North Carolina Retirement Systems

Disability Income Plan of North Carolina
Register of Deeds' Supplemental Pension Fund
Death Benefit Plans of North Carolina

Investigation of Demographic and Economic Experience
Five-Year Period from January 1, 2010 – December 31, 2014

Board of Trustees Meeting

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January 21, 2016

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State Plans Covered Today

- Disability Income Plan
- Death Benefit Plans (State)

State Plans Covered in October 2015

- Teachers' and State Employees' Retirement System
- Consolidated Judicial Retirement System
- Legislative Retirement System
- National Guard Pension Fund

Local Plans Covered Today

- Register of Deeds' Supplemental Pension Fund
- Death Benefit Plans (Local)

Local Plans Covered in October 2015

- Local Governmental Employees' Retirement System
- Firefighters' and Rescue Squad Workers' Pension Fund

Agenda

- Experience Review Process
- Review of Demographic Assumptions
- Review of Economic Assumptions
- Review of Funding Methods
- Cost Impact of Proposed Assumption and Method Changes

The Valuation Process

INPUT

- Member Data
- Asset Data
- Benefit Provisions
- Actuarial Assumptions
- Funding Methodology

RESULTS

- Actuarial Value of Assets
- Actuarial Accrued Liability
- Net Actuarial Gain or Loss
- Funded Ratio
- Employer Contributions

Over the short term, contributions are determined by the actuarial valuation based upon estimated investment return, benefits and expenses using assumptions and methods recommended by the actuary and adopted by the Board. Over the long term, contributions are adjusted to reflect actual investment return, benefits and expenses.

Actuarial Assumptions

- Actuarial assumptions bridge the gap between the information that we know with reasonable certainty as of the valuation date – age, gender, service, pay or benefits of the members – and what may happen in the future.
- The actuarial assumptions of the North Carolina Retirement Systems are reviewed every five years in a process known as an Experience Review.
  - The last experience review was prepared as of December 31, 2009 and first used in the December 31, 2009 valuation.
  - The results of this review will be used with the December 31, 2015 valuation.
- Detailed summaries of current actuarial assumptions are provided in the most recent actuarial valuation reports prepared for these systems.

Experience Review Process

- Based on Five-Year Experience Review for Period January 1, 2010 – December 31, 2014
- Consider trends observed during the previous Experience Review
- Compare Experience ("Actual") with Assumptions ("Expected")
- Make Judgments About Future Trends:
  - Plan-Specific Experience vs. National Trends
  - Long-Term vs. Short-Term Factors
- Recommend changes in assumptions as needed
- Implement effective with the December 31, 2015 Actuarial Valuation
- For full sets of rates, see Appendix

"Enhancing Reliability of Actuarial Valuations for Pension Plans" by the GFOA

Engage the actuary to perform additional services to validate the actuarial assumptions used for the valuation. Such services include…Actuarial Experience Study. An actuarial experience study reviews the differences between a plan's assumed and actual experience over multiple years (typically 3 to 5), with the goal of examining the trends related to actual experience and recommending changes to assumptions, if needed.

Actuarial Assumptions – 12/31/2014 Disability Income Plan Valuation

- **Demographic**
  - Mortality
    - Based on RP-2000 mortality tables adjusted for NCRS experience
    - Projected improvements based on Scale AA
  - Service Retirement
    - Varies by age, gender, service and employee group
    - Study reduced retirement and unreduced retirement
  - Termination of Employment
    - Varies by age and gender
  - Disability
    - Varies by age and gender
  - Termination of Disability (Recovery or Death from Disabled Status)
    - Varies by age at disability, gender, and duration of disability
  - Leave Conversions
    - Adjustments to service and pay at retirement
    - Varies by gender and employee group

- **Economic**
  - Rate of Return (5.75%)
  - Inflation (3.00%)
  - Productivity Growth (0.5%)
  - Merit Pay Increases:

Years of Service	Classroom Teachers	General Employees and Other Education	Law Enforcement Officers
0	4.05%	2.00%	5.60%
5	3.05%	2.00%	3.60%
10	2.20%	1.95%	1.90%
15	1.95%	1.75%	1.45%
20	1.75%	1.75%	1.15%
25	1.75%	1.75%	0.75%
30	1.75%	1.75%	0.75%
35	1.75%	1.75%	0.75%

This is a summary of the assumptions currently used in the actuarial valuation of the Disability Income Plan.

Most assumptions are the same as TSERS assumptions, with the exception of Rate of Return, Disability and Recovery or Death from Disabled Status.

Key Takeaways – Disability Income Plan

Assumption	Recommendation	Impact on Costs
1. Mortality from active employment status	Decrease Rates and Update Mortality Improvement Projection Scale	Slight Increase
2. Service retirement	Decrease Rates	Slight Increase
3. Termination from active employment	Decrease Rates	Slight Increase
4. Rate of disability	Decrease Rates	Significant Decrease
5. Recovery or death from disabled status	Increase Rates	Significant Decrease
6. Leave conversions at retirement	Varies by Group	Slight Increase
7. Investment return	Decrease Rate	Significant Increase
8. Merit pay increases	Decrease Rates	Slight Increase
9. Inflation	No Change	N/A
10. Productivity growth	No Change	N/A
11. Amortization method	No Change	N/A
12. Actuarial cost method	No Change	N/A
13. Asset valuation method	5-year Smoothing	Slight Increase

Notes:

4. The assumption for rate of disability from active employment was the source of the largest decrease in costs. Better access to healthcare, workplace safety and accommodation for modified work, and more rigor in disability determination/approvals are among the reasons for the decrease in rates.
5. The assumption for termination of disability status (due to death or recovery) was the source of the second largest decrease in costs. In addition to the reasons listed in note 4, significantly more data points were included in the standard industry table and included an update to the methodology for recovery rates. Death from disabled status rates have decreased, mimicking the change from RP-2000 to RP-2014, but overall termination from disability rates have increased, particularly in the early stages of disabled status.
7. The current investment return assumption of 5.75% is no longer reasonable under current market conditions. Propose change to 3.75%.

Overall, the net impact on liabilities was a decrease

Actuarial Assumptions – 12/31/2014 Register of Deeds' Supplemental Pension Fund Valuation

- **Demographic**
  - Mortality
    - Based on RP-2000 mortality tables adjusted for NCRS experience
    - Projected improvements based on Scale AA
  - Service Retirement
    - Varies by age, gender, and service
    - Study reduced retirement and unreduced retirement
  - Disability
    - Varies by age and gender
  - Termination
    - Varies by gender and employee group
    - Varies by service prior to five years of service and by age after five years of service

- **Economic**
  - Rate of Return (5.75%)
  - Inflation (3.00%)
  - Productivity Growth (0.5%)
  - Merit Pay Increases:

Years of Service	General Employees
0	4.25%
5	3.00%
10	1.95%
15	1.70%
20	1.50%
25	1.50%
30	1.50%
35	1.50%

This is a summary of the assumptions currently used in the actuarial valuation of Register of Deeds' Supplemental Pension Fund.

Most assumptions are the same as LGERS assumptions for general employees, with the exception of Rate of Return.

Key Takeaways – Register of Deeds' Supplemental Pension Fund

Assumption	Recommendation	Impact on Costs
1. Mortality	Decrease Rates and Update Mortality Improvement Projection Scale	Significant Increase
2. Service retirement	Decrease Rates	Slight Decrease
3. Disability retirement	Decrease Rates	Slight Decrease
4. Termination from active employment	Decrease Rates	Slight Increase
5. Leave conversions at retirement	Varies by Group	Immaterial
6. Investment return	Decrease Rate	Significant Increase
7. Merit pay increases	Decrease Rates	Slight Decrease
8. Inflation	No Change	N/A
9. Productivity growth	No Change	N/A
10. Amortization method	No Change	N/A
11. Actuarial cost method	No Change	N/A
12. Asset valuation method	5-year Smoothing	Slight Increase

Notes:
1. The mortality assumption was the source of the largest increase in costs, outside of the change in investment return.
6. The current investment return assumption of 5.75% is no longer reasonable under current market conditions. Propose change to 3.75%

Overall, the net impact on liabilities was an increase

Actuarial Assumptions – 12/31/2014 Death Benefit Plans Valuation

- **Demographic**
  - Mortality
    - Based on RP-2000 mortality tables adjusted for NCRS experience
    - Projected improvements based on Scale AA
  - Service Retirement
    - Varies by age, gender, service and employee group
    - Study reduced retirement and unreduced retirement
  - Disability
    - State System: Only for grandfathered group of employees
    - Local System: Varies by age, gender, and employee group
  - Termination
    - Varies by gender and employee group
    - Varies by service prior to five year of service and by age after five years of service
  - Leave Conversions
    - Adjustments to service and pay at retirement
    - Varies by gender and employee group

- **Economic**
  - Rate of Return (5.75%)
  - Inflation (3.00%)
  - Productivity Growth (0.5%)
  - Merit Pay Increases
    - Varies by service and employee group
    - Set based on respective State and Local System

This is a summary of the assumptions currently used in the actuarial valuation of Death Benefit Plans.

Note that the assumptions correspond to those used in the respective State or Local System.

Key Takeaways – Death Benefit Plans

Assumption	Recommendation	Impact on Costs
1. Mortality	Decrease Rates and Update Mortality Improvement Projection Scale	Significant Decrease
2. Service retirement	Decrease Rates	Immaterial
3. Disability retirement	Decrease Rates	Immaterial
4. Termination from active employment	Decrease Rates	Immaterial
5. Leave conversions at retirement	Varies by Group	Immaterial
6. Investment return	Decrease Rate	Significant Increase
7. Merit pay increases	Decrease Rates	Immaterial
8. Inflation	No Change	N/A
9. Productivity growth	No Change	N/A
10. Amortization method	No Change	N/A
11. Actuarial cost method	No Change	N/A
12. Asset valuation method	5-year Smoothing	Immaterial

Notes:
1. The mortality assumption was the source of the largest decrease in costs.
6. The current investment return assumption of 5.75% is no longer reasonable under current market conditions. Propose change to 3.75%.

The net impact was an increase in surplus for the TSERS and LGERS Death Benefit Plans, a decrease in surplus for the Separate Insurance Benefits Plan for Law Enforcement Officers, and an increase in the unfunded status for the Retirees' Contributory Death Benefit Plan.

Demographic Assumptions

Mortality

Retirement

Termination of Employment

Disability

Termination of Disability

Administrative Expense

Demographic Assumptions – Recommendations for Disability Income Plan

- Mortality*
  - Update base rates from TSERS adjusted versions of RP-2000 to TSERS adjusted versions of RP-2014 tables
  - Update mortality improvements from projection Scale AA to Scale MP-2015
- Retirement* - Set to corresponding TSERS rates
- Termination of Employment* - Set to corresponding TSERS rates
- Disability - See Slide 15
- Termination of Disability - See Slide 16
- Administrative Expense - No administrative expense assumption

*See TSERS experience review presented in October 2015 for more details

Disability Rates for Disability Income Plan

- Disability rates measure the probability that a member will become disabled and receive a disability benefit under the Disability Income Plan (DIP)
- Higher rates of disability result in higher estimated liabilities in DIP
- DIP currently uses disability rates that vary by age and gender
- Proposed rates based on 1987 Group Long-Term Disability (GLTD) table for the six-month Elimination Period and adjusted for recent trends in the industry
- Expected number of TSERS disabilities indicates low credibility of plan experience (~35% credibility factor)
- Actual number of TSERS disabilities was much lower than current assumption and 1987 GLTD table
- Weighted average of rates set between experienced rates and 1987 GLTD table based on credibility factor
- See Appendix for full set of proposed rates

Termination of Disability Rates for Disability Income Plan

- The valuation anticipates that members may terminate from disabled status due to recovery or death
- Higher termination of disability rates results in lower estimated liabilities for DIP
- Rates of termination of disability are much higher when the duration of disability has been shorter
- DIP currently uses rates that vary by age at disability, gender, and duration of disability
- Current rates based on the 1987 GLTD termination table with a three-month elimination period
- A 2008 GLTD termination table was released with more in depth rates, including separate recovery and death tables as well as rates by reason for disablement
- An update to this table was made in 2012 for mortality improvement and a marginal increase
- Recommend 2012 GLTD table with six-month elimination period, including margin and mortality improvement, but no diagnosis definition
- See Appendix for full set of proposed rates

Demographic Assumptions – Recommendations for Register of Deeds' Supplemental Pension Fund

- Mortality*
  - Update base rates from LGERS adjusted versions of RP-2000 to LGERS adjusted versions of RP-2014 tables
  - Update mortality improvements from projection Scale AA to Scale MP-2015
- Retirement* - Set to corresponding LGERS rates for general employees
- Termination of Employment* - Set to corresponding LGERS rates for general employees
- Disability* - Set to corresponding LGERS rates for general employees
- Administrative Expense - 0.15% of the market value of assets

*See LGERS experience review presented in October 2015 for more details

Demographic Assumptions – Recommendations for Death Benefit Plans

- Mortality*
  - Update base rates from TSERS or LGERS adjusted versions of RP-2000 to TSERS or LGERS adjusted versions of RP-2014 tables
  - Update mortality improvements from projection Scale AA to Scale MP-2015
- Retirement* - Set to corresponding TSERS or LGERS rates
- Termination of Employment* - Set to corresponding TSERS or LGERS rates
- Disability* - Set to corresponding TSERS or LGERS rates
- Administrative Expense - No administrative expense assumption

*See TSERS and LGERS experience reviews presented in October 2015 for more details

Economic Assumptions

Inflation

Investment Return

Salary Increases

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ASOP 27

- Provides guidance to actuaries in selecting economic assumptions
  - General Selection Process
    - Identify components, if any, of the assumption
    - Evaluate relevant data
      - Review appropriate recent and long-term historical economic data
      - The actuary should not give undue weight to recent experience
      - Some historical economic data may not be appropriate due to changes in the underlying environment
    - Consider factors specific to the measurement
    - Consider other general factors
      - The actuary should consider the balance between refined economic assumptions and materiality
      - The actuary may incorporate the views of experts but the selection or advice should reflect the actuary's professional judgment
    - Select a reasonable assumption
      - See next slide
  - After completing these steps for each economic assumption, the actuary should review the set of economic assumptions for consistency and make appropriate adjustments if necessary

ASOP 27 – Selecting a Reasonable Assumption

Recent ASOP 27 Change in Determining the Reasonableness of a Selected Assumption

- Previously: Use a "best-estimate" range
  - Assumption is reasonable if selected from within a range over which it was "more likely than not" to fall
- New: Apply best-estimate standard
  - Each economic assumption selected by the actuary should be reasonable.
  - For this purpose, an assumption is reasonable if it has the following characteristics:
    - It is appropriate for the purpose of the measurement
    - Reflects the actuary's professional judgment
    - Takes into account historical and current economic data that is relevant as of the measurement date
    - Reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and
    - Has no significant bias

Economic Assumptions - Current

Inflation (General and Wage)	3.00% per year
Real Rate of Return	2.75% per year
Nominal Rate of Return	5.75% per year
Real Wage Growth (productivity)	0.50% per year
Merit Adjustments (Individual Salary Increases related to performance, promotion, etc.)	Vary by service and employee group

Investment Return Assumption - Considerations

- Use Expected Rates of Return by Asset Class Based Upon Accepted Industry Practice
- Determine Aggregate Real Return for Board's Target Asset Allocation Policy
- Recent investment performance is driven by economic and capital market factors that may or may not persist over the longer term over different economic and capital market cycles
- Actuarial Standards of Practice allow for the inclusion of a margin of conservatism
  - All else being equal, a lower return assumption is easier to achieve and has a higher likelihood of securing the benefits by increasing future contributions
  - Historically North Carolina Retirement Systems has been on lower end of the range of assumptions selected by state retirement systems

Investment Return

Asset Class	Allocation
Fixed Income – Investment Grade	95.50%
Cash	4.50%
Public Equity	0.00%
Private equity	0.00%
Non-Core Real Estate	0.00%
Fixed Income – Opportunistic	0.00%
Inflation Sensitive	0.00%
Core Real Estate	0.00%
Multi-Strategy	0.00%
	100.00%

The assumed rate of return is based on the target asset allocation and the expectation of future asset returns for each asset class. The current return assumption of 5.75% was last reviewed and adopted at the July, 2010 Board of Trustees meeting in conjunction with all economic assumptions.

On the next slide we have estimated nominal and real returns over various time periods based on this allocation and Buck's current return expectations.

Nominal and Real Returns - Buck Estimate

Compound (Geometric) Returns over Projected Periods

	5-Year	10-Year	15-Year	20-Year	25-Year	30-Year
Nominal						
75th Percentile	1.74%	2.92%	3.80%	4.50%	4.97%	5.29%
60th Percentile	1.51%	2.61%	3.44%	4.10%	4.49%	4.78%
50th Percentile	1.34%	2.44%	3.25%	3.83%	4.24%	4.48%
40th Percentile	1.13%	2.25%	3.00%	3.58%	3.95%	4.22%
25th Percentile	0.69%	1.98%	2.68%	3.18%	3.56%	3.85%
Real						
75th Percentile	0.50%	1.24%	1.68%	2.03%	2.25%	2.38%
60th Percentile	-0.17%	0.74%	1.28%	1.60%	1.86%	2.03%
50th Percentile	-0.63%	0.36%	0.97%	1.33%	1.62%	1.77%
40th Percentile	-1.10%	0.03%	0.63%	1.04%	1.31%	1.52%
25th Percentile	-2.07%	-0.72%	-0.04%	0.44%	0.79%	1.02%

Based on 2015 assumptions. Amounts shown are net of investment expenses.

The current assumption of 5.75% is not expected to be achieved over any time horizon. An assumption of 3.75% is expected to be achieved more than 50% of the time over time horizons of 20 years and beyond.

Current standards of practice suggest the use of an assumption that falls within the 40th and 50th percentile of projected returns based on the long term asset allocation. This is a change from the last time we reviewed the assumed rate of return, where the Actuarial Standards of Practice defined the range as between the 25th and 75th percentiles. Under the previous guidelines, Buck restricted the range to returns that were between the 25th and 50th percentiles.

Based on the above, the current assumption of 5.75% should be revised to be 3.75%.

Economic Assumption - Recommendations

Inflation (General and Wage)	No change - 3.00% per year
Real Rate of Return	Lower to 0.75% per year
Nominal Rate of Return	Lower to 3.75% per year
Real Wage Growth (productivity)	No change - 0.50% per year
Merit Adjustments (Individual Salary Increases related to performance, promotion, etc.)	Lower adjustments to better reflect experience in accordance with State and Local experience review adopted assumptions

Funding Methodology

Asset Valuation Methods

Actuarial Costs Method

Amortization Method

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Asset Valuation Methods

- Asset Valuation Methods smooth or average the market value returns over time to alleviate contribution volatility
  - ASOP 44 provides guidance to actuaries in selecting and recommending asset valuation methods
  - Actuarial value of assets should fall within a reasonable range around the market value and differences between the market value and the actuarial value should be recognized within a reasonable period of time
  - Sufficiently narrow ranges or sufficiently short periods are also reasonable
- Current asset valuation method reflects 20% of difference between expected actuarial value and market value, with a corridor of 80%-to-120% of market value of assets
- Current method is smooth but not as transparent or predictable as other methods

We recommend that the current asset valuation method for Disability Income Plan and Register of Deeds' Supplemental Pension Fund be modified to reflect a five-year smoothing method. An overview of the method is shown on the next slide.

Proposed Asset Valuation Method

- The proposed asset method is based upon a smoothed market value method. Under this method, asset returns in excess of or less than the expected return on market value of assets will be reflected in the actuarial value of assets over a five-year period. The calculation of the Actuarial Value of Assets is based on the following formula:

$$MV - 80\% \times G/(L)_1 - 60\% \times G/(L)_2 - 40\% \times G/(L)_3 - 20\% \times G/(L)_4$$

where:

MV = the market value of assets as of the valuation date

$G/(L)_i$ = the asset gain or (loss) for the i-th year preceding the valuation date (i.e., actual return on market value of assets less expected return on market value of assets)

- Propose to set actuarial value equal to market value as of December 31, 2014, which will *decrease* actuarial value of assets by $263,000 for Register of Deeds' Supplemental Pension Fund and $10.9 million for Disability Income Plan.
- May increase market volatility over the next 5 years
- Propose Death Benefit Plans continue to use market value of assets to monitor the sufficiency of the current level of contribution rates

Actuarial Cost Method

- Actuarial Cost Methods allocate costs to the actuarial accrued liability (i.e., the amount of money that should be in the fund) for past service and normal cost (i.e., the cost of benefits accruing during the year) for current service.
  - The Board of Trustees has adopted Entry Age Normal as its actuarial cost method for Register of Deeds' Supplemental Pension Fund
  - Develops normal costs that stays level as a percent of payroll
  - Entry Age Normal used by over 85% of public sector plans
- GASB has also adopted Entry Age Normal for all accounting calculations
- Disability Income Plan uses the Aggregate Method, which spreads costs over the expected future salaries of active employees
- Death Benefit Plans use the Aggregate Method to monitor the sufficiency of the current level of contribution rates

No recommended changes in actuarial cost method.

Cost Impact – Disability Income Plan

Had the proposed assumptions and methods been reflected for the December 31, 2014 annual actuarial valuation, the impact would have been a net decrease in costs:

- The actuarial accrued liability, or the amount of assets that should be in the fund, would be 17.4% lower, decreasing from $503.1 million to $415.8 million
- The net change in Annual Required Contribution (ARC) as a percentage of payroll would have decreased from 0.38% to 0.15% as shown in the table below.
- Resetting the asset smoothing method as of December 31, 2014 would decrease actuarial value of assets by $10.9 million

	Current Valuation	Reflecting Disability Rate Changes	Reflecting Termination of Disability Changes	Reflecting All Assumptions Changes and Asset Smoothing	Final Results Including 3.75% Discount Rate
Normal Cost	0.38%	0.21%	0.10%	0.11%	0.15%
Accrued Liability	0.00	0.00	0.00	0.00	0.00
Total	0.38%	0.21%	0.10%	0.11%	0.15%
Cumulative Change		(0.17)%	(0.28)%	(0.27)%	(0.23)%

Cost Impact – Register of Deeds' Supplemental Pension Fund

Had the proposed assumptions and methods been reflected for the December 31, 2014 annual actuarial valuation:

- The actuarial accrued liability, or the amount of assets that should be in the fund, would be 29.1% higher, increasing from $23.7 million to $30.6 million
- The net change in Annual Required Contributions (ARC) would remain unchanged as shown in the table below.
- Resetting the asset smoothing method as of December 31, 2014 would decrease actuarial value of assets by $263,000

	Current Valuation (5.75%)	Reflecting Mortality Changes Including MP-2015	Reflecting All Assumptions Changes and Asset Smoothing	Final Results Including 3.75% Discount Rate
Normal Cost	$634,379	$669,950	$662,189	$931,876
Unfunded Accrued Liability Amortization – (30 years)	(1,720,955)	(1,633,000)	(1,610,364)	(966,865)
ARC (not less than zero)	-	-	-	-
Accrued Liability	23,745,153	24,983,540	25,045,290	30,574,280
Assets	48,078,302	48,078,302	47,814,953	47,814,953
Unfunded Accrued Liability	(24,333,149)	(23,094,762)	(22,769,663)	(17,240,673)
Unfunded Accrued Liability Amortization – (12 years)	(2,862,437)	(2,716,923)	(2,678,765)	(1,810,204)

Cost Impact – Death Benefit Plans

Had the proposed assumptions and methods been reflected for the December 31, 2014 annual actuarial valuation, the impact would have been a net increase in surplus for the TSERS and LGERS Death Benefit Plans:

Death Benefit Plan for Members of the Teachers and State Employees' Retirement System	Current Valuation	Reflecting Updated Assumptions (5.75%)	Final Results Including 3.75% Discount Rate
Liabilities	$213,446,992	$158,403,928	$181,103,814
Present Assets	35,268,316	35,268,316	35,268,316
Prospective Assets	203,280,493	188,410,949	218,318,121
Total Assets	$238,548,809	$223,679,265	$253,586,437
(Unfunded)/Surplus	$25,101,817	$65,275,337	$72,482,623

Death Benefit Plan for Members of the Local Governmental Employees' Retirement System	Current Valuation	Reflecting Updated Assumptions (5.75%)	Final Results Including 3.75% Discount Rate
Liabilities	$60,665,132	$50,259,677	$57,927,707
Present Assets	80,277,033	80,277,033	80,277,033
Prospective Assets	40,665,237	38,798,520	45,009,695
Total Assets	$120,942,270	$119,075,553	$125,286,728
(Unfunded)/Surplus	$60,277,138	$68,815,876	$67,359,021

Cost Impact – Death Benefit Plans (continued)

Had the proposed assumptions and methods been reflected for the December 31, 2014 annual actuarial valuation, the impact would have been a net decrease in surplus for the Separate Insurance Benefits Plan for Law Enforcement Officers…

Separate Insurance Benefits Plan for Law Enforcement Officers	Current Valuation	Reflecting Updated Assumptions (5.75%)	Final Results Including 3.75% Discount Rate
Liabilities	$24,108,840	$21,142,323	$32,336,851
Present Assets	69,169,247	69,169,247	69,169,247
(Unfunded)/Surplus	$45,060,407	$48,026,924	$36,832,396

…and a net increase in the unfunded status of the Retirees' Contributory Death Benefit Plan:

Retirees' Contributory Death Benefit Plan	Current Valuation	Reflecting Updated Assumptions (5.75%)	Final Results Including 3.75% Discount Rate
Liabilities	$455,848,041	$412,716,063	$536,695,107
Present Assets	235,350,296	235,350,296	235,350,296
Prospective Assets	189,773,434	205,405,468	242,209,442
Total Assets	$425,123,730	$440,755,764	$477,559,738
(Unfunded)/Surplus	$(30,724,311)	$28,039,701	$(59,135,369)

Disclosures

- Buck's work product contained herein was prepared exclusively for the Board of Trustees and Staff of NCRS. It is a complex, technical analysis that assumes a high level of knowledge concerning the operations of NCRS.
- No third party recipient of Buck's work product should rely upon Buck's work product absent involvement of Buck or without our approval. Third parties recipients inclined to present our work product should engage NCRS and Buck during the presentation process to ensure that this work product is appropriately represented. If this is not desirable, such recipients should engage qualified professionals for advice appropriate to their own specific needs.
- The consultants who worked on this assignment are pension actuaries with significant experience in public funds like NCRS. Buck's advice is not intended to be a substitute for qualified legal or accounting counsel.

Certification

The results were prepared under the direction of Larry Langer and Michael Ribble who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. These results have been prepared in accordance with all applicable Actuarial Standards of Practice, and we are available to answer questions about them.

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions or applicable law.

Except where otherwise indicated, an analysis of the potential range of such future differences is beyond the scope of this report.

Larry Langer, FCA, ASA, EA, MAAA
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Questions?

THANK YOU

Appendix

Disability Income Plan
Proposed Rates of Disability

Rate of Disability Per 1,000 Lives		
Age	**Male**	**Female**
20 to 24	0.62	0.78
25 to 29	0.68	0.89
30 to 34	0.80	1.19
35 to 39	1.05	1.77
40 to 44	1.53	2.31
45 to 49	2.65	3.44
50 to 54	4.83	5.31
55 to 59	8.55	7.70
60 to 64	12.05	9.04

Appendix

Disability Income Plan
Proposed Rates of Termination of Disability

Males									
Duration of Disability (in months)	Age at Disability								
	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64
5	187.7	166.3	150.7	135.4	121.8	108.3	94.4	83.9	75.6
10	51.5	44.4	38.3	33.3	29.5	26.6	23.1	21.2	19.8
15	32.7	27.9	23.7	20.2	17.8	16.1	13.8	12.6	12.0
20	23.0	20.1	17.1	14.7	12.8	11.6	9.6	9.0	8.6
24	20.6	18.1	15.4	13.3	11.4	10.2	8.3	7.7	7.3

Female									
Duration of Disability (in months)	Age at Disability								
	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64
5	177.5	157.7	139.5	126.0	115.0	106.0	96.0	88.7	81.3
10	46.5	40.8	36.5	33.2	31.0	29.1	26.3	24.6	22.6
15	29.7	25.8	22.6	20.2	18.4	17.1	15.2	14.1	13.0
20	21.8	18.7	16.3	14.3	12.8	11.8	10.2	9.5	8.9
24	19.8	16.8	14.6	12.7	11.2	10.3	8.6	8.1	7.5

Appendix

Disability Income Plan
Proposed Rates of Termination of Disability
(continued)

Males									
Duration of Disability (in years)	Age at Disability								
	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64
5	94.7	83.8	72.9	63.5	56.3	51.2	42.3	43.8	43.2
10	42.0	40.3	36.3	32.2	30.0	31.2	34.3	38.0	40.9
15	29.2	28.3	28.4	27.3	28.3	32.2	35.9	40.8	47.2
20	25.2	26.3	29.3	31.4	36.1	42.2	47.8	58.5	68.4
25	28.3	28.5	33.6	36.2	38.1	53.1	59.6	88.8	129.4

Female									
Duration of Disability (in years)	Age at Disability								
	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64
5	90.9	76.3	64.7	55.4	48.5	44.4	37.2	38.5	37.1
10	40.0	35.6	29.3	25.4	23.0	23.0	24.5	27.9	29.5
15	28.5	26.5	22.4	20.6	20.5	22.2	25.1	26.2	37.5
20	26.8	23.8	21.8	21.5	24.2	27.7	31.9	39.8	55.7
25	27.6	25.5	25.1	24.2	27.1	41.7	41.5	76.6	130.2