal (based on reduced and unreduced benefits) rates of retirement;
- Disclose the general inflation and the wage inflation assumptions (one is shown in the GASB disclosure section on page 9, but it is not clear which one is shown);
- Disclose how lump sums payable at retirement and additional service due to unused sick leave are valued;
- Include an adjustment for option factors during periods when the factors do not use the current valuation assumptions;
- Review termination rates for Teachers from and after age 45 which, oddly, seem to increase (and may include other activity, such as short term disability).

One interesting aspect of the assumptions was the use of a separate mortality table for survivors. It is not clear there is justification for believing that survivors have different mortality than retired members and the experience study does not provide a justification. The survivors, as a group, are not large enough to produce credible data so we recommend using the same table that is used for retirees. In addition, with the use of two separate tables, an odd situation arises. The situation will occur when two teachers are married and both retire and elect contingent options. Then one dies. The one living receives both his/her benefit and the contingent benefit from his/her spouse and will have two different records on the data file. He/she will be valued with two different mortality rates (one as a member and one as a survivor), which is an illogical result.

Other Report Content

GASB Section

The transition between the computed ARC from one valuation to the dollar amount of the ARC in the subsequent valuation (for the same fiscal year) was not obvious. Changes in the ARC after the production of the valuation report also led to a great amount of confusion on the reader's part. We recommend:

- Reconciling the ARC disclosed in the prior valuations with the ARC used in the development of the NPO, including any changes to the ARC post valuation and including the transition from a rate to a dollar amount (we understand that the NPO is based on actual payroll and therefore recommend showing that payroll);
- Getting a formal legal/accounting review of Section 135-1(11), which makes this plan appear to be a multiple employer cost-sharing plan (even though staff has indicated that an informal review has indicated that it is a single employer plan). If it is a cost sharing plan, then an NPO development would not be necessary;
- Adding an historical schedule of Employer Contributions with final ARC amounts.

Valuation Results Section

We recommend:

- Showing the development of the gain/loss for the year (preferably by risk category);
- Adding historical schedules of results;
- Adding a short condition test. This test can show the trend of the funded status of the active liability and can more easily identify periods when the retiree liability is not fully funded. An example is shown below:

Year	Liabilities for (\$ Mill)			Net Assets Available for Benefits	Percent of Liabilities Covered by Net Assets		
	(1) Aggregate Member Contributions	(2) Current Retirees and Beneficiaries	(3) Active and Inactive Members (Employer Financed Portion)		(1)	(2)	(3)
2006	\$8,258	\$25,248	\$15,855	\$52,421	100%	100%	119%
2007	\$8,756	\$26,799	\$17,260	\$55,283	100%	100%	114%

- Showing the Normal Cost and the Accrued Liabilities by decrement;
- Clarifying the results page so that the actual prior year's ARC and the current year's ARC are shown and clearly identifiable;
- Recommend revising the display of the appropriations/ARC section of the results page to something like the following:

Prior Year's Computed Rate (12/31/06)	3.05%
Post Valuation Benefit Changes	<u>0.31%</u>
Prior Year's Final ARC	3.36%
Prior Year's Appropriation Act	3.36%*
Change in Normal Cost	0.07%
Changes Due to System Benefit Changes	x.xx%
Changes Due to Investment Gain/Loss	x.xx%
Changes Due to Liability Gain/Loss	x.xx%
Misc Changes (due to timing of pay increases, demographic changes, etc)	<u>x.xx%</u>
Current Year's Computed Rate based on a 9-year Amortization	3.57%

* If prior year's appropriation act rate was left unchanged for the current year, the UAAL would be fully amortized in 9.x years.

Financial Section

We recommend:

- Showing a schedule of revenue and expenditures in the report;
- Showing an allocation of investments by category.

Valuation Results

One way to evaluate the valuation results is to measure the average annuity value for retired members (present value of benefits divided by pension payroll) from year to year. In a group like TSERS, this should be a very stable number and should be in the range of 7 to 12 (with a 0% COLA assumption). The average annuity for retired members was very stable from 2006 to 2007 (changing from 9.13 to 9.08) and was in the expected range.

LOCAL GOVERNMENT EMPLOYEES RETIREMENT SYSTEM (LGMERS)

Member Data

All relevant data appears to be included in the valuation. We understand that data submitted annually does not give the actuary enough detail to value deferred benefits, so liabilities are estimated at 200% of accumulated contributions. We also understand that the value of the members' accumulated contributions at retirement is not provided on the beneficiary file. Buck has to match the retiree file to the active file from the previous year to obtain this data item.

We recommend:

- That the data be changed to give the actuary the necessary data to value deferred members more explicitly;
- Including Social Security Numbers (or, preferably, some other unique identifier) of both the pension recipient and the original member to facilitate file matching, particularly in the case of a recipient who is both a member and a survivor (we understand that this issue has been addressed by NCRS for the 2008 data file);
- That NCRS supply the value of each retired member's accumulated contribution (at retirement) on the beneficiary file;
- Including a combined age and service schedule for actives by employment group (instead of a separate schedule for age and a separate schedule for service);
- Including a schedule of deferred members valued (age and member accumulated contributions or age and service and accumulated contributions, if service is available);
- Including historical schedules of number counts and average age & service.

One other issue that we are working through in the replication process relates to the back to work retirees. For the back to work retirees, Buck seems to correctly try to ignore their active records and value their retiree records. However, there may be 30 to 40 members that have no retiree record on the Buck retiree data file and could have been missed in the valuation.

Summary of Benefits

The Summary appears to be consistent and relatively complete when compared to the member handbook and statutes with the exception of the following:

- The summary seems to mix the descriptions of Service and Early retirements – essentially all the conditions are described, but not all in the same place. We would expect the distinction to be related to whether or not a reduction is applied to the benefit, but this does not appear to be the case in the summary. We recommend keeping the unreduced and reduced descriptions of eligibility and amounts completely separate;
- We recommend stating that there may be benefits payable on death in service from the Death Benefit Plan (details are not necessary);
- We recommend describing the service reciprocity and that there are several ways in which members can purchase service (most at full actuarial cost);

- We recommend stating the interest rate currently paid on member contributions (or alternatively including this in the assumption section);
- We recommend referring to statutory section 128-27(k) when referring to the proviso that COLAs are only granted in the event that the increased liabilities do not increase the employer rate. We also recommend indicating the frequency of COLAs being granted in other sections of the Statute;
- We recommend discussing how lump sums at retirement and unused sick leave affect benefits;
- We recommend adding a statement regarding terminated members eligibility for death and disability benefits (if death or disability occurs within a short time window of the termination).

Member Handbook

The handbook indicates that the early retirement percentage for a member age 53 with 20 years of service is 52% -- the formulae seem to suggest that this number should be 50%. We understand that there is a closed group of members to whom the 52% rate applies. However, the handbook makes it appear that it applies to all current members. We recommend that, at a minimum, a footnote be added to the handbook to disclose that the 52% may not be applicable to all members.

Experience Study

We found the experience study to be difficult to analyze due to the lack of detail provided. In general, we prefer a level of detail that shows exposure, expected activity, actual activity and crude rates by decrement, separately for service based rates and age based rates. The chart below is an example of this.

Withdrawal Experience of SOMHSPRS Members 200x-200y

Age	Service	Withdrawal	Exposure	RATES			EXPECTED WITHDRAWALS	
				Crude	Old	New	Old	New
	0	4,645	31,101	0.1494	0.1600	0.1500	4,976	4,665
	1	2,240	22,774	0.0984	0.1200	0.1100	3,644	2,505
	2	1,494	19,226	0.0777	0.0900	0.0800	2,307	1,538
	3	909	17,051	0.0533	0.0750	0.0700	1,535	1,194
	4	638	15,368	0.0415	0.0700	0.0600	1,153	922
20-24	5&UP	5	70	0.0714	0.0800	0.0600	5	4
25-29		304	2,936	0.1035	0.0780	0.0600	229	176
30-34		713	10,963	0.0650	0.0570	0.0600	625	658
35-39		663	19,359	0.0342	0.0420	0.0350	813	678
40-44		786	24,348	0.0323	0.0330	0.0300	803	730
45-49		781	26,870	0.0291	0.0300	0.0280	806	752
50-54		581	21,540	0.0270	0.0280	0.0260	603	560
TOTALS		13,759	211,606	0.0650	0.0827	0.0680	17,499	14,383

This type of presentation has several advantages.

1. A reader can judge if the “exposure” is approximately correct. For a four year study, for example, each person is exposed once each year, so the exposure at each age should be similar to about 4 times the number of people in the current valuation. We note that exposure is never shown at all in the retained actuary’s experience study. This exposure number is fundamental to the entire process, and we believe that it should be shown.
2. Special care is required in deriving assumed rates for ages when the exposure is low. Revealing the exposure allows the reader to tell if this is being done.
3. The “crude rates” in the above chart are simply the ratio of the actual number of withdrawals to the exposure. By viewing the crude rates, the present rates, and the proposed new rates, the reader can gain an insight into the actuary’s smoothing techniques and into the judgments that were made.
4. The presentation allows verification that the “expected” figures in the experience study are derived from the assumption rates being used in the valuation.
5. It is easy to see if the proposed new rates match the final assumptions, and the assumptions used in the valuation reports.
6. It clearly separates the service based period from the age based periods. In the current experience study, the service based periods/rates are addressed by a footnote, making it very difficult to determine how the actual table relates to experience and how similar tables in different groups compare.

In addition, we have the following recommendations for the experience study:

- The study should include both economic and demographic assumptions (the published report only covers the demographic assumptions);
- Separate the retirement pattern based on eligibility for reduced and unreduced benefits (the current patterns are separated on what appears to be an arbitrary distinction);
- Combine men and women in the Law Enforcement and Fire groups for non-mortality decrements to add credibility to results due to the relatively low number of women;
- Review the loads/processes for lump sums payable at retirement that are includable in the computation of Average Final Compensation and the effect that unused sick leave has on service;
- Study the marital assumption (100% seems intuitively high);
- Review the withdrawal table for Law Enforcement with focus on the lower withdrawal rates at the younger ages;
- Study the unisex percentages for members electing optional forms of payment and add a comment on whether or not options are based on valuation assumptions or if a subsidy exists in the option factor basis;
- Add a comment on how service purchase factors are determined;
- Develop an overall summary of demographic experience showing current expected, proposed expected and actual activity by decrement.

Actuarial Methods

The funding method is Frozen Initial Liability (FIL), with initial liability for new employers determined by Entry Age Normal Cost (EANC). This is acceptable under the Actuarial Standards of Practice and GASB. However, the North Carolina Statute discusses the method of funding in section 128-30(d)(2). We found this section of the statute difficult to follow, but we think it might require the use of the EANC method until the system is 100% funded and the Aggregate method, thereafter. The statute seemed to be silent on the required funding method if an unfunded actuarial accrued liability develops again, after having been funded. We understand that the section that allows the Board to adopt any administrative or accounting methods it deems necessary has been interpreted to include actuarial funding methods. We have the following recommendations with regard to the Actuarial Methods:

- Consider the use of a closed period on the asset smoothing method along with a corridor around the market value of assets;
- Level percent of payroll amortization method seems to be required by the statute (see section 128-30(d)(5)) and may require the use a wage inflation assumption no less than 3%. While the current method complies with this, we recommend that legal counsel and the actuary review this section together to ensure compliance and that the actuary document the finding in the report;
- Consider including a projection in the amortization method to account for the contribution delay between the valuation date and the starting date of the computed rate.

Actuarial Assumptions

Assumptions appear to be generally reasonable. We recommend:

- Directly fund the COLA (this might mean increasing the interest rate assumption and introducing a COLA assumption that gets reviewed in the experience study);
- Use the same mortality rates for survivors as for retired members;
- Show sample mortality rates;
- Disclose timing of decrements and pay increases;
- Disclose how liabilities are calculated for deferred members;
- Disclose the mortality table used for post retirement impaired mortality (and show sample rates);
- Use separate early and normal (based on reduced and unreduced benefits) rates of retirement;
- Disclose the general inflation and the wage inflation assumptions (one is shown in the GASB disclosure section on page 9, but it is not clear which one is shown);
- Disclose how lump sums payable at retirement and additional service due to unused sick leave are valued;
- Review termination rates for Law Enforcement which, oddly, seems to be lower at younger ages.

One interesting aspect of the assumptions was the use of a separate mortality table for survivors. It is not clear there is justification for believing that survivors have different mortality than members and the experience study does not provide a justification. The survivors, as a group, are not large enough to produce credible data so we recommend using the same table that is used for retirees. In addition, with the use of two separate tables, an odd situation arises. The situation will occur when two members are married both retire and elect contingent options. Then the female dies. The one living receives both his benefit and the contingent benefit from his spouse and will have two different records on the data file. He will be valued with two different mortality rates (one as a member and one as a survivor), which is an illogical result.

Other Report Content

GASB Section

The valuation does not disclose a single ARC for the plan. We understand that because of the varying rates, a single aggregate rate may be difficult to develop. However, if that is truly the case, the ARC can be shown as a dollar amount. We recommend that an historical schedule of Employer Contributions should be added.

Valuation Results Section

We recommend:

- Adding historical schedules of results;
- Adding a short condition test;
- Showing the liabilities by decrement;
- Defining the difference between the current funding policy and the ARC;
- Showing the total aggregate ARC for the Plan (can be shown in dollars);

Financial Section

We recommend:

- Showing a schedule of revenue and expenditures in the report;
- Showing an allocation of investments by category.

Valuation Results

The average annuity (present value of benefits divided by pension payroll) for retired members was very stable from 2006 to 2007 (changing from 9.27 to 9.22).

CONSOLIDATED JUDICIAL RETIREMENT SYSTEM (CJRS)

Member Data

All the relevant data appears to be included in the valuation. We understand that the data submitted does not provide enough information to directly value deferred member liabilities for TSERS and LGERS and so these are estimated at 150% or 200% of accumulated contributions. It was not clear if this same estimation process was used for the CJRS. Our data recommendations are:

- Supply the actuary with enough information to directly value the deferred member liabilities so that they do not have to be estimated (assuming that there are deferred members);
- Include an age and service matrix schedule of active members (instead of separate schedules) in the report;
- Include an age and service schedule of deferred members included in the valuation (or an age and accumulated contribution schedule) or explicitly state that there are no deferred members;
- Include an age and average benefit amount schedule of retirees;
- Review active judges that are beyond the mandatory retirement age (see age schedule on page 17 of 2007 report) to determine if this is a data error;
- Include an historical schedule of member counts and group average statistics.

Summary of Benefits

The summary of benefits included in the valuation appears to be mostly complete when compared to the statute and the handbook. We recommend consideration of the following:

- Comment on the fact that there may be (retiree funded) benefits payable from the separate death benefit trust in certain circumstances that were not included in this valuation;
- Soften the statement regarding how/when COLAs are granted. These rules do not appear to be in the statute and there appears to be a very strong history of granting COLAs annually. The statement regarding COLAs being granted only when contributions do not increase could be moved to the assumption section and referred to as a general policy, rather than a plan provision;
- Add language discussing how lump sums at retirement and unused sick leave might affect the benefits for members with TSERS or LGERS service, along with a statement that they do not affect benefits based on Judicial service;
- Add a statement regarding the ability of members to apply for disability benefits within the first 3 years after retirement;
- Disclose the current rate of interest paid on member contributions and when it is payable (the rate could alternatively be included in the assumption section).

Member Handbook

The handbook indicates that the employer rate for fiscal year 2009 is 17.31%. This rate does not tie into the valuations in an obvious way. We understand that this rate includes a medical cost and recommend that this be clarified in the handbook.

Experience Study

There was no experience study for this group. We recommend that one be performed. In addition, we would recommend a regular schedule for performing an experience study – such as once every 7-10 years.

Actuarial Methods

The Actuarial Funding Method is Projected Unit Credit (PUC). This is an acceptable method under the Actuarial Standards of Practice and GASB Statements No. 25 and No. 27. There are two main ways to determine PUC: 1) the accrued benefit method and 2) the service pro-rate method. The report is silent on which method is used. However, if it is the service pro-rate method (which is a commonly used method), then we would recommend the addition of a promotion assumption related to the likelihood of a judge with one benefit level changing positions and obtaining a higher benefit level.

We recommend:

- Disclosing how the PUC method was determined and using a promotion assumption if the service pro-rate method is used;
- Considering the use of a closed period on the asset smoothing method along with a corridor around the market value of assets;
- Consider including a projection in the amortization method to account for the contribution delay between the valuation date and the starting date of the computed rate.

Actuarial Assumptions

Assumptions appear to be generally reasonable, and possibly conservative. We recommend:

- Showing sample mortality rates;
- Showing sample rates of withdrawal (or explicitly stating that none was assumed);
- Disclosing timing of decrements and pay increases;
- Disclosing how liabilities are calculated for deferred members;
- Disclosing the mortality table used for post retirement impaired mortality (and showing sample rates);
- Using separate early and normal (reduced and unreduced) rates of retirement;
- Disclosing the general inflation and the wage inflation assumptions (one is shown in the GASB disclosure section on page 9, but it is not clear which one is shown).

Other Report Content

GASB Section

The transition between the computed ARC from one valuation to the dollar amount of the ARC in the subsequent valuation (for the same fiscal year) was not obvious. Changes in the ARC after the production of the valuation report also lead to a great amount of confusion on the reader's part. We recommend:

- Reconciling the ARC disclosed in the prior valuations with the ARC used in the development of the NPO, including any changes to the ARC post valuation and including the transition from a rate to a dollar amount;
- Adding an historical schedule of Employer Contributions with final ARC amounts.

Valuation Results Section

We recommend:

- Showing the development of the gain/loss for the year (preferably by risk category);
- Adding historical schedules of results;
- Adding a short condition test;
- Showing the Normal Cost and the Accrued Liabilities by decrement;
- Clarifying the results page so that the actual prior year's ARC and the current year's ARC are shown and accurately identifiable;
- Revising the display of the appropriations/ARC section of the results page to something like the following:

Prior Year's Computed Rate (12/31/06)	11.31%
Post Valuation Benefit Changes	<u>1.90%</u>
Prior Year's Final ARC	13.21%
Prior Year's Appropriation Act	13.21%*
Change in Normal Cost	0.03%
Changes Due to System Benefit Changes	x.xx%
Changes Due to Investment Gain/Loss	x.xx%
Changes Due to Liability Gain/Loss	x.xx%
Misc Changes (due to timing of pay increases, demographic changes, etc)	<u>x.xx%</u>
Current Year's Computed Rate based on a 9-year Amortization	15.11%

* *If prior year's appropriation act rate was left unchanged for the current year, the UAAL would be fully amortized in 9.x years.*

Financial Section

We recommend:

- Showing the schedule of revenue and expenditures in the report;
- Showing allocation of investments by category.

Valuation Results

The average annuity (present value of benefits divided by pension payroll) was very stable from 2006 to 2007 and within a reasonable range.

Based on the work GRS has performed for similar judicial systems, we believe that the normal cost looks low. After making rule of thumb adjustments for differing provisions and assumptions, we expected to see a normal cost in the 19% to 20% range. We recommend that these results be reviewed by Buck or that a replication audit for this plan be performed.

FIREMEN’S AND RESCUE SQUAD WORKERS’ PENSION FUND (FRSWPF)

Member Data

Data appears complete. Our data recommendations are:

- Include an age and service matrix schedule of active members (instead of separate schedules) in the report;
- Include an age and service schedule of deferred disabled members included in the valuation;
- Include an historical schedule of member counts and group average statistics;
- Include a statement regarding deferred non-disabled members (such as “none reported”).

Summary of Benefits

The summary of benefits included in the valuation appears to be complete when compared to the statute.

Member Handbook

The handbook coordinated well with the statute and the summary of benefits in the valuation report.

Experience Study

There was no experience study for this group. Although accurate volunteer fire data is traditionally difficult for retirement systems to maintain, the fact that this plan requires member contributions should enable NCRS to have more accurate information than its peers that administer systems for volunteer personnel. That plus the size of the active membership (at 36,000+ members) leads to our recommendation that an experience study be performed for this group every 5 years.

Actuarial Methods

The Actuarial Funding Method is Entry Age Normal Cost (EANC). This is an acceptable method under the Actuarial Standards of Practice and GASB Statements No. 25 and No. 27.

We recommend:

- Considering the use of a closed period on the asset smoothing method along with a corridor around the market value of assets;
- Clarifying whether or not the method is level dollar entry age (we have assumed that it was level dollar entry age);

- Consider including a projection in the amortization method to account for the contribution delay between the valuation date and the starting date of the computed rate;
- Disclosing a history of the benefit amounts to see if a pattern emerges that should be recognized in the valuation.

Actuarial Assumptions

Assumptions appear to be generally reasonable, but possibly conservative. We recommend:

- Showing sample mortality rates;
- Disclosing timing of decrements;
- Disclosing the mortality table used for post retirement impaired mortality (and showing sample rates).

Other Report Content

GASB Section

We found this section confusing. Specifically, it was not obvious how the ARC, as determined in the summary of principal results relates to the ARC shown in the development of the NPO. For example, the ARC shown on page 2 of the 2007 report is \$8,077,594 for the fiscal year ending on 6/30/2008. However, on page 10 of the 2008 report, the ARC is reported to be \$8,733,954 for the fiscal year ending 6/30/2008 for the development of the NPO. Adding a reconciliation in the report that shows how the numbers relate would greatly add to the understandability of the report. In addition, this appears to be a cost sharing multiple employer plan (for which a NPO would not apply). However, the State (not the employers) is making all the employer contributions. We recommend:

- Reconciling the ARC disclosed in the prior valuations with the ARC used in the development of the NPO;
- Commenting on how or why the recommended contribution might be different from the ARC (they were the same in the two reports we reviewed) – if they cannot be different then one should be deleted;
- Adding an historical schedule of Employer Contributions with final ARC amounts;
- A review by legal counsel or NCRS accountants to determine if this is a single employer plan or a multiple cost sharing employer plan (for which the NPO calculation would not apply).

Valuation Results Section

We recommend:

- Showing the development of the gain/loss for the year (preferably by risk category);
- Adding historical schedules of results;
- Adding a short condition test.

Financial Section

We recommend:

- Showing a schedule of revenue and expenditures in the report;
- Showing an allocation of investments by category.

Valuation Results

We recommend that when there is a change in liabilities due to a benefit change that it be quantified and disclosed in the first valuation after the change is adopted.

REGISTER OF DEEDS' SUPPLEMENTAL PENSION FUND (RODPF)

Member Data

All the relevant data appears to be included in the valuation. However, it was not clear if non-LGERS members of the RODPF were included in the valuation (this would apply only to deferred members since we understand that all Registers of Deeds are now covered by LGERS). We understand that the data submitted does not provide enough information to directly value deferred member liabilities for LGERS and so these are estimated at 200% of accumulated contributions. While this should not be an issue for the RODPF, it was not clear how the deferred member was valued. Since there is only 1, this would not be expected to have a material effect on results, regardless of the approach. Our data recommendations are:

- Supply the actuary with enough information to directly value the deferred member liabilities so that they do not have to be estimated (assuming that they are estimated);
- Include an age and service matrix schedule of active members (instead of separate schedules) in the report;
- Include an age and service schedule of deferred members included in the valuation (or an age and accumulated contribution schedule);
- Include an age and average benefit amount schedule of retirees;
- Include an historical schedule of member counts and group average statistics;
- Separately identify the active and retired members of the RODPF that are not members of LGERS (or specifically state that the data for these members was not available).

Summary of Benefits

The summary of benefits included in the valuation appears to be mostly complete when compared to the statute and the handbook. We recommend:

- Adding a statement regarding the offset for non-LGERS members and indicating that all Registers of Deeds are now LGERS members.

Member Handbook

No member handbook was available.

Experience Study

There was no experience study specifically for this group. As part of the LGERS, their experience is studied in the LGERS experience study. However, that report did not indicate that these members were separately studied. Given that this supplemental benefit is available to these members, we think it is warranted to study the register of deeds experience separately for both LGERS and RODPF.

Actuarial Methods

Actuarial Funding Method is Entry Age Normal Cost (EANC). This is an acceptable method under the Actuarial Standards of Practice and GASB Statements No. 25 and No. 27. However, it is not clear if the method is level dollar or level percent of payroll.

We recommend:

- Disclosing whether or not the EANC is level dollar or level percent of payroll;
- Clarifying whether or not item 4 on page 7 (labeled present value of future normal contributions by employers) is the present value of future normal costs or the present value of future statutory contributions;
- Consider using a level percent of payroll amortization method (should not affect results given the current funded level);
- Consider including a projection in the amortization method to account for the contribution delay between the valuation date and the starting date of the computed rate.

Actuarial Assumptions

Assumptions appear to be generally reasonable, but possibly conservative. We recommend:

- Showing sample post retirement mortality rates;
- Disclosing timing of decrements and pay increases;
- Disclosing how liabilities are calculated for deferred members;
- Disclosing the mortality table used for post retirement impaired mortality (and showing sample rates);
- Using separate early and normal (reduced and unreduced) rates of retirement – the current separation described as normal and early retirement does not directly coincide with the reduced and unreduced eligibility conditions;
- Disclosing the general inflation and the wage inflation assumptions (one is shown in the GASB disclosure section on page 6, but it is not clear which one is shown).

Other Report Content

GASB Section

The transition between the computed ARC from one valuation to the dollar amount of the ARC in the subsequent valuation (for the same fiscal year) was not obvious. Changes in the ARC after the production of the valuation report also led to a great amount of confusion on the reader's part. We recommend:

- Adding an historical schedule of Employer Contributions with final ARC amounts.

Valuation Results Section

We recommend:

- Showing the development of the gain/loss for the year (preferably by risk category);
- Adding historical schedules of results;
- Adding a short condition test;
- Showing the Normal Cost and the Accrued Liabilities by decrement.

Financial Section

We recommend:

- Showing a schedule of revenue and expenditures in the report;
- Showing an allocation of investments by category.

Valuation Results

The average annuity (present value of benefits divided by pension payroll) was very stable from 2006 to 2007 and within a reasonable range.

NATIONAL GUARD PENSION FUND (NGPF)

Member Data

We understand that the membership data is not maintained by NCRS for this system. We also understand that the data supplied to NCRS satisfies the statutory requirements. This data satisfies the minimum requirements of the actuary and excludes members with less than 7 years of service. Our data recommendations are:

- Collect and supply to the actuary membership data on all members of the plan, not just those with 7 years of service;
- Study the retention rates of members with 7 or less years of service and develop specific withdrawal assumptions based on actual experience;
- Include an age and service matrix schedule of active members (instead of separate schedules) in the report;
- Include an age and service schedule of deferred members included in the valuation. Note that between the three classifications of members (active, retired and deferred) the deferred members have the largest liability and the least amount of disclosure.
- Include an age and average benefit amount schedule of retirees;
- Include an historical schedule of member counts and group average statistics.

Summary of Benefits

The summary of benefits included in the valuation appears to be complete when compared to the statute with one exception:

The summary indicates that members must have 20 years of service (15 with the National Guard) to be vested. The statute seems to indicate that members only need to have 15 years of National Guard service at the time of termination (the other 5 years of outside military service can be obtained after termination from the National Guard).

This raises the question of whether or not liabilities for terminated members with 15 years of service (who later acquire the 5 years of other military service) are included in the valuation. If not, we recommend that an assumption be developed for members terminating with 15 to 20 years of service acquiring entitlement to deferred vested benefits after termination from the National Guard.

Member Handbook

There was no handbook for this group.

Experience Study

There was no experience study for this group. We recommend that one be performed. In addition, we would recommend a regular schedule for performing an experience study – such as once every 7-10 years.

Actuarial Methods

Actuarial Funding Method is Entry Age Normal Cost (EANC). This is an acceptable method under the Actuarial Standards of Practice and GASB Statements No. 25 and No. 27. It is not clear from the report, however, what is considered to be the entry age of a member. Technically, a member enters upon hire. However, since data is not reported on members until they obtain 7 years of service, entry could be a member's 7th year anniversary of hire for purposes of the funding method. If the funding method is based on an entry age equal to the date of hire, then the normal cost will be understated and a loss will be generated every time a member reaches 7 years of service.

We recommend:

- Explicitly valuing every member of the plan and then introducing an appropriate withdrawal assumption;
- Considering the use of a closed period on the asset smoothing method along with a corridor around the market value of assets;
- Clarifying whether or not the method is level dollar entry age (we have assumed that it was level dollar entry age);
- Consider including a projection in the amortization method to account for the contribution delay between the valuation date and the starting date of the computed rate.

Actuarial Assumptions

Assumptions appear to be generally reasonable, but possibly conservative. We recommend:

- Showing sample mortality rates;
- Disclosing timing of decrements;
- Disclosing how liabilities are calculated for deferred members;
- Disclosing the mortality table used for post retirement impaired mortality (and showing sample rates);
- Consideration of combining rates of disability with rates of withdrawal (since there is no disability benefit);
- Developing appropriate assumptions on withdrawal (needs to be coordinated with the discussions above regarding the treatment and reporting of members with less than 7 years of service).

Other Report Content

GASB Section

We found this section confusing. Specifically, it was not obvious how the ARC, as determined in the summary of principal results relates to the ARC shown in the development of the NPO. For example, the ARC shown on page 6 of the 2007 report is \$6,231,909 for the fiscal year ending on 6/30/2008. However, on page 1 of the 2006 report, the ARC is reported to be \$3,847,884 for the fiscal year ending 6/30/2008. Adding a reconciliation in the report that shows how the numbers relate would greatly add to the understandability of the report. We recommend:

- Reconciling the ARC disclosed in the prior valuations with the ARC used in the development of the NPO;
- Commenting on how or why the recommended contribution might be different from the ARC (they were the same in the two reports we reviewed) – if they cannot be different then one should be deleted;
- Adding an historical schedule of Employer Contributions with final ARC amounts.

Valuation Results Section

We recommend:

- Showing the development of the gain/loss for the year (preferably by risk category);
- Adding historical schedules of results;
- Adding a short condition test.

Financial Section

We recommend:

- Showing a schedule of revenue and expenditures in the report;
- Showing an allocation of investments by category.

Valuation Results

We reviewed the normal cost and the average annuity factor for retirees (present value of benefits for retired members divided by annual pension payroll). The normal cost dropped by 2.8% from the 2006 valuation to the 2007 valuation. This is a surprising result, given the funding method. The average annuity value was not stable between 2006 and 2007. However, given the plan change that occurred in 2006, GRS was not certain that it was appropriately identifying the correct numbers in order to perform this test. We recommend:

- Results be reviewed for consistency between the 2006 and 2007 valuations;
- Adding an explanation of why normal costs decrease (or increase) in future reports;
- Providing enough detail in the report to determine the average annuity factor for retirees and providing an explanation when there are large changes in this value.

DISABILITY INCOME PLAN (DIP)

Member Data

Member data is the same as used for TSERS with the addition of members that participate in the ORP. Since the ORP members are not detailed in another valuation report, they should be separately identified in the data schedules in this report. We recommend the addition of the following data schedules:

- Age and service schedule of active members, separately identifying TSERS and ORP members;
- Schedule of members receiving STD benefits by age and average benefits;
- Schedule of members receiving LTD benefits by age and average benefits;
- Data reconciliation showing the number of members moving from disability benefits to active status, the number of members moving from disabled benefits to normal retirement benefits and the number of members moving from STD benefits to LTD benefits.

Summary of Benefits

The summary of benefits included in the valuation appears to be complete and consistent when compared to the statute and the respective handbooks. We recommend the following:

- Add a description of the duration of the LTD benefit for members obtaining 5 years of service after 8/2007, which is contingent on being approved for Social Security disability benefits (it may be just a correction of current language that is needed here);
- Be more explicit regarding the duration of LTD benefits for ORP members (based on eligibility for unreduced benefits had the member been in TSERS).

Member Handbook

The benefits are described in TSERS. We have no comments (aside from those already discussed in the TSERS section) on the handbooks.

Experience Study

Same as TSERS – see those sections for comments regarding the experience studies. However, the duration of disabilities are not explicitly studied in the experience study. We recommend that the duration of disabilities be explicitly studied.

Actuarial Methods

Actuarial Funding Method is Aggregate Normal Cost. This is an acceptable method under the Actuarial Standards of Practice and GASB Statements No. 43 and No. 45.

We recommend:

- Discussing how members are valued after termination of disability (i.e., are they again exposed to becoming disabled and are the rates of re-exposure higher than other rates of disability);
- Considering the use of a closed period on the asset smoothing method along with a corridor around the market value of assets;
- Consider including a projection in the amortization method to account for the contribution delay between the valuation date and the starting date of the computed rate.

Actuarial Assumptions

The assumptions appear to be generally reasonable and are generally the same as TSERS. See the TSERS section for our general recommendations on assumptions. Our recommendations specifically related to this valuation are:

- Disclose the mortality table used for post retirement impaired mortality and show sample rates (there is currently no evidence that an impaired mortality table is used in this valuation, but it is shown in the experience study);
- Disclosing the general inflation assumption and the wage inflation assumption (one of them is detailed in the GASB disclosure section on page 5);
- Add more details on how the IBNR for STD and LTD are determined (valuation states that they are based on previous year's expected disabilities but provides no detail);
- For the LTD, we think that the IBNR should be related to the number of members that have been on short term disability for 6 to 12 months (which may mean that the IBNR is related to the expected disabilities from 2 years ago or the average of the last two years);
- Although this plan's asset allocation is much different than TSERS and LGERS, (nearly 100% bonds versus approximately 50% bonds and 50% equities) the investment return of 7.25% assumption is the same as the other two systems. We recommend this be reviewed since the assumption may be more aggressive than the Board intended given the asset allocation;
- Consider basing the STD IBNR on the historical STD payouts.

Other Report Content

GASB Section

We recommend:

- Reconciling the ARC rate disclosed in the prior valuations with the ARC dollars used in the development of the NPO;
- Adding an historical schedule of Employer Contributions with final ARC amounts.

Although we believe that GASB Statements No. 43 and No. 45 are the appropriate statements that apply to this plan, we recommend consulting with the outside auditor/accountant to confirm this.

Valuation Results Section

We recommend:

- Adding historical schedules of results;
- Adding an historical schedule of actual versus expected disabilities.

Financial Section

We recommend:

- Showing allocation of investments by category;
- Showing a revenues and expenditures statement.

Valuation Results

The average annuity value was not stable between 2005 and 2007, changing from 6.2 to 5.1 to 4.7 from '05 to '07. The dramatic lowering could be a result of 1) an aging of the covered group, 2) a change in assumptions, or 3) a lowering of the expected duration of benefits. None of these events is apparent in the valuation. We recommend that Buck review this relationship and identify the reasons for the change.

TEACHERS' AND STATE EMPLOYEES' BENEFIT TRUST (DEATH BENEFIT PLAN OR DBP)

Member Data

Member data is the same as used for TSERS and LGERS. Although the number of TSERS members matched the TSERS report, the number of LGERS members did not match the LGERS report. We understand that this is because each employer makes a separate election to provide the death benefit (aside from the election to join LGERS) and not all LGERS employers have elected to provide the death benefits provided in this plan.

Since the membership data is not identical to TSERS and LGERS, we recommend adding data schedules to this report.

Summary of Benefits

The summary of benefits included in the valuation appears to be complete and consistent when compared to the statute and the respective handbooks.

Member Handbook

The benefits are described in the respective TSERS and LGERS handbooks. We have no comments (aside from those already discussed in the TSERS and LGERS section) on the handbooks.

Experience Study

Same as TSERS and LGERS – see those sections for comments regarding the experience studies.

Actuarial Methods

The Actuarial Funding Method is stated to be One-Year Term Cost on page 6. However, the narrative on pages 4 and 5 seems to describe the Aggregate Normal Cost method. Reserves should provide for a sufficient margin above claims to ensure that the fund does not become insolvent in the event of a catastrophic event (such as the rates of death doubling in a particular year).

We recommend:

- Clarifying which method was actually used;
- Using an overriding test to ensure that the reserves are sufficiently greater than the annual claims plus a margin (in the TSERS sub fund, reserves are approximately 2/3 of annual claims and annual contributions are approximately 97% of annual claims).

Actuarial Assumptions

Assumptions appear to be generally reasonable and are the same as used for TSERS and LGERS, respectively. See the respective TSERS and LGERS sections for our general recommendations on assumptions. We have one other recommendation specifically for this plan:

- Although this plan's asset allocation is much different than TSERS and LGERS, (nearly 100% bonds versus approximately 50% bonds and 50% equities) the investment return of 7.25% assumption is the same as the other two systems. We recommend this be reviewed since the assumption may be more aggressive than the Board intended given this asset allocation.

Other Report Content

GASB Section

There does not appear to be a separate GASB section in this valuation. We recommend consulting with the outside auditor/accountant to determine if additional reporting requirements are applicable to this plan.

Valuation Results Section

We recommend:

- Showing the development of the gain/loss for the year;
- Adding historical schedules of results;
- Adding an historical schedule of actual versus expected death by member/fund.

Financial Section

We recommend:

- Showing allocation of investments by category.

Valuation Results

TSERS: "Current assets and contributions are adequate to support the benefits" – we recommend that the basis for this statement be disclosed (i.e., based on the Board's policy of having reserves equal to some multiple of claims).

LGERS: Employers first participating before 7/1/2004 have fixed contribution rates; employers first participating after 7/1/2004 pay full actuarial cost – we recommend disclosing the funding

policy that “full actuarial costs” are based on as well as how the potential over/under funding for the pre 7/1/2004 employers is handled.

We recommend that the employer rate sheet disclose whether the first participation date is before or after 7/1/2004 for each employer.

We recommend disclosing how the contribution rates for the retiree contributory death benefit was determined (i.e., by statute, by periodic adjustment through valuations, by Board policy, etc). We would also recommend adding a history of actual benefits versus the expected benefits for this component.

PHASE TWO REVIEW RESULTS

TSERS REPLICATION VALUATION RESULTS

To verify the accuracy of the retained actuary's valuation results, GRS performed an independent December 31, 2007 valuation of the Teachers' and State Employees' Retirement System (TSERS) using the "groomed data" of the retained actuary. The replication uses the same methods and procedures that were used by the retained actuary. The results show that the retained actuary's numerical results are reproducible within acceptable tolerance ranges. The biggest difference is in the development of the Entry Age Normal Cost Rate. After discussions with the retained actuary, we believe that this is attributable to a difference in how their system takes the individual computations and develops an aggregate rate versus how our system does this. Given this calculation difference, the difference in our results is well within an acceptable range. However, there are certain issues that were discovered in the replication process that merit further discussion. The items are separated into two categories – those that we believe might have a material effect on results and those we believe would have a minor effect on results.

Issues that GRS believes would have a minor (or no) effect on results:

- Documentation of methods and procedures. This is a carry-over issue from the review process. In general, the documentation of the methods and assumptions in the valuation report could be improved. ASOP 41 states:
3.3.3 Actuarial Report—In addition to the actuarial findings, an actuarial report should identify the data, assumptions, and methods used by the actuary with sufficient clarity that another actuary qualified in the same practice area could make an objective appraisal of the reasonableness of the actuary's work as presented in the actuary's report. To the extent the data, assumptions, and methods used have been described in a previous actuarial report that is available to the intended audience, the actuary may, if appropriate under the circumstances, incorporate this information by reference into the actuarial report.
We believe that additional documentation would be required in order for the 2007 TSERS report to meet this standard. We recommend that Buck increase the disclosures in the report (see the review section for specific details);
- GRS did not understand the accumulation of death benefits for certain members. Test case 7256 shows that the accumulation of death benefits for this member stopped at age 70 although the death-in-service decrement continues to operate after age 70. GRS believes that this accumulation should have continued past age 70 to be consistent with the assumptions and the application of the decrement. We recommend that Buck look into this Test Case;
- Buck has indicated to us that they use a minimum entry age of age 19 (which is not disclosed in the report). Test case 3954 uses an entry age of 20 in the detail lines provided to GRS (suggesting the minimum entry age used is actually age 20). GRS calculates this member's entry age to be 17. Since our experience indicates that it is common for public plans to have members with entry ages as low as age 16, we recommend that a lower minimum entry age be used in the valuation as well as looking

into this specific test case. This might have a downward impact on the normal cost and an upward impact on the accrued liability.

- The application of decrements does not appear to be consistent with our expectations of how the decrements should be applied.
 - For example, Test Cases that had older entry ages had their select withdrawal periods reduced from 3 years to 2, 1 or 0 years in certain cases for their initial periods of service, even though they may not have been eligible to retire.
 - This can also be seen with Test Case 3954 in the application of the retirement pattern. The pattern used by Buck is 40% for the first year, 0% in the second year followed by 20% rates. Based on their description of the rates, we believe it should be 60% the first year 20% the second year and so on.

We recommend that Buck look into the application of decrement rates in these circumstances.

- The summary of benefits appears to be missing a parenthetical “15” year eligibility for Law Enforcement Officers under the description of Survivor Alternate Benefits.
- It appears that there were approximately 282 Back-to-work retirees that were not valued. We recommend that they be included in future valuations.

Issues that GRS believes may have a material effect on results:

- We believe that it would be appropriate to include a projection on the computation of the UAAL contribution to the applicable fiscal year (this is also discussed in the review section);
- We believe that the treatment of current members on LTD may understate the accrued liabilities;
- We believe that allowing the future members expected to be on LTD to be treated as active (with continued future pay and continued exposure to the withdrawal decrement) may understate the normal cost percent;
- The entry age normal cost is based on the generational mortality for the current member instead of the member’s new entrant replacement. The effect of this is that all mortality improvements projected in the generational table between the current member’s date of entry and the member’s replacement date of entry flow into the normal cost when the replacement is hired. This can amount to 5 to 30 years of mortality improvement and can result in a normal cost that greatly increases as current members are replaced. We recommend basing the normal cost on the ultimate mortality table used in the current valuation (which would incorporate all future mortality improvement as of the valuation date);
- The retained actuary determines the group normal cost rate by averaging individual member’s normal cost rates on their present value of future salary. We believe that this has the potential to introduce gains or losses into the process and prefer an averaging method that is based on the expected payroll for the upcoming year (valuation pays adjusted for assumed pay increases and turnover). An illustration of the issue is shown in the appendix. Our testing has indicated that the difference in the 2007 valuation due to the use of the present value of future salary weighting was +0.10% of covered payroll. However, we believe that the quantitative difference could vary from year to year.

Currently, members that are on LTD are reported on the active data file. If these members are reported with non-zero compensation, they are valued like all other actives. However, if these members are reported with non-zero compensation, the reported compensation does not appear to represent their actual earnings. For example, there were 317 LTD members reported with compensation in the data file with average annual earnings of \$5,761. We believe that the current method used to value these members understates their accrued liabilities (and slightly understates the normal cost percent because contributions are not being collected on their pays).

As of June 30, 2007 there were 5,983 LTD recipients. As described above, 317 were treated as active members. We believe that Buck treated the remaining 5,666 as inactive members since they were reported on the data file with no compensation. The process Buck used to value these members was to set their liabilities equal to 150% of their member contribution balances. We believe that this significantly understates the accrued liability for these members. While precise data was not available to exactly measure the understatement, we believe the magnitude to be in the range of 1% to 3% of total accrued liability. We recommend that Buck revise the manner in which these members are valued to more accurately measure the accrued liability for these members.

Buck does not assume any future members will become disabled and receive LTD benefits, since the LTD benefit is payable outside of TSERS and the members on LTD continue to receive service credit and wage inflation adjustments. We believe that there are two technical issues with this approach. First, members who go on LTD should not be exposed to the withdrawal decrements (their probability of quitting is 0%, unless they recover and become active again). Therefore, their accrued liabilities are slightly understated (the degree of understatement is directly related to the actual rates of disability, which are generally small for civilian groups and may be more material for uniformed groups. In addition, since their future pay is not removed from the present value of future pay for TSERS, normal costs rates would be understated because this process would assume that contributions (employer and employee) continue to be collected on future LTD members during their period of LTD benefits, which staff has confirmed is not the case. We recommend that Buck review this procedure and quantify the effect of assuming future disabilities in the TSERS valuation.

TEACHERS' AND STATE EMPLOYEES' RETIREMENT SYSTEM
DECEMBER 31, 2007 VALUATION RESULTS COMPARISON

	<u>GRS</u>	<u>Buck</u>	<u>% Diff</u>
Active Valuation			
Number	338,475	338,490	0.00%
"Valuation" Payroll	\$ 13,739,396,596	\$ 13,743,185,124	-0.03%
Average Pay	\$ 40,592	\$ 40,601	-0.02%
Present Value of Future Benefits	\$ 40,041,978,715	\$ 40,337,670,446	-0.73%
Entry Age Accrued Liability	\$ 25,070,510,101	\$ 24,800,905,168	1.09%
Retiree Valuation			
Number	145,855	145,855	0.00%
Total Benefits	\$ 2,885,867,520	\$ 2,885,868,222	0.00%
Average Benefit	\$ 19,786	\$ 19,786	0.00%
Accrued Liability	\$ 26,176,282,824	\$ 26,200,906,236	-0.09%
Inactive Deferred			
Number	69,420	69,420	0.00%
Accrued Liability	\$ 1,215,270,163	\$ 1,215,290,201	0.00%
Summary of Principal Results			
Entry Age Normal Cost	11.67%		
Admin Fees	<u>0.10%</u>		
Total Normal Cost	11.77%	12.26%	-3.98%
Employee Contribution Rate	<u>6.00%</u>	<u>6.00%</u>	0.00%
Total Employer Normal cost	5.77%	6.26%	
UAAL Payment	<u>-2.42%</u>	<u>-2.69%</u>	
Employer Contribution Rate	3.35%	3.57%	
Actuarial Accrued Liability*	52,462,063,088	52,217,101,605	0.47%
Actuarial Value of Assets*	54,685,132,941	54,685,132,941	0.00%
Unfunded Actuarial Accrued Liability (UAAL)	(2,223,069,853)	(2,468,031,336)	-9.93%

* Net of reserve for increases in retirement benefits effective July 1, 2008.

CASE STUDIES

In addition to the parallel actuarial valuation, we requested from the retained actuary valuation results for individual test cases. Valuation results were requested for 6 active test cases and 7 retired test cases.

Results between GRS and the retained actuary were generally within expected boundaries, especially for the retiree test cases, as can be seen in the following exhibits. Note that some of the test cases with small accrued service were harder to match, which we believe is more related to minor rounding issues than substantial differences in calculations.

ACTIVE TEST CASES

<u>Test Case</u>	<u>Age</u>	<u>Service</u>	<u>Valuation Pay</u>	<u>Sex</u>	<u>Valuation Result</u>	<u>GRS</u>	<u>Buck</u>	<u>% Diff</u>
Test Case 1 XXX-XX-7256	65	1.33	157,829	Male	PVFS	764,044	757,827	-0.81%
					EAAL	27,287	31,580	15.73%
Illustrates a difference in the accumulation of death benefits.					PVB	151,006	146,621	-2.90%
Test Case 2 XXX-XX-0037	32	9.50	74,939	Female	PVFS	927,933	927,435	-0.05%
					EAAL	105,793	101,653	-3.91%
					PVB	214,799	218,741	1.84%
Test Case 3 XXX-XX-9245	66	32.30	30,590	Female	PVFS	107,501	106,123	-1.28%
					EAAL	148,650	146,950	-1.14%
					PVB	159,503	157,270	-1.40%
Test Case 4 XXX-XX-4357	25	0.17	16,237	Female	PVFS	107,968	108,398	0.40%
					EAAL	83	178	114.33%
					PVB	9,298	10,265	10.40%
Test Case 5 XXX-XX-9492	49	11.92	8,585	Male	PVFS	57,429	57,416	-0.02%
					EAAL	19,801	18,972	-4.19%
This is an example of a member on LTD. The GRS numbers are based on the methods used by Buck					PVB	28,632	27,032	-5.59%
Test Case 6 XXX-XX-3954	44	26.58	56,388	Male	PVFS	211,664	276,754	30.75%
					EAAL	300,505	290,973	-3.17%
Illustrates the decrements not being applied consistent with GRS' expectations. The GRS numbers are based on our understanding of how the decrements should apply. Also illustrates a difference in the entry					PVB	322,875	323,457	0.18%

RETIRED TEST CASES

<u>Test Case</u>	<u>Age</u>	<u>Retirement Type</u>	<u>Option Elected</u>	<u>Sex</u>	<u>Valuation Result</u>	<u>GRS</u>	<u>Buck</u>	<u>% Diff</u>
Test Case 1 XXX-XX-4985	84	Service	Modified Cash Refund	Female	PVB	7,536	7,517	-0.25%
Test Case 2 XXX-XX-3780	72	Service	50% J&S	Female	PVB	348,621	348,167	-0.13%
Test Case 3 XXX-XX-7312	50	Service	Straight Life SS Equated	Male	PVB	278,842	278,619	-0.08%
Test Case 4 XXX-XX-2900	85	Service	Modified Cash Refund	Male	PVB	20,082	20,011	-0.35%
Test Case 5 XXX-XX-3791	58	Disability	50% J&S Pop-Up	Male	PVB	267,755	267,483	-0.10%
Test Case 6 XXX-XX-1775	65	Service	Modified Cash Refund	Female	PVB	309,394	309,047	-0.11%
Test Case 7 XXX-XX-6776	67	Service	Straight Life	Female	PVB	164,490	164,293	-0.12%

LGERS REPLICATION VALUATION RESULTS

To verify the accuracy of the retained actuary's valuation results, GRS performed an independent December 31, 2007 valuation of the Local Governmental Employees' Retirement System (LGERS) using the "groomed data" of the retained actuary. The replication uses the same methods and procedures that were used by the retained actuary. The results show that the retained actuary's numerical results are reproducible well within acceptable tolerance ranges. However, there are certain issues that were discovered in the replication process that merit discussion. The items are separated into two categories – those that we believe might have a material effect on results and those we believe would have a minor effect on results.

Issues that GRS believes would have a minor (or no) effect on results:

- Documentation of methods and procedures. This is a carry-over issue from the review process. In general, the documentation of the methods and assumptions in the valuation report could be improved. ASOP 41 states:
3.3.3 Actuarial Report—In addition to the actuarial findings, an actuarial report should identify the data, assumptions, and methods used by the actuary with sufficient clarity that another actuary qualified in the same practice area could make an objective appraisal of the reasonableness of the actuary's work as presented in the actuary's report. To the extent the data, assumptions, and methods used have been described in a previous actuarial report that is available to the intended audience, the actuary may, if appropriate under the circumstances, incorporate this information by reference into the actuarial report.
We believe that additional documentation would be required in order for the 2007 LGERS report to meet this standard. We recommend that Buck increase the disclosures in the report (see the review section for specific details).
- Buck has indicated to us that they use a minimum entry age of age 19 (which is not disclosed in the report). The test cases seem to indicate that the minimum is actually age 20. Since our experience has shown that it is common for public plans to have members starting at age 16, we recommend using a lower minimum entry age, if this can be supported by the valuation software. Since LGERS does not use the entry age normal cost method, this may not affect annual valuation results. However, it may have a marginal impact on the initial liability calculation for new employers.
- The application of decrements does not appear to be consistent with our expectations of how the decrements should be applied. For example, Test Cases that had older entry ages had their select withdrawal periods reduced from 3 years to 2, 1 or 0 years in certain cases for their initial periods of service, even though they may not have been eligible to retire. In addition, test case 6204 uses a 3% withdrawal probability at several ages that does not seem to coincide with the stated assumptions. We recommend that Buck look into this issue.
- It appears that there were approximately 32 back-to-work retirees that were not valued. We recommend that they be included in future valuations.

Issues that GRS believes may have a material effect on results:

None.

LOCAL GOVERNMENT EMPLOYEES RETIREMENT SYSTEM DECEMBER 31, 2007 VALUATION RESULTS COMPARISON

	<u>GRS</u>	<u>Buck</u>	<u>% Diff</u>
Active Valuation			
Number	127,959	127,959	0.00%
"Valuation" Payroll	\$ 5,088,259,656	\$ 5,088,260,280	0.00%
Average Pay	\$ 39,765	\$ 39,765	0.00%
Total Present Value of Future Benefits	\$ 14,364,949,505	\$ 14,300,834,427	0.45%
Retiree Valuation			
Number	42,408	42,408	0.00%
Total Benefits	\$ 689,369,133	\$ 689,369,335	0.00%
Average Benefit	\$ 16,256	\$ 16,256	0.00%
Total PVFB	\$ 6,352,803,911	\$ 6,359,783,062	-0.11%
Inactive Deferred			
Number	24,907	24,907	0.00%
Total PVFB	\$ 561,566,755	\$ 561,568,872	0.00%
Summary of Principal Results			
Present Value Future Benefits	\$ 21,279,320,171	\$ 21,222,186,361	0.27%
Assets @	\$ 16,648,237,562	\$ 16,648,237,562	0.00%
Unfunded Accrued Liabilities	\$ 76,163,736 *	\$ 76,163,736	0.00%
Total PVFNC	\$ 4,554,918,873	\$ 4,497,785,063	
Present Value Future Salary	\$ 44,883,661,768	\$ 44,330,451,000	1.25%
Total NC %	10.15%	10.15%	0.00%
Employee Contribution	<u>6.00%</u>	<u>6.00%</u>	
Total Employer Contribution Rate	4.15%	4.15%	
Present Value Future Pay - Gen and Fire	36,275,695,261		
Present Value Future Pay - LEO	8,607,966,507		
Flat difference between contribution rates#	0.47%		
Preliminary Contribution Rate for Gen and Fire	4.06%	4.22%	
Admin Fees	<u>0.20%</u>	<u>0.20%</u>	
Final Contribution Rate for Gen and Fire	4.26%	4.42%	
Contribution Rate for LEO	4.53%	4.69%	

There is always a .47 difference between the contribution rates for General/Fire and LEO.

@ Rates for increases in retirement allowances were removed from assets.

* Remaining UAAL not reviewed, retained Actuary's number is used in both columns.

CASE STUDIES

In addition to the parallel actuarial valuation, we requested from the retained actuary valuation results for individual test cases. Valuation results were requested for 5 active test cases and 7 retired test cases.

Results between GRS and the retained actuary were generally within expected boundaries, especially for the retiree test cases, as can be seen in the following exhibits. Note that some of the test cases with small accrued service were harder to match, which we believe is more related to minor rounding issues than substantial differences in calculations.

ACTIVE TEST CASES

<u>Test Case</u>	<u>Age</u>	<u>Service</u>	<u>Valuation Pay</u>	<u>Sex</u>	<u>Valuation Result</u>	<u>GRS</u>	<u>Buck</u>	<u>%Diff</u>
Test Case 1 XXX-XX-6204	57	0.00	13,418	Male	PVFS	66,660	64,619	-3.06%
					EAAL	117	143	22.21%
					PVB	8,806	8,189	-7.01%
Illustration of Buck using a 3% withdrawal assumption that does not coincide with stated assumptions. GRS numbers are based on stated assumptions.								
Test Case 2 XXX-XX-2487	40	2.00	23,559	Male	PVFS	203,089	203,005	-0.04%
					EAAL	5,851	5,779	-1.22%
					PVB	28,648	28,524	-0.43%
Test Case 3 XXX-XX-7406	25	2.00	35,109	Male	PVFS	748,447	746,553	-0.25%
					EAAL	12,933	13,021	0.68%
					PVB	152,146	154,101	1.28%
Test Case 4 XXX-XX-1222	61	29.00	79,482	Male	PVFS	161,645	161,759	0.07%
					EAAL	341,097	348,789	2.26%
					PVB	369,532	377,649	2.20%
Test Case 5 XXX-XX-1643	73	2.00	33,702	Male	PVFS	78,734	63,871	-18.88%
					EAAL	8,877	9,097	2.48%
					PVB	18,775	17,449	-7.06%

RETIRED TEST CASES

Test Case	Age	Retirement Type	Option Elected	Sex	Valuation Result	GRS	Buck	% Diff
Test Case 1 XXX-XX-0234	68	Service	Modified Cash Refund	Male	PVB	70,517	70,411	-0.15%
Test Case 2 XXX-XX-9038	59	Service	Straight Life SS Equated	Female	PVB	336,191	335,881	-0.09%
Test Case 3 XXX-XX-8370	72	Survivor	Straight Life	Female	PVB	35,924	35,872	-0.15%
Test Case 4 XXX-XX-3195	81	Service	Modified Cash Refund	Female	PVB	55,536	55,409	-0.23%
Test Case 5 XXX-XX-9862	67	Service	50% J&S Pop-Up	Female	PVB	97,062	96,959	-0.11%
Test Case 6 XXX-XX-8192	51	Disability	Straight Life	Male	PVB	193,830	193,617	-0.11%
Test Case 7 XXX-XX-6421	76	Service	100% J&S	Male	PVB	28,807	29,241	1.51%

APPENDIX

**Development of Contribution Rate with No Projection Under the Entry Age
Normal Cost Method**

Interest Rate	7.25%	
Wage Inflation	3.75%	
Val Date	12/31/2007	12/31/2008
Payroll	13,000,000,000	13,487,500,000
UAAL	(2,500,000,000)	1,000,000,000
Normal Cost %	12.00%	12.00%
Employee Rate	6.00%	6.00%
Amortization Period	9	9
		Uses level % of payroll
Amortization Factor	7.639907594	7.639907594 for illustration
UAAL Contribution	-2.52%	0.97%
Fiscal Year	7/1/09 - 6/30/10	7/1/10 - 6/30/11
Computed Er Rate	3.48%	6.97%

Experience for the plan year ending in 2008 resulted in an increase in the computed contribution rate. However, because rates are determined in advance, the computed contribution rates will not increase until 18 months after the valuation date. This produces a contribution loss during the plan year ending in 2009. Under the method on page 52, this contribution loss does not get recognized in the computed contribution rates until FY 2012. Under the method on page 53, this contribution loss gets recognized in the development of the FY 2011 contribution rates (1 year earlier). The concepts illustrated here are similar when there is an experience gain, except that there is a contribution gain that would be recognized one year earlier with the projection method.

**Development of Contribution Rate with Projection Under the Entry Age
Normal Cost Method**

Interest Rate	7.25%		
Wage Inflation	3.75%		
Val Date	12/31/2007	12/31/2008	
Payroll	13,000,000,000	13,487,500,000	
UAAL	(2,500,000,000)	1,000,000,000	
Normal Cost %	12.00%	12.00%	
Employee Rate	6.00%	6.00%	
Amortization Period	9	9	
Amortization Factor	7.639907594		
UAAL Contribution	-2.52%		
		UAAL Projection	
UAAL ER Rate 1/1/09 - 6/30/09		-3.50%	
Er Dollars 1/1/09 - 6/30/09		(79,404,530)	
Projected UAAL 6/30/09		1,116,421,944	
UAAL ER Rate 7/1/09 - 6/30/10		-2.52%	
Er Dollars 7/1/09 - 6/30/10		(355,488,160)	
Projected UAAL 6/30/09		1,565,511,675	
Remaining Amortization Period		9.00 *	
		Uses level % of payroll	
UAAL Amortization Factor		7.63991	for illustration
UAAL Rate		1.44%	
Fiscal Year	7/1/08 - 6/30/09	7/1/09 - 6/30/10	7/1/10 - 6/30/11
Computed Er Rate	2.50%	3.48%	7.44%

*Need to decide if the current 9 years is from the val date or the contribution start date.

Experience for the plan year ending in 2008 resulted in an increase in the computed contribution rate. However, because rates are determined in advance, the computed contribution rates will not increase until 18 months after the valuation date. This produces a contribution loss during the plan year ending in 2009. Under the method on page 52, this contribution loss does not get recognized in the computed contribution rates until FY 2012. Under the method on page 53, this contribution loss gets recognized in the development of the FY 2011 contribution rates (1 year earlier). The concepts illustrated here are similar when there is an experience gain, except that there is a contribution gain that would be recognized one year earlier with the projection method.

**Illustration of Developing the Entry Age Normal Cost for the Group,
Based on Individual Results**

Example 1

	Person 1	Person 2	Total
Normal Cost %	10.00%	20.00%	
Current Salary	50,000	50,000	100,000
Present Value of Future Salary (PVFS)	50,000	500,000	550,000
Normal Cost Dollars Needed	5,000	10,000	15,000
GRS Method -- Weight NC on Pay			15.00%
Contributions Collected			15,000
Buck Method			
Present Value of Future Normal Cost (PVFNC)	5,000	100,000	105,000
Buck Method -- Total PVFNC/Total PVFS			19.09%
Contributions Collected			19,090

Example 2

	Person 1	Person 2	Total
Normal Cost %	10.00%	20.00%	
Current Salary	50,000	50,000	100,000
Present Value of Future Salary (PVFS)	500,000	50,000	550,000
Normal Cost Dollars Needed	5,000	10,000	15,000
GRS Method -- Weight NC on Pay			15.00%
Contributions Collected			15,000
Buck Method			
Present Value of Future Normal Cost (PVFNC)	50,000	10,000	60,000
Buck Method -- Total PVFNC/Total PVFS			10.91%
Contributions Collected			10,910

In the first example the accrued liability will increase by \$15,000 (plus interest). Under the Buck method of determining the total rate for the group, \$19,090 will be collected in contributions, producing a contribution gain. In the second example the accrued liability will increase by \$15,000 (plus interest). Under the Buck method of determining the total rate for the group, \$10,910 will be collected in contributions, producing a contribution loss.

GRS does not believe that a gain or loss should be produced from the method that determines the total normal cost for the group and prefers an averaging method based on salary. In practice, GRS weights the normal costs by the expected pay paid, which is the valuation pay adjusted for assumed pay increases and assumed terminations occurring during the year.

The illustrations above are illustrative only and are not intended to quantify the actual difference in the methods based on NCRS valuation results. Our testing has indicated that the 2007 valuation results would differ by 0.10% of covered payroll under these two methods. We believe

that the quantitative difference in the methods could vary over time.