

COMPREHENSIVE ACTUARIAL REVIEW OF THE
2017 ACTUARIAL VALUATION OF THE
SHERIFFS' PENSION & RELIEF FUND



ACTUARIAL SERVICES
PRESENTED TO THE PUBLIC RETIREMENT SYSTEMS' ACTUARIAL COMMITTEE
FEBRUARY 22, 2018



LOUISIANA LEGISLATIVE AUDITOR
DARYL G. PURPERA, CPA, CFE

February 5, 2018

Mr. Osey "Skip" McGee, Jr.
Executive Director
Sheriffs' Pension and Relief Fund
1225 Nicholson Drive
Baton Rouge, Louisiana 70802

Re: Comprehensive Actuarial Review of the 2017 Actuarial Valuation

Dear Mr. McGee:

To fulfill the requirements of R.S. 11:127(C), the Louisiana Legislative Auditor (LLA) will prepare a Comprehensive Actuarial Review (CAR) every other year for each of the statewide retirement systems.

The remainder of this letter contains the results of our comprehensive review of your June 30, 2017 Actuarial Valuation (prepared by G.S. Curran & Company and dated November 28, 2017). More specifically, we have evaluated for reasonableness the actuarial assumptions and methods employed by the System and its actuary. Based on our review, we expect to recommend that the Public Retirement Systems' Actuarial Committee (PRSAC) not accept the Sheriffs' Pension and Relief Fund's (SPRF) funding valuation. Instead, we will recommend that PRSAC request SPRF to revise its actuarial valuation report including a significantly lower return assumption.

I would like to thank you and your staff for your cooperation and assistance with this review. Your formal response to this review has been incorporated in Appendix B of this letter.

Sincerely,

Daryl G. Purpera, CPA, CFE
Legislative Auditor

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cc: G.S. Curran & Company

2017 COMPREHENSIVE ACTUARIAL REVIEW FOR LSPRF

Scope of Review

The 2017 Actuarial Valuation Report for SPRF for funding purposes (2017 Funding Valuation) was prepared by the actuary for SPRF's retirement board, G.S. Curran & Company, dated November 28, 2017.

This Comprehensive Actuarial Review (CAR) of that report was prepared by the actuary for the Louisiana Legislative Auditor, Mr. Paul Richmond, and includes evaluations and recommendations concerning key actuarial assumptions and methods for appropriateness. This CAR presents documented evidence for the opinions expressed herein concerning various assumptions and methods employed by the board and its actuary in the 2017 Funding Valuation.

Summary of Findings

A summary of our findings follows. Additional details are addressed in the remainder of this report.

- 1. Gain-sharing Cost-of-Living Adjustments (COLAs).** The cost of future COLAs is currently not included in the 2017 Funding Valuation. We recommend that the board (a) engage its actuary to model the likelihood and dollar amounts of future cost-of-living increases funded with "excess" investment earnings, as permitted by the statutory template and (b) incorporate permitted future cost-of-living increases in the measurement of the plan's costs and liabilities to the extent they are considered material for actuarial and accounting purposes.

Refer to "Section 1: Cost-of-living Adjustments" of this report for details.

- 2. Overly Optimistic Return Assumption.** The net inflation assumption, which is one of the building blocks included within the net investment return assumption, is an outlier and higher than the estimates from eight independent professional inflation forecasters. The board's 7.40% net investment return assumption is also outside the consensus mainstream of professional investment forecasters. It is, in our opinion, overly optimistic. A more appropriate net return assumption would be 5.75% per year. Even though the board and actuary lowered the return assumption from 7.50% in 2016 (with a plan of reaching 7.25% over the next two years), the 7.40% in 2017 is still overly optimistic for use in the 2017 Funding Valuation. All valuation assumptions need to stand on their own each year.

Refer to "Section 2: Overly Optimistic Return Assumption" of this report for details.

- 3. Salary Scale Inconsistency.** The net return assumption for the 2017 Funding Valuation was reduced by the same amount as the inflation rate reduction. However, no similar reduction was made in the salary scale assumptions even though the 2017 Funding Valuation report indicates the new lower inflation rate is embedded in the salary scale. For consistency and in accordance with the Actuarial Standards of Practice (ASOPs), it is our opinion that the salary scale assumption should be lowered in this case because the inflation assumption is lowered (in the absence of a full, new experience study on salary scales). Having a plan to address the salary scale in a future year is not relevant to the June 30, 2017 valuation because our actuarial review is limited to an examination of the 2017 Funding Valuation.

Refer to "Section 3: Salary Scale Inconsistency"

- 4. Mortality Assumption.** Careful analysis was undertaken by the board's actuary, in compliance with current actuarial literature, in assessing the degree of plan-specific mortality experience that should be recognized in the mortality tables assumed for the 2017 Funding Valuation. The current mortality assumption is acceptable.

Refer to "Section 4: Mortality Assumption" of this report for details.

As a result of the findings summarized above, with particular regard for the overly optimistic return assumptions, I cannot endorse the actuarial valuation prepared by SPRF. I realize that other actuaries may have different opinions on the future than I have. However, I trust you will give consideration to the robust methodology and process by which I arrived at my opinion.

I relied on research provided by Gabriel, Roeder, Smith & Company (GRS); however, I am solely responsible for my opinions. GRS bears no responsibility for the opinions I have expressed in this report. I reviewed their work carefully, as I do for any other external resource, in forming my opinions and in drafting and signing this Comprehensive Actuarial Review. Please refer to my certification at the end of this report.

Section 1: Gain-sharing Cost-of-living Adjustments

Page 4 of the 2017 Funding Valuation states:

“Although the Board of Trustees has authority to grant ad hoc Cost of Living Increases (COLAs) under limited circumstances, these COLAs have not shown to have a historical pattern, the amounts of the COLAs have not been relative to a defined cost-of-living or inflation index, and there is no evidence to conclude that COLAs will be granted on a predictable basis in the future. Therefore, for purposes of determining the present value of benefits, these COLAs were deemed not to be substantively automatic and the present value of benefits excludes COLAs not previously granted by the Board of Trustees.”

Certain Louisiana statutes are applicable to all state and statewide retirement systems and provide numerous rules, conditions, thresholds, and benefit levels governing the granting and paying of cost-of-living adjustments or permanent benefit increases. For the purpose of this letter report, we refer to both as COLAs.

For example, R.S. 11:241-248 provides substantive rules applicable broadly to many of Louisiana’s retirement systems, including SPRF. Certain other Louisiana statutes are applicable to specific retirement systems. For example, R.S. 11:2178 provides substantive COLA rules specifically for SPRF.

The broadly applicable rules and the specific system rules have changed over time; significant changes were most recently adopted in 2013 and 2014. Nevertheless, COLA statutes applicable to SPRF have been part of the framework for many years. This statutory history of providing a mechanism for SPRF’s COLAs continues today.

SPRF holds a significant amount of additional funds in the Funding Deposit Account (FDA), from which COLAs may be granted. These are not “gain-sharing” COLAs, and are not discussed in detail in this CAR. In the absence of a specific reference to gain-sharing, all references to COLAs herein are deemed to be gain-sharing COLAs available to SPRF under the relevant statutes.

Currently, the gain-sharing COLA statutes applicable to SPRF provide for (a) mathematical and logical rules for *when* the SPRF board may recommend a COLA and (b) mathematical and logical rules for *how much* COLA the SPRF board may recommend. There is not much if any discretion in the application of these mathematical rules.

When

The statutory mechanism for *when* the SPRF board is allowed to grant base COLAs and additional COLAs depends on whether the funded ratio is at or above certain percentage levels and on how long it has been since a COLA had previously been granted.

According to pages 11 and 24 of the 2017 Actuarial Valuation, the funded ratio of SPRF was 94.12% as of June 30, 2017. According to the statutes, during the time while SPRF’s funded ratio is at least 90% a COLA is allowed every other year subject to the excess earnings rule determining the amount, as described below. This can be called a “window rule”. A COLA is expected to be allowed every other year subject to the “excess earnings” rule determining the amount. However, there may not be complete clarity on exactly how to apply the rule concerning how much time must pass between COLAs.

How much

The statutory mechanism for *how much* COLA the SPRF board may grant (assuming it is permitted to do so based on the conditions above) depends on (a) how far above the threshold the funded ratio is, (b) how far above the assumed valuation rate the actuarial valuation rate actually was during the year, (c) how much the present value of benefits for eligible members is measured to be, (d) whether it is a base gain-sharing COLA, in which case the increase amount for each eligible member can be up to 3.0% per year, (e) whether it is an additional gain-sharing COLA, in which case the additional increase amount can be 2% of the eligible member's initial commencement amount, and (f) whether the A+B method in R.S. 11:241 is applied.

Discretion

If the conditions outlined in the second step above are satisfied and the SPRF board is permitted to grant a base gain-sharing COLA and possibly an additional gain-sharing COLA, the board must vote to actually grant the COLA. The board is free to vote for or against a COLA when permitted, or not to vote at all. This is the discretionary aspect of the gain-sharing COLA-granting process. This discretionary step is what prevents the COLA from being considered "automatic." But consider the following internal and external forces at play which tend to press board members to grant COLAs when allowed:

- a. While we have no personal knowledge of, or experience with, the SPRF board, generally speaking, retirement board members often have a sense of duty to serve the plan members. The SPRF retirement board of trustees is composed of individuals who have a natural constituency in plan members. There is a natural tendency to grant COLAs when allowed.
- b. Social Security gives a COLA almost every year. In any given future year, if SPRF retirees have not had a COLA in a couple years, and since they are not generally covered by Social Security, there is a natural tendency to grant a COLA if allowed.
- c. Furthermore, if other retirement systems, such as LASERS, TRSL, or other state or statewide systems give COLAs in a given year, SPRF' board members will feel pressure to grant a COLA if allowed.
- d. Finally, if the funded ratio of the System continues to improve as it is expected to do, board members might feel like sharing that success with the plan members by granting a COLA.

On the other hand, the direction of the employer contribution rate (going upward or downward) also influences the willingness to recommend a COLA. Indeed, there are fiscal pressures that move board members at times to refrain from recommending COLAs when permitted if the employer contribution rate goes up by sufficient margins or if the funded ratio falls.

The interplay between granting COLAs from "excess" earnings versus from the Funding Deposit Account will also affect the likelihood of granting a gain-sharing COLA. If the granting of an FDA-funded COLA replaces the granting of a gain-sharing COLA, that might be treated the same as a gain-sharing COLA for modelling purposes except for the fact that a lower FDA balance reduced plan assets in that and future valuations. But all this can be incorporated into a model. If SPRF is permitted to grant either a gain-sharing COLA in a window year if there are "excess" earnings that year or grant an FDA-funded COLA in such a year (or in a year when there are no "excess" earnings), that may be considered to produce COLAs at least as often as COLAs modelled solely from "excess" earnings, or more often, subject to availability of an FDA balance. Repeated use of the FDA to pay for COLAs just makes the model a little more complex, but not insurmountable.

The use of an Experience Account (as for the state plans) and a Funding Deposit Account (for statewide plans) is similar in some ways but different in others. They are similar in the sense that a permitted COLA *appears* not to cost anything because the funds to pay for it already exist in an account (either an EA or an FDA); and when the COLA is granted money moved from those notional accounts into, or back into, the core fund. So the increase in present value of benefits equals the increase in the core fund, making the granting *appear* not to have a cost.

It may be argued that they are different because the source of contributions into the FDA is not the core fund itself (as in the EA), but from an outside source. That makes it different. However, even the contributions into the FDA could and would go into the core fund if it were not for the program. So the core fund is being denied use the contribution for any number of other applications for funding core benefits because of the FDA.

The following exhibit illustrates recent history of when SPRF's COLAs were allowed to be granted and how much. There is strong logical support for the presumption that the SPRF board will vote for a gain-sharing COLA whenever permitted to do so.

- In our opinion, a decision to not measure the likelihoods and magnitudes must be supported by more than an assertion that COLA liabilities do not need to be calculated because COLAS are not automatic.
- Moreover, in our opinion, the lack of any guarantee or certainty about whether the Board will adopt a COLA when permitted to do so is not relevant.

Of far greater importance is the relative magnitude of the liability and its relative effect on contribution requirements.

The likelihood, the *when*, and the *how much* are all actuarially measurable. Given the high degree of confidence in the board granting gain-sharing COLAs whenever permitted, in our opinion, material costs and liabilities of future COLAs should be measured and included in the valuations.

Exhibit 1 The Statutory Template for Allowing COLAs is Actuarially Measurable					
Actuarial Valuation Date	Amount Permitted By Statutory Template	COLA Granted by Board	Approved by Board	Effective Date of COLA	Comments
6/30/2017	3.0%	Yes	12/18/2017	1/1/2018	COLA granted from Funding Deposit Account, not a gain-sharing COLA
6/30/2016	None	None			
6/30/2015	None	None			
6/30/2014	Up to 3.0%	Yes, 2.5%		1/1/2015	Granted and effective during fiscal year ending 2015.
6/30/2013	None	None			
6/30/2012	None	None			
6/30/2011	None	None			
6/30/2010	None	None			
: This information has been extracted from Title 11 of the Louisiana Revised Statutes, from information reported in ROVERS' annual actuarial valuation reports and from correspondence with SPRF's actuary.					

Given the recent examples of granting a COLA when allowed (measured at the fiscal year ending June 30, 2014), coupled with the analysis above, it is our opinion that there is a reasonable probability that the board will grant a COLA whenever permitted. It seems unreasonable to “assume” a 0% chance of granting a COLA in future years when otherwise allowed.

Legislative Framework Presumes COLAs

The COLA provisions are in the Louisiana statutes for a reason: To pay COLAs – sometimes. The sponsors and other legislators fully presume COLAs to be granted periodically, even if only every few years. If not, these statutory provisions probably would not have been codified.

It is incumbent upon the actuary to recognize the possibility and likelihood that COLA benefits will be paid with some regularity, even if only every few years. That is why we believe the statutory provision is there. Failure to recognize (even if making only a rough estimate) material costs and liabilities of the statutes' COLA provisions is to deny the purpose of the statutes.

Something is Better Than Nothing

In the current and prior years, the board's actuary has posited (a) that one cannot know with any certainty when COLAs will be granted, (b) that no automatically segregated and accumulated (like the state systems) accounts are maintained for the purpose of payment of future cost of living increases and (c) that statutes limit the frequency permitted for granting COLAs. This has been put forth as support for not recognizing future COLAs in advance (the "No Recognition" approach).

Traditional actuarial methods model the payment of various plan benefits over time, none of which are known with certainty. For example: the times when members will terminate, become disabled, die, or retire are not known with certainty; how much employees' pensionable compensation will increase over time is not known with certainty; nor do we know with certainty what the future investment returns or future inflation will be.

Nevertheless, these uncertainties do not stop us from making reasonable projections using accepted actuarial techniques to measure future costs and liabilities associated with any given plan benefit provision. Decrement events and benefits do not need to be fully predictable before an actuary recognizes their likelihood within an actuarial valuation.

While gain-sharing COLA benefits are different from other benefit provisions in the events and conditions in which the actual benefits arise, they are the same as any other benefit provision in the sense that (a) they are a well-defined benefit payable to plan members, (b) all aspects of their eligibility and calculations can be programmed and calculated using accepted actuarial techniques, and (c) other aspects of their eligibility/approval may be discretionary but do have a reasonably high likelihood of being approved whenever allowed. Actuarially measuring the future costs and liabilities of gain-sharing COLA benefits (recognizing a degree of likelihood and timing) is consistent with our traditional practice of actuarially measuring on a scientific basis other plan benefit provisions (recognizing a degree of likelihood and timing).

Refer to the Appendix A at the end of this letter for several citations from the Actuarial Standards of Practice (ASOPs) pertaining to the valuation of COLAs.

Given the size of SPRF's accrued liabilities and asset portfolio, reasonable scientific actuarial modelling methods are available to the board and its actuary. The modelling methods are affordable and cost-effective: producing information that better identifies the true cost of the SPRF benefit program.

Although scientific measurements are superior and preferred, even a rough non-scientific estimate is better than the "No Recognition" approach currently used by SPRF. Following the reasoning set forth in the pages above, it is reasonable to expect gain-sharing COLAs to be permitted every few years, in the amount of 2.0% to 5.0% for some or all eligible members each time granted.

Other Ad Hoc COLAs

Other plans around the country have no special provisions for COLAs, no well-defined criteria or hurdle to satisfy for granting COLAs, and have no history (or no discernible pattern) of granting ad hoc COLAs. Those are different. In those cases, there is no good reason to expect COLAs to be paid in the future, until or unless some pattern (even if erratic) of truly ad hoc COLAs emerges. But SPRF is different, as are other Louisiana retirement systems.

There is a long and specific statutory history with detailed conditions for granting COLAs, fully contemplating that COLAs would be granted. In the past eight years, the two times when a COLA was

allowed to be granted for satisfying the statutory conditions, the board did indeed grant the specified COLA. That, together with other facts presented above, is a strong indicator that there is some likelihood that a COLA will be granted sometimes.

Reasonable Actuarial Estimates

There are at least two preferred approaches to actuarially measuring the cost and liabilities of SPRF's COLA provisions. Both preferred approaches use explicit, stochastic methods and involve running actuarial simulations of the future.

1. *Single equivalent annual COLA assumption.* The simulation spins off information about the frequency and magnitude of each year's permitted gain-sharing COLA. The mean (average) transfer amount can be considered a benefit stream. Solving for X, it determines what would be the single annual equivalent COLA, e.g., 0.35%, or some other such estimated equivalent annual COLA. Solve for the X% that has the same actuarial present value over the next 30 years as the average simulated transfer amount.
2. *Single equivalent benefit load assumption.* Dividing that same mean (average) transfer stream for each year by its regular benefits projected to be payable for that year, as spun off from the open group forecast valuation, provides an estimate of the load on benefits that approximates the average transfer amount, e.g., 3%, 4%, or some other such percent load.

Either of these two alternative *actuarial methods* is acceptable and preferable, in our opinion. Both of these methods are transparent and explicit *actuarial methods* for recognizing the actuarially measureable likelihood of future gain sharing COLAs for funding purposes.

The first method presented above (single equivalent annual COLA assumption) provides a reasonable proxy for what would likely actually happen in the years to come. The value of X% annual COLA serves as the single equivalent COLA, and is treated in the valuation "as if" it is a regular annual COLA increase. The only challenge is to make a reasonable estimate of X% which scientific actuarial methods enable us to do.

Materiality

Assuming an actuarial study is prepared that models the future gain-sharing COLAs stochastically, it might turn out not to be material. If it is found not to be material for actuarial funding or for accounting purposes, then the future gain-sharing COLAs would not need to be measured.

Only an actual stochastic model simulating the future gain-sharing COLAs could demonstrate whether the statutory template is expected to produce sufficient future COLAs to be material. Estimating it would likely not be sufficient.

While not a trivial project, the model is fairly easy to build and test, especially if the framework could be used for other statewide systems as well. Refer to the Appendix A at the end of this CAR for a brief summary of the steps typically found in such a project.

Section 2: Overly Optimistic Return Assumption

In our opinion, the assumed rate of return used by SPRF and its actuary (7.40% as of June 30, 2017) is overly optimistic compared to a consensus of independent expert investment consultants and forecasters. Our rationale for this conclusion follows.

This section sets forth (a) our evaluation of SPRF's defense of 7.40% as a return assumption and (b) a disciplined process for setting a return assumption that ensures it is mainstream and defensible, and provides the details for how we arrived at 5.75% as the more appropriate net return assumption.

A Disciplined Process

The cost of being wrong is substantial, especially if it is over a 10-year or 30-year period, and could be detrimental to both plan members and taxpayers. To take this evaluation of SPRF's net return assumption a step further, consider the subsection below which describes a *process* for setting or evaluating a net return assumption that:

- a. Is unbiased, objective, and free of agency risk;
- b. Is disciplined and robust;
- c. Is defensible; and
- d. Improves intergenerational equity, contribution stability, and benefit security of plan members.

The most significant factors in setting or evaluating an assumed return are:

- a. The horizon over which returns are expected to be satisfied;
- b. Future rates of inflation (forward-looking), as expected by a *consensus of experts* in the field of inflation forecasting who are both independent and nationally recognized;
- c. Current and future asset allocation percentages by asset class; and
- d. Future investment performance (forward-looking) and other capital market assumptions for various asset classes, as expected by a *consensus of experts* in the field of investment forecasting who are both independent and nationally recognized.

Horizons

There is an ongoing debate over the time horizon that should be used to set the rate of return assumption. Some have posited that pension plans are long-term propositions and their return assumptions should reflect a long-term horizon, for example, 30 years. Others believe that a shorter time horizon should be used. It is our opinion that a forward-looking mid-term horizon (e.g., 10 years) should influence the final choices of return assumptions. Long-term horizon forecasts (e.g., 20-30 years) are useful for discussion purposes, but not to the exclusion of mid-term horizons. Pension funds are, indeed, usually long-term arrangements. However, in our opinion (for the reasons cited below), 30 years is too long for the selection of a pension fund's expected rate of return.

Some of the reasons supporting the use of a mid-term horizon are:

- a. *Underperformance in the mid-term may not be sustainable.* If the forecasting experts are correct, there will be lower compounded returns over the next decade or two while waiting for the

following decades to bail out pension plans in order to achieve the higher long-term expectation. Undoubtedly, there will be better-than-assumed years on occasion. But a consensus of independent experts says (in the support outlined below, in various investment periodicals and in retirement conferences across the country) the next decade is expected to see compound returns well below 7.00%; much lower than SPRF's current 7.40% assumed rate.

Anticipating higher returns in the long-term, while regularly suffering underperformance in the mid-term, is not sustainable. It causes repeated contribution rate increases and a lack of progress in paying down the unfunded actuarial liability. It will test the patience and tolerance of taxpayers, elected representatives, and budget directors, and may push them into serious consideration of proposed retirement plan designs that transfer all or some of the investment risk onto plan members.

- b. *Forecasts for 30-year long-term horizons are the least reliable.* There is much less certainty in long-term forecasts than mid-term forecasts. In the face of uncertainty, investors become more conservative. Thus, decision-makers should consider being more conservative than the longest-term forecasts indicate because the longest-term forecasts are more uncertain. This is a truism, whether in financial forecasting, election forecasting, or hurricane forecasting. Long-term forecasts are less reliable than mid-term forecasts.

No one knows the future for certain. When in doubt, in our opinion it is best to err on the side of conservatism (lower return assumptions).

- c. *Duration of the liability.* The duration of SPRF's plan liabilities is approximately 9.5 years. Relying too much on a 30-year horizon for return expectations fails to recognize the mid-term cash demands upon the plan.

Perspectives

There are two types of perspectives to consider when defending or determining assumptions for a future net rate of return of a pension fund and a future rate of inflation. One is temporal – Do we look more to historical rates to inform decision-makers or more to forward-looking forecasts of the future? The other is social – Do we look more to what other retirement systems are doing or look more to what expert forecasters would expect for SPRF's own portfolio in the future?

Temporal. Historical rates of return and inflation are viewed more as mere information, than used to defend or determine a current net return or inflation assumption. The past is indeed useful for understanding historical relationships among various economic forces and various statistical metrics such as standard deviations, correlation coefficients and P/E ratios; but even those have been known to change over time and may be different from their historical averages. Certainly, past performance should not be a driver in decision-making.

The current domestic and global environment is not like the past 10, 30, or 50 years; and the future domestic and global environment is certain to be different from the past. A forward-looking perspective should drive the defense or determination of a net return assumption for pension actuarial valuations. Strategically selecting historical returns (an X-year period ending on Y-date) to justify a net return assumption being applied to the next 10-, 20-, or 30-year period is not valid.

Past performance is not an indicator of future performance

Social. Looking to what other peer retirement systems have adopted for their own net return assumptions should not be a driver in decision-making. Other retirement systems have their own asset allocation and expense structure and their own set of politics, protectionism, budget issues, and agency risk. They are not the best source to turn for defense or determination of another system’s net return assumption.

Independent, unbiased, expert sources of inflation and investment return forecasts are the best places to look for input when setting a net return assumption for pension valuations. These are much more objective and unfiltered sources – obtained directly from the experts themselves, to guide decision-makers.

Adopting a *process* that looks to a consensus of external subject matter experts’ forward-looking forecasts is the best way to avoid political and budget pressures that sometimes distract or influence assumption-setters away from their primary duty to set return assumptions as their unbiased best estimate of future.

Inflation

An assumed rate of future inflation is a component of the assumed return assumption and the salary increase assumptions. When inflation rates are lowered, the return and salary increases should be lowered (unless there is a coincidental change in real returns or real salary increases that offset it). Conversely, when inflation rates are increased, the return and salary increases should be increased. Expected future inflation is a critical component of the other assumptions. Therefore, much care and attention should be given to the expected future rates of inflation.

SPRF’s 2017 Funding Valuation (page 4) states: “An inflation rate of 2.775% was implicit in the assumed rate of return.”

Having a plan to reduce the rate of inflation in a future year is not relevant to the June 30, 2017 valuation because our actuarial review is examining the 2017 Funding Valuation. Based on the evidence presented below, the current 2.775% assumed rate of inflation is an outlier and serves to cause an overly optimistic return assumption.

We suggest an inflation assumption closer to the 2.25% supported by the research on expected inflation rates in Exhibits 3 and 4. An inflation assumption of 2.775% is an outlier compared to specified and authoritative forecasts.

Currently, expert professional sources for forward-looking inflation forecasts generally lie between 1.73% and 2.60%. Consider the forward-looking forecasts from the following subject matter experts.

Exhibit 2

Eight Major National Sources of Inflation Forecasts	
Bond Investors	Congressional Budget Office
Federal Reserve Bank of Philadelphia	Federal Reserve Bank of Cleveland
Federal Reserve Board	GRS Survey
HAS Survey	Social Security Trustees Report

Some of them provide multiple measures of inflation for different time horizons, making a total of 19 forecasts from eight reputable sources.

Exhibit 3

2017 Measures of Inflation		
Horizon	Average	Number of Sources
26.3 - 30 yrs	2.20%	7
20 yrs	2.06%	3
9.40 -15 yrs	2.16%	9

It has become increasingly difficult to support inflation assumptions greater than 2.50% in the face of so many opinions to the contrary from experts in the field of inflation forecasting.

Our preferred inflation assumption would currently be 2.25% because it lies more comfortably near a consensus of the expectations in the summary table above and the detailed table below. In our opinion, outliers are not safe, conservative or mainstream assumptions.

Consider Exhibit 4, which shows inflation forecasts of these eight large reputable experts in the field of inflation forecasting.

Exhibit 4

Forward-looking Annual Inflation Forecasts (From Professional Experts in the Field of Forecasting Inflation)	
Federal Reserve Board's Federal Open Market Committee Current Long-run Price Inflation Objective (Since Jan 2012; Personal Consumer Expenditures)	2.00%
Congressional Budget Office: <i>The Budget and Economic Outlook</i> Overall Consumer Price Index (June 2017; Ultimate) Overall Consumer Price Index (June 2017; 11 Years) Personal Consumer Expenditures (June 2017; Ultimate) Personal Consumer Expenditures (June 2017; 11 Years)	2.40% 2.36% 2.00% 1.98%
2017 Social Security Trustees Report CPI-W 15-Year Intermediate Assumption CPI-W 30-Year Intermediate Assumption GDP Deflator 15-Year Intermediate Assumption GDP Deflator 30-Year Intermediate Assumption	2.60% 2.60% 2.20% 2.20%
Quarterly Survey of Professional Forecasters 2Q2017 Federal Reserve Bank of Philadelphia 10-Year Forecast	2.30%
Federal Reserve Bank of Cleveland 30-Year Expectation on June 1, 2017 20-Year Expectation on June 1, 2017 10-Year Expectation on June 1, 2017	2.13% 1.97% 1.73%
Bond Investors (Excess Yield of Non-indexed Treasuries Over Indexed Treasuries) 30-Year Expectation on June 30, 2017 Median 30-year Expectation over 6/30/12 - 6/30/17 20-Year Expectation on June 30, 2017 Median 20-year Expectation over 6/30/12 - 6/30/17 10-Year Expectation on June 30, 2017 Median 10-year Expectation over 6/30/12 - 6/30/17	1.85% 2.09% 1.77% 2.02% 1.73% 1.96%
Investment Consultants and Forecasters 2017 GRS Survey major national investment forecasters and consultants Median expectation among 8 firms (averaging 9.4 years) Median expectation among 4 firms (averaging 26.3 years) 2017 HAS Survey of 12 investment advisors: Median (10 years) 2017 HAS Survey of 12 investment advisors: Median (20 years)	2.25% 2.21% 2.32% 2.44%

Asset Allocation

It has been generally accepted for many years that a fund’s asset allocation is responsible for the vast majority of a fund’s investment performance. Therefore, the asset allocation of the System is a core element in setting and evaluating assumed future returns.

In our evaluation of the actuary’s net return assumption, we first relied on the 10 target asset allocation percentages set forth in System’s formal Investment Policy Statement (IPS) last updated October 2017. We then relied on page 122 of a document from the System’s (“Attachment 4 - Reports), prepared by BNY/Mellon, to further separate these percentages into 12 target asset allocation percentages.

Exhibit 5

2017 SPRF Target Asset Allocation			
Risk Assets		Fixed Income Assets	
Domestic Equity	40.0%	U.S. Core Bonds	20.0%
Large Cap (85%)		Emerging Market Debt	2.5%
Mid Cap (5%)		High Yield Bonds	2.5%
Small Cap (10%)			
Non-U.S. Equity	17.5%		
Emerging Market Equity	2.5%	<i>Total Fixed Income Assets</i>	25.0%
Private Real Estate	4.0%		
Hedge Funds	7.0%		
Commodities	3.0%		
REITS	1.0%		
<i>Total Risk Assets</i>	75.0%	<i>Total Asset Allocation</i>	100.0%

Source: SPRF' Investment Policy Statement (October, 2017)

It should be noted that SPRF’s asset allocation is more conservative than other state and statewide systems. Consequently, it is expected that the forecasted net returns would be lower than other state and statewide systems.

Consensus of Professional Investment Forecasts

We applied the target asset allocations to the expectations in the GRS Survey of 10 major national investment consultants and forecasters. Eight of these 10 investment consultants/forecasters provided GRS with their mid-term (10 years) horizon forecasts, and four of them provided GRS with their longer-term (20- to 30-year) horizon forecasts. Given the brevity of the descriptions of the asset classes identified, our mapping of these 12 asset classes to the investment consultant’s asset classes may not be exact.

Listed below are the national firms in our 2017 GRS Survey. These are very large and reputable investment consultants and forecasters.

Exhibit 6

10 Major National Investment Consultants and Forecasters in the GRS Survey			
Aon Hewitt	BNY/Mellon*	J. P. Morgan*	Marquette Associates
Mercer*	NEPC *	Pension Consulting Alliance*	Principal
R.V. Kuhns	Voya		

**Each firm has between \$1 trillion and \$10 trillion in worldwide assets under management or advisement; the others are large managers and advisors below \$1 trillion.*

We applied the investment forecasters' expected returns to SPRF's asset allocation. We replaced the investment forecasters' respective inflation assumptions with 2.25%, our preferred assumption based on the consensus of expert inflation forecasters' expectations presented above in order to normalize for a consistent inflation assumption across all forecasters.

We reduced the respective forecasts for SPRF by the expected investment-related expenses and added alpha back in to replace active management expenses above expected passive management expenses, as permitted and limited by Actuarial Standard of Practice No. 27. This leaves a net reduction estimated to be for passive investments.

This process results in normalized expected returns for any one given year in the forecast horizon (called the expected arithmetic return). Finally, we reduced the resultant one-year arithmetic returns for volatility drag in the compound return expected over time, because pensions are all about compounding in a volatile environment over the horizon.

It matters not whether the field of forecasting is for hurricanes, earthquakes, elections, or inflation and investment returns, a *consensus average* of many reputable experts is proven to be more accurate than any one of those experts.

Below are the results of this process for the mid-term horizon.

Exhibit 7
Expected Likelihood of Achieving Forecast Results
Based on a 10-year Time Horizon

Investment Consultant 10 Year Horizon	Distribution of 10-Year Average Geometric-Compound Net Nominal Return (Percentiles)			Probability of exceeding 7.40%
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	3.63%	4.57%	5.52%	22.71%
2	4.78%	5.58%	6.38%	28.39%
3	4.63%	5.50%	6.38%	29.29%
4	4.45%	5.44%	6.44%	31.10%
5	4.66%	5.69%	6.72%	33.82%
6	4.98%	5.93%	6.89%	34.91%
7	5.56%	6.51%	7.48%	40.77%
8	5.16%	6.33%	7.51%	40.94%
Average of All 8	4.73%	5.69%	6.67%	32.74%

There are three important takeaways from Exhibit 7:

- a. Over the mid-term horizon the range of expectations of the 50th percentile of compound average return runs from 4.57% to 6.33%.
- b. The 50th percentile consensus expert mid-term forecast is 5.69%, or rounded to 5.75%.
- c. The consensus of these experts is that there is only a 32.74% chance of achieving at least the current 7.40% over the mid-term horizon. This does not mean a 32.74% chance of achieving the 7.40% assumption in any year during the horizon; it means that the compound return over the next 10 years has a 32.74% of achieving at least the 7.40% assumption.

This is why, actuarially speaking, the 5.69% rate of return is the preferred assumption for funding because it is the 50th percentile expectation of compound returns over a mid-term horizon. The consensus is that there is a 50-50 chance of returning at least 5.69% when compounded over the next 10 years.

None of the eight major national investment consultants with mid-term horizon forecasts expect the 50th percentile of the compound return to be at or above the current 7.40% assumption over the next 10 years. Again, there is safety in consensus, rather than rushing to an outlier. There are good reasons for these professionals' bleak mid-term forecasts, the details of which are beyond the scope of this report.

If the independent experts are right, the next 10-year period will experience a substantial shortfall, while the board hopes to be bailed out in years 11 through 30.

Below are the results of this process for the long-term horizon.

Exhibit 8
Expected Likelihood of Achieving Forecast Results
Based on a 25-year Time Horizon

Investment Consultant 20-30 Year Horizon	Distribution of 25-Year Average Geometric-Compound Net Nominal Return (Percentiles)			Probability of exceeding 7.40%
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	5.59%	6.19%	6.80%	30.73%
2	5.82%	6.43%	7.04%	34.46%
3	5.91%	6.51%	7.12%	35.53%
4	6.05%	6.70%	7.36%	31.10%
Average	5.84%	6.46%	7.08%	32.96%

There are three important takeaways from Exhibit 8:

- a. Over the long-term horizon the range of expectations of the 50th percentile of compound average return runs from 6.19% to 6.70%.
- b. The 50th percentile expectation of the consensus average for the long-term horizon is 6.46%, or rounded to 6.50%.
- c. The consensus of these experts is that there is only a 32.96% chance of achieving at least the current 7.40% over the long-term horizon. This does not mean a 32.96% chance of achieving the 7.40% assumption in any year during the horizon; it means that the compound return over the next 25 years has a 32.96% of achieving at least the 7.40% assumption.

None of the four consultants with longer term forecasts expects a 50-50 chance of achieving the 7.40% return over 25 years.

This makes the current 7.40% assumption an outlier among the mainstream investment forecasters. According to the capital market assumptions of these investment forecasters, there is only a 32.74% chance of achieving at least the 7.40% compound annual return over the next 10-year period and only a 32.96% chance over the next 25-year period.

For use in an actuarial valuation for pensions, where the entire measurement and funding model is built on compounding (present values and future values), the 50th percentile compound or geometric expectation over a mid-term horizon are the most appropriate choices of a net return assumption.

Again, no one knows the future for certain. When in doubt, in our opinion it is best to err of the side of conservatism (lower return assumptions), relying on the experts to form my opinions.

Section 3: Salary Scale Inconsistency

The 2016 Funding Valuation report stated (page 39) that the Annual Salary Increase Rate is 5.5% (2.875% Inflation / 2.625% Merit). This salary rate was employed for the 2016 Funding Valuation, when the inflation assumption was 2.875% which was embedded in the salary rate above.

The 2017 Funding Valuation report stated (page 39) that the Annual Salary Increase Rate is 5.5% (including 2.775% Inflation). This salary scale was employed for the 2017 Funding Valuation, when the inflation assumption was 2.775%. Notice the disclosure acknowledges that the 2.775% inflation assumption was embedded in the salary rate above. That is a change in the inflation assumptions. Yet the rate did not change.

For consistency and in accordance with the Actuarial Standards of Practice (ASOPs), it is our opinion that the salary rate assumption should be lowered in this case because the inflation assumption is lowered (in the absence of a full, new experience study on salary rates). As mentioned earlier, having a plan to address the salary scale in a future year is not relevant to the June 30, 2017 valuation because our actuarial review is limited to an examination of the 2017 Funding Valuation.

Section 4: Mortality Assumption

The 2017 Actuarial Valuation (page 39) states that the mortality assumption for annuitant and beneficiary mortality is the “RP 2000 Combined Healthy with Blue Collar Adjustments Sex Distinct Projected to 2028 for males and set forward 1 year and projected to 2028 for females. (Projections based on scale AA as published by the Society of Actuaries)”

Base table

To evaluate the reasonableness of the mortality assumption, we reviewed the base mortality (RP2000 with Blue Collar Adjustments) separately from the projection scale (Scale AA).

We believe the use of the RP2000 with Blue Collar Adjustments as the base mortality table to be reasonable. The process we used to determine the reasonableness of the base mortality table is as follows:

1. Experience Study: An experience study (dated February 26, 2016) was prepared covering the period from July 1, 2009, through June 30, 2014. We reviewed the experience study report and found the section on mortality to be described with reasonable detail and careful recognition of relevant mortality experience. The report describes reasonable applications of actuarial credibility principles.
2. Size of the plan: Due to the small size of the experience group and low number of deaths during the study period, the results of the experience study are not fully credible. Only partial credibility can therefore be given to the results of the experience study. A weighted average of the group’s experience and that of a standard reference table is needed to obtain a final mortality assumption for valuation purposes.
3. Standard mortality table: Since the experience study is not fully credible, it is necessary to select a standard mortality table as a reference table to be used in the determination of the mortality assumption. Possible candidates for a standard reference table include:
 - a. The mortality tables developed for LASERS or TRSL. However, an actuarial assessment would need to be made of the appropriateness of the actuarial methodology and the comparability of the groups covered before considering them for use as the standard reference table for this purpose.
 - b. The RP2000 mortality table was published in or around the year 2000. It was developed by the Society of Actuaries based on national private sector pension data.
 - c. RP2014 mortality table was published in October 2014. As for RP2000, this table was also developed by the Society of Actuaries based on national private sector pension data. It is the most recent reliable base mortality table available, for purposes of national estimates of mortality for pension plans.
4. Louisiana mortality rates: The Centers for Disease Control and Prevention (CDC) has published data¹ demonstrating that mortality rates in Louisiana are generally higher than national averages.

¹ Refer to Table 3 in the *National Vital Statistics Reports* (Volume 60, Number 4) dated January 22, 2012, published by the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System.

Therefore, it would be more prudent not to use a current national mortality table (such as RP2014) as the standard reference table in the weighted average calculations described above without adjustment.

5. RP2000 with blue collar adjustment as the standard mortality table: The experience study states that RP2000 mortality table was selected as the standard base mortality table. The RP2014 mortality table, being the newest table available, was considered by the system's actuary. However, the RP2000 mortality table was ultimately selected to account for the higher mortality rates in Louisiana. We find this approach reasonable. We analyzed the data from CDC¹ and found that mortality rates in Louisiana are approximately 20% higher than national mortality rates. We found the mortality rates in RP2000 to be approximately 26% higher than those of RP2014 (representative of national rates). In our opinion, this is close enough for RP2000 to qualify as a reasonable standard reference table for reflecting general Louisiana mortality. The blue collar adjustments are also reasonable.
6. Credibility weights: Credibility weights were calculated separately by GSC for males and females based on the number of deaths observed in the experience study. Due to the low number of deaths, the weights assigned to the combined group's experience were low (55% for males and 45% for females). The associated weights assigned to the standard reference table were the compliments of those (45% for males and 55% for females). These weighting factors calculated by GSC used standard actuarial treatment required for developing weighted average mortality that recognizes the credibility level of data in an experience study with insufficient data of its own.
7. Credibility weighted mortality: The credibility weights were applied to (a) the experience study mortality rates and (b) standard reference table's mortality rate (RP2000 as projected to 2012) to obtain the weighted mortality rates. The average rate was 101% of the standard reference table for males and 110% of the standard reference table for females.
8. Set-forwards and set-backs: The credibility weighted mortality rates were compared to the standard reference table to set the appropriate set-forwards and set-backs to determine the best fitting table to use for the final mortality assumption. A set-forward of 1 year (in the RP2000 table projected by Scale AA to 2012) was determined by GSC to be the best fit for males and no adjustment to the standard reference table was determined to be the best fit for females.

Therefore, we find the base table (before projection for future mortality) to be fully appropriate for the 2017 Actuarial Valuation.

Projection scales

Once the base table was found to be reasonable, we then reviewed the projection scale used in the mortality assumption (projection Scale AA). We believe the actuary's use of Scale AA projected to 2028 is not unreasonable.

However, there is an intermediate projection scale, Scale BB, which was developed to be used in connection with RP2000, pending subsequent creation and release of RP2014 and MP2014. Scale BB was released in September 2012 and available at the time of the experience study. Scale BB was developed after the results of the Society of Actuaries' analyses showed that the rates of mortality improvement in the U.S. over the then-recent past had differed significantly from those predicted by Scale AA. Scale BB would be a better choice for the projection of mortality improvements when coupled with RP2000.


Furthermore, there are two ways to reflect mortality improvement: (a) Project the improvements to a target year in the future or (b) Apply the improvement scale generationally. The first way applies the mortality rate for a 65-year old (for example) regardless of whether the member turns 65 in 2020 or turns 65 in 2040. The generational projection applies the improvements for the years between the observation year and 2020 for a member turning 65 in 2020, but applies the improvements for the years between the observation year and 2040 for a member turning 65 in 2040. While the actuarial literature permits the use of a static projection to a given future year, the actuarial profession is endorsing the generational approach as being preferable.

A more current approach to estimating mortality rates for valuation purposes would be to use either: (a) RP2000 projected generationally by Scale BB or (b) RP2014 loaded with 120% (for CDC data) and adjusted for partially credible plan-specific experience, then projecting generationally using MP2016 or MP 2017. Blue Collar adjustment would also be reasonable for each. While either of these two approaches would be more current and preferable methodologies, we do not find the mortality tables used in the SPRF 2017 actuarial funding valuation report to be unreasonable.

Actuarial Certification

This report is considered to be a Statement of Actuarial Opinion. Therefore, I make the following certification:

I, Paul Richmond, am the Manager of Actuarial Services for the Louisiana Legislative Auditor. I am a member of the American Academy of Actuaries, an Associate in the Society of Actuaries, an Enrolled Actuary, and I meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein.



Paul T. Richmond, ASA, MAAA, EA, FCA

February 5, 2018
Date

APPENDIX A

Actuarial Standards of Practice Cost-of-Living Actuarial Modelling

APPENDIX A

Actuarial Standards of Practice

ASOP No. 4 Section 3.5

3.5 Plan Provisions - When measuring pension obligations and determining **periodic costs** or **actuarially determined contributions**, the actuary should reflect all significant **plan provisions** known to the actuary as appropriate for the purpose of the measurement. However, if in the actuary's professional judgment, omitting a significant **plan provision** is appropriate for the purpose of the measurement, the actuary should disclose the omission in accordance with section 4.1(d).

ASOP No. 4 Section 3.5.3

3.5.3 Plan Provisions that are Difficult to Measure - Some **plan provisions** may create pension obligations that are difficult to appropriately measure using traditional valuation procedures. Examples of such **plan provisions** include the following:

- a. Gain sharing provisions that trigger benefit increases when investment returns are favorable but do not trigger benefit decreases when investment returns are unfavorable;
- b. Floor-offset provisions that provide a minimum defined benefit in the event a **participant's** account balance in a separate plan falls below some threshold;
- c. Benefit provisions that are tied to an external index, but subject to a floor or ceiling, such as certain cost-of-living adjustment provisions and cash balance crediting provisions; and
- d. Benefit provisions that may be triggered by an event such as a plant shutdown or a change in control of the plan sponsor.

For such **plan provisions**, the actuary should consider using alternative valuation procedures, such as stochastic modeling, option-pricing techniques, or deterministic procedures in conjunction with assumptions that are adjusted to reflect the impact of variations in experience from year to year. When selecting alternative valuation procedures for such **plan provisions**, the actuary should use professional judgment based on the purpose of the measurement and other relevant factors.

The actuary should disclose the approach taken with any **plan provisions** of the type described in this section, in accordance with section 4.1(i).

ASOP No. 27 Section 3.11.2

3.11.2 Cost-of-Living Adjustments—Plan benefits or limits affecting plan benefits (including the Internal Revenue Code (IRC) section 401(a)(17) compensation limit and section 415(b) maximum annuity) may be automatically adjusted for **inflation** or assumed to be adjusted for **inflation** in some manner (for example, through regular plan amendments). However, for some purposes (such as qualified pension plan funding valuations), the actuary may be precluded by applicable laws or regulations from anticipating future plan amendments or future cost-of-living adjustments in certain IRC limits.

Cost-of-Living Actuarial Modelling

Following is a simplified step-by-step explanation of the actuarial simulation process.

An open group forecast valuation of the system forms the basis for a stochastic estimation of the current present values of future COLA benefits. There are other unforeseen benefits to an open group forecast that prove useful to both actuary and board members as they manage the funding of the system. Once the process solves for X%, the usual closed group valuation is then performed using the X% as a regular COLA.

An Excel spreadsheet can be developed with the necessary open group liability projections, projected fund values based on an investment return for each future year, and annual valuation calculations (annual gain/loss calculation, amortization bases and payments, administrative expense load, experience account balance maintenance, etc.) built into the spreadsheet. With the same expected return every year, the spreadsheet produces deterministic forecast valuations. But if Excel's random number generator selects return assumptions in a macro from its internal lognormal distribution function, the Fund's return varies from year to year, producing a stochastic forecast of future valuations.

Running that forecast valuation with and without COLAs, the single equivalent X% can be solved so as to approximate the present value of simulated COLAs.

This is not too complicated for an actuary to design, program, and run. It is being done more and more in many firms across the country. Furthermore, the cost should not be considered too much for a plan the size of SPRF (approximately \$3.3 billion in assets) for the worthy benefit of obtaining a decent actuarial measure of the cost and liability for providing these COLA benefits. Furthermore, once it is built, it can be adjusted for use on behalf of other retirement systems, thereby spreading the costs.

However, even a rough estimate, not based on scientific or actuarial processes would be better than the "No Recognition" approach used by SPRF. Just following the reasoning set forth in the pages above, it is reasonable to expect COLAs to be allowed every three years in the next decade or so, but every other year thereafter, in the amount of 2.0% to 5.0% for some members each time granted.

Much of the description of the COLA conditions and benefits above are merely a summary and much involves interpretation of statutes. This Comprehensive Actuarial Review should not be considered a legal opinion. The statutes should be consulted for more detailed descriptions and we defer to legal counsel and other authoritative sources for legal interpretations.

APPENDIX B

Management's Response

Louisiana Sheriffs' Pension & Relief Fund

1225 Nicholson Drive • Baton Rouge, Louisiana 70802
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February 2, 2018

TRUSTEES

President
Sheriff William Hilton

Vice President
Sheriff Willy Martin

Active Sheriffs
Jay Russell
Greg Champagne
Jeffrey F. Wiley

Retired Sheriffs
Ken Goss
Wayne F. McElveen
Harold A. Turner

Active Deputies
Sharon Cutrera
Debbie McBeth
Calvin K. McFerrin

Retired Deputies
Joey Alcede
Ronald J. Morse
Don Rittenberry

Ex-Officio
Sen. Barrow Peacock
Rep. Gregory A. Miller

Mr. Daryl G. Purpera, CPA, CFE
Legislative Auditor
1600 North Third Street
Baton Rouge, Louisiana 70804-9397

Dear Mr. Purpera:

Please be assured that we have the greatest of respect for you, and your staff and the broad responsibilities your office holds. We thank you for your courtesy in giving us an opportunity to respond to your Comprehensive Actuarial Review. In our response to your comprehensive review, we ask you to consider some views and actions our Board and staff have taken over the years to improve the funding and management of the LSPRF for the long term future, as mentioned in the next paragraph.

Through the years our Board has come to realize the importance of managing liabilities as well as assets for the long term future. In addition to other measures, LSPRF sponsored major pension reform legislation effective Jan. 1, 2012 to provide substantial cost savings well out into the future. Also beginning in 2012 LSPRF set a plan in place to begin gradually reducing our valuation interest rate over time. That plan is still in place and the rate continues to be reduced each valuation year. Reducing the rate with this method helps us to avoid placing a large burden on our employers and public services with the annual experience gain realized from the reform legislation. Please see further information in **Exhibit A**.

Please be advised that our actuary, G. S. Curran and Co., has assisted us in responding to your findings in this comprehensive review to the following issues:

- **The Handling of Cost of living adjustments within the Funding Valuation Report**
- **"Overly Optimistic Return Assumptions" & inflation discussion**
- **"Salary Scale Inconsistency"**
- **The Mortality Assumption**

Mr. Curran's response states our case very well, so I believe readers of this response will benefit more from considering his report than by me bringing out highlights of his report.

Following is the complete text of G. S. Curran & Company's response to the findings of the comprehensive review by the Louisiana Legislative Auditor. We have a very high regard for Mr. Curran and his firm and the results they produce for our Fund. Curran & Co.'s analysis and response brings out very important information that we very respectfully ask be considered.

Executive Director
Osey McGee, Jr.

Assistant Director
Keith Duplechain

Legal Counsel
Robert D. Klausner

Actuary
Gary S. Curran

Trustees Emeritus
Larry Deen
Laura Endsley
Graham Hendricks

The handling of Cost-of-Living Adjustments within the funding valuation report

On page 1 of the CAR, the LLA states that COLAs may be funded with “excess” earnings. On page 3 the CAR states that COLAs may also be funded from the Funding Deposit Account. In truth, the SPRF legal construct does not fund COLAs with “excess” earnings. Instead, the law mentions “excess” earnings when setting up limits to the Board’s ability to offer COLAs that are not funded out of the Funding Deposit Account. In years where the fund’s actuarial rate of return does not exceed the assumed rate of return by at least the lifetime cost of a COLA, the Board is restricted from granting any COLA unless using the Funding Deposit Account. Although we recognize that formulas exist within the statutes that limit the payment of COLAs and set the maximum formula for the amount of COLA available when legislatively authorized, there is no automatic feature related to COLAs in the statutes and no portion of investment gains are automatically segregated for the purpose of the payment of future cost of living increases. This construct does not act as a guarantee that a portion of gains will be used to pay COLAs. Therefore, we disagree with the LLA’s characterization of the applicable COLA provisions as gain-sharing.

The Board of Trustees has collected significant funds within the Funding Deposit Account (which has a total balance of \$56,567,343 as of June 30, 2017). This balance is not the result of a gain-sharing arrangement. Instead, it is the result of collecting employer contributions in excess of the minimum actuarially recommended employer contribution rate. Unlike gain sharing arrangements that automatically siphon off a portion of investment gains for a specified purpose, depriving the plan of the use of those gains in setting its minimum contribution rates, the Funding Deposit Account allows the plan to set its minimum employer contribution rate based upon all funds collected from employers based on the rate approved by PRSAC (The Public Retirement Systems’ Actuarial Committee). Only contributions that would not have been collected without setting the employer contribution rate above the PRSAC approved rate are added to the Funding Deposit Account. Therefore, if the Funding Deposit Account is used to fund a COLA, it truly represents prefunding of the COLA liability.

The system’s actuarial valuation report states that the present values do not include provisions for potential future increases not yet authorized by the Board of Trustees. Based on our determination that future cost of living increases are not substantively automatic or reasonably predictable, we do not believe that inclusion of future COLAs within the liabilities calculated is necessary. In addition, we believe that there is a good chance that the Board of Trustees will use the Funding Deposit Account to fund at least a portion of future cost of living increases. Should this occur, it would be inappropriate to prefund such COLAs by adjusting the current measure of plan liabilities since the use of the Funding Deposit Account balance to offset COLA liabilities at the point of granting the COLA fully offsets the increase in plan liabilities.

Despite the fact that actuarial standards of practice do not require the SPRF to include the valuation of potential future COLAs within the plan’s measurement of liabilities, we look forward to working with the system’s Board of Trustees and staff to discuss the pros and cons of potential changes in the current valuation process.

The LLA report states, “Failure to recognize (even if making only a rough estimate) material costs and liabilities of the statutes’ COLA provisions is to deny the purpose of the statutes. Again, we simply disagree. The COLA statutes have existed alongside the funding formulas within statutes

for decades. If the purpose of the statutes were to recognize the potential liabilities related to future COLAs before they are paid, a simple statutory provision within the funding formula would suffice. This comment does touch on an important question – Who should set policy with regard to funding of things that are not guaranteed? Actuarial funding would require funding directly for termination benefits, retirement benefits, disability benefits, death/survivor benefits, and DROP benefits because they are part of the plan in a way that ad hoc COLAs are not. No Board can act to deprive a member of any benefit promised in the statutes. This sets these benefits apart from the COLAs applicable to the SPRF. The Board of Trustees could choose to never again approve an ad hoc COLA. Therefore, in our opinion, we intend to work with the Board of Trustees and the Legislature to determine the “purpose of the statutes” and to set funding policy with regard to ad hoc COLAs.

“Overly Optimistic Return Assumption”

The Comprehensive Actuarial Review of the 2017 Actuarial Valuation expresses a significant difference in opinion between the actuaries employed by the LLA and G. S. Curran & Company with regard to the valuation interest rate (or investment return assumption). This significant difference stems from a few separate items: a lower net inflation assumption, the use of 10 year expected rates of return to develop the return assumption, and a tendency to develop a single point estimate return assumption as opposed to determining a reasonable range for return assumptions.

The LLA discusses the need for a disciplined process to setting the return assumption. It is my belief that the LLA is well aware that G. S. Curran & Company does use a disciplined process of collecting and analyzing information from many expert investment consultants and forecasters. The expert information utilized includes expected real rates of return for each available asset class, standard deviations of returns for each available asset class, and the correlations between asset classes. G. S. Curran & Company has consistently used such expert information to formally adopt a reasonable range of assumed rates of return based directly on the system’s own target asset allocation. As asset allocations have changed and as expert opinions have changed, G. S. Curran & Company has provided revised recommendations to the Board of Trustees. In response, the Board of Trustees has adopted significant reductions in its assumed rate of return over the past decade.

To set the expected nominal rate of return, we first project the expected real rate of return determined based on the target asset allocation set by the Board. One significant difference in our approach is the use of 20-30 year projections instead of 10 year projections for setting these economic assumptions. We simply do not agree with the LLA with regard to the appropriate time horizon to consider in setting either the assumed rate of return or inflation rate. We have reviewed inflation expectations of many experts and have used that information to develop our reasonable range for the long-term inflation assumption. Our ongoing review of this long-term inflation assumption has led us to tend toward reducing the assumption as economists and forecasters have brought their expectations lower, but our review has found reason to be concerned that inflation forecasting has often been influenced by static analysis with regard to tax policy and future economic growth. A survey of economists finds sharp disagreement as to the potential impact of the structural changes being made to the U.S. tax code. Many believe that such a change could cause increased growth in the U.S. economic output. Others focus on concerns related to the U.S. deficit. Business leaders like the J.P. Morgan chief U.S. economist

suggest that the tax bill is supportive of inflation and further Federal Reserve rate hikes. Due to the politics of tax law changes, forecasts are often clouded by political ideology. This is evident in the vastly differing opinions of economic impact estimates of the tax changes produced by economists.

All of the backup evidence that we previously provided to the Legislative Auditor related to our inflation assumptions was produced prior to changes in the tax rates. We believe that it will take time for these changes to be contained within published forecasts by the Federal Reserve and Social Security Administration. Further, when we review the vast set of expert opinions related to expected long-term future inflation, what is most evident is the degree of uncertainty. This is demonstrated by the remarks of Federal Reserve Chair Janet Yellen on September 26, 2017 at the 59th Annual Meeting of the National Association for Business Economics. In her remarks, the Fed Chair discussed inflation expectations and the many inputs to be considered. Although her remarks did not settle the issue related to expected inflation, they did clearly show that the Federal Reserve recognizes how difficult it is to predict inflation. Within her remarks are suggestions that inflation may remain low, but she includes statements like, "Key among current uncertainties are the forces driving inflation, which has remained low in recent years despite substantial improvement in labor market conditions." Also, she states, "Some of the recent decline in inflation, although not all, reflects idiosyncratic shifts in the prices of some items, such as the large decline in telecommunication service prices seen earlier in the year, that are unlikely to be repeated." Ms. Yellen adds, "Although we judge that inflation will most likely stabilize around 2 percent over the next few years, the odds that it could turn out to be noticeably different are considerable."

With this level of uncertainty, which has always existed around such economic assumptions, it has been our policy to slowly move our long-term assumptions in a direction supported by a majority of expert opinions while remaining within what we consider the reasonable range for long-term inflation. Ms. Yellen suggests that the Federal Reserve uses the same method to adjust monetary policy when she says, "How should policy be formulated in the face of such significant uncertainties? In my view, it strengthens the case for a gradual pace of adjustments. Moving too quickly risks over adjusting policy to head off projected developments that may not come to pass."

Therefore, although the 2.875% inflation assumption utilized in our 2016 actuarial valuation was within our reasonable range of long-term inflation assumptions, we recognized that our preference was to reduce the assumption given evidence drawn from many sources. Therefore, as the assumed long-term rate of return used to discount plan liabilities decreases, we expect to further decrease the assumed rate of future inflation as long as we do not see changes to the future expected real rates of return on investments held by the system's board of trustees or economic changes that increase inflationary pressures. This reduction will be gradual and will continually be reviewed with the goal of not over adjusting the assumption.

With regard to the return assumption, we believe that our process of reviewing the assumed rate of return based on the system's particular target asset allocation and a collection of data from many investment consulting firms with regard to long-term expected rates of return, standard deviations of return, and correlations for each asset class is more than defensible. It would appear that the main reason for the difference in our range of reasonable return assumptions with that developed by the Louisiana Legislative Auditor is time frame. We, in

keeping with a majority of public plan actuaries, believe that the appropriate return assumption is based on expected rates of return and inflation over the long-term (20 – 30 years). The LLA has suggested that a 10 year assumption is more appropriate. In our opinion, the use of mid-term assumptions will lead to frequent changes in assumptions as markets go up and down and assumptions are adjusted for expected near and mid-term performance. We believe that assumptions based on 10 year time horizons will be more volatile and will tend to build in recent experience so that recent out-performance will tend to result in lower 10 year forecasts. In addition, long-term forecasts are not necessarily less reliable than mid-term assumptions. Although determining a reliable long-term point estimate of future returns is difficult, forecasting over longer periods has the advantage of the averaging process to reduce the volatility of outlier returns.

The LLA performed a Comprehensive Actuarial Review on only one of the statewide retirement systems in 2017 and 2018 – the Firefighters’ Retirement System. We find the drastic change in the LLA’s own recommendation for this system after only one year to be a concerning sign of how volatile mid-term assumptions and simple point estimates can be. A comparison of the two Comprehensive Actuarial Reviews show that the 6.7% consensus expectation stipulated in 2017 has been reduced to 6.0% just one year later. Such volatility in recommended discount rates shows how dependent the end result is on the inputs to the process.

The LLA states that “The board’s 7.40% net investment return assumption is also outside the consensus mainstream of professional investment forecasters.” We believe that our assumption is within the consensus mainstream of professional investment forecasters for long-term return assumptions. Although we do not set our return assumption by looking at the assumptions used by other public plans, when considering whether our assumption is “mainstream” it can be instructive to compare to other public plans. In this case, the system’s assumed rate of return is below the mean and median return assumptions of the 152 public employee retirement systems represented in the most recent NASRA survey and is set by Board decision to be further reduced in the coming years. It’s simply unreasonable to claim that the Board’s assumed rate of return is outside the consensus mainstream.

“Salary Scale Inconsistency”

Within the fiscal 2017 actuarial valuation report, the assumed rate of return was lowered by 0.10% and the assumed rate of inflation was reduced from 2.875% to 2.775%, also 0.10%. The change in assumed rate of inflation by an amount equal to the change in the assumed rate of return is a recognition that the reduction in the assumed rate of return is not based on a reduction in the long-term expected real rates of return for asset classes within the system’s target allocation, but a reduction in the underlying inflation rate. Consistency is important between the salary scale assumption and the inflation assumption. If you assume that assumptions are exact point estimates, you would reduce the salary scale by an amount equal to the reduction in the plan’s assumed rate of inflation. When you determine a reasonable range for an assumption such as the rate of inflation, and you change the assumed rate of inflation to a slightly lower point within that range, it is not inconsistent to leave the salary scale assumption unchanged. In fact, maintaining the salary scale assumption is more conservative than reducing the assumption. Since the system is expected to have a full experience study performed within two years and since the current salary scale assumption is not inconsistent with the updated

inflation assumption, we do not feel that it is necessary or advisable to simply make a change in the salary scale assumption without completing a more in-depth analysis.

The Mortality Assumption

G. S. Curran & Company provided detailed information with regard to the method of setting mortality assumptions and since the LLA found the tables in use to be reasonable, we have not provided further discussion. We will, of course, continue to review the plan's mortality assumption as part of the experience study process. Changes to account for updated information related to mortality experience of the plan, mortality improvement scales, and even the use of static vs. generational mortality will be considered within each future experience study.

- End of G.S. Curran and Co. Report-

Russell Consulting has also provided us information that supports their original position submitted in your request for information and their perspective in our response. Russell is a large firm and a fiduciary of our Fund. We have worked with them for about 15 years and they are very familiar with the funding of our Plan. They have provided Asset/Liability Studies and other analysis. The view point they have provided us is included below:

Asset Allocation

The LSPRF asset allocation policy has evolved over the last 15 years from a conservative 45% equity/55% core fixed income strategy to today's 80% Risk Assets/20% core bonds. The Investment Committee and the Board, in conjunction with the plan's investment consultant, have carefully modified the allocation policy over time to be achieve several objectives:

- Improve their expected returns relative to liability growth
- Improve the plan's funded status
- Control expected employer contributions
- Maintain an appropriate level of expected risk relative to expected returns

Time horizon for determining long term returns

Across Russell's investment consulting practice, standard practice for our clients (pension plans and other owners of assets such as insurance companies, endowments, etc.) is to use a 20 - 30 year horizon for determining their long term expected rate of return assumption vs shorter 5 – 10 year horizons. The longer horizon is relied upon for two primary reasons:

- A longer time horizon is consistent with the longterm nature of the plan's liability structure - benefit payments will continue to be made for 30 - 50 years and beyond;
- The 30-year period smooths out local market disruptions and gives a more reasonable expectation over time. To illustrate using recent history:
 - a. The last ~10 years is distorted heavily by the Global Financial Crisis in 2008
 - b. The prior ten years prior to the Global Financial Crisis, beginning 1998, was heavily influenced on the dot-com run up in in the late 1990's

- c. Looking at these two ten year horizons in isolation provides a very narrow view of the markets. However, over the longer 30 years horizon, from 1988 to the end of 2017, levels and smooths out the market extremes and provides a more appropriate view when judging the markets and any given plan's performance expectations.

Manager Skill – Expected Excess Return [alpha]

The LSPRF's assets are invested with significant exposure to active investment strategies that are expected to outperform their benchmarks over a market cycle. Exposure to active investments strategies by asset class are illustrated below:

- US Equity ~80%
- Non-US Equity ~80%
- Global Equity 100%
- Core Fixed Income ~99%
- Commodities 100%
- Real Estate 100%
- Opportunistic Investments 100%

With nearly 50 years' experience studying and researching active managers, Russell has developed excess return expectations for each asset class, and includes those estimates in our long term expected return projections for clients' pension plans and other institutional pools of assets.

Based on this experience and research, the expected alphas range from a low of 0.25% per year for private real estate to 1.75% for emerging market equities. On a Policy-weighted basis, the expected excess return from active management / manager skill is +1.2% above a passively managed portfolio.

Despite the differing views on the time horizon for this exercise, adding this level of total plan excess return to the auditor's median expected passive return of +5.75% (see page 17 of their letter) results in an expected return of +6.95%. For added reference, this is consistent with the 7.00% long term expected return the LSPRF plans to adopt in 2020.

Inflation

Russell's expected inflation over a 30-year horizon is +2.6%.

This forecast is derived from two horizons, with the first 10 years based on Consensus Economics long term inflation forecasts. Beyond year 10, our inflation forecast begins to converge to the global equilibrium inflation rate by year 50.

To illustrate our forecast methodology / calculation:

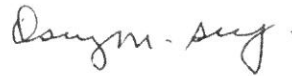
1. The Consensus Economics long term inflation forecast over 10 years as of June 30, 2017 was 2.3%.
2. The global equilibrium inflation rate at year 50 is 2.9%.
3. The difference between year 10 (2.3%) and year 50 (2.9%) is 0.6%.

4. Year 30 is half way between Year 10 and year 50;
5. Thus the 30 year expected inflation rate is $2.3\% + 0.3\%$ or 2.6% .

- End of Russell Report-

Thank you again for allowing us to respond to your report of the actuarial review. We always appreciate the courtesy you extend to us. We appreciate your interest in keeping the retirement systems sound and we work diligently to keep LSPRF sound for the benefit of our members. We know we will always have more work to do and always will remain committed to our goals. Best regards.

Sincerely,

A handwritten signature in cursive script that reads "Osey McGee, Jr." with a period at the end.

Osey McGee, Jr.
Executive Director

Exhibit A

Pension Reform and Valuation Interest Rate Reduction

In the 2011 Legislative Session, our Board made a decision to voluntarily sponsor pension benefits reform for the LSPRF in order to strengthen and provide for the long term future of our plan in assisting to control plan costs and employer contributions for our Plan sponsors, the Louisiana Sheriffs. The reform legislation became effective January 2012 and has proven to be very successful in providing substantial costs savings that will continue to occur each year over time for many years to come.

Also in 2012 the Board made a decision, in consultation with our actuary, to begin reducing the Fund's valuation interest rate from the 8% level at that time by 10 bps each year due to declining Capital Market Assumptions. The original goal was to reduce the valuation interest rate to 7.5% over time and then re-evaluate current economic conditions and assumptions. When the Fund reached the original goal of 7.5%, the Board decided to continue decreasing the rate by 10 bps, with the current goal to lower the rate to 7% then re-evaluate conditions again.

Each year of the reduction plan our savings from the pension reform legislation has substantially reduced the cost impact of the assumption changes on the Plan's Normal Cost Accrual Rate and accomplished our goal of assisting in controlling costs and assisting us in managing our employer contribution rates for our plan sponsors and for the public cost.

We believe that with the current sound condition of our Plan, we have the time to continue to reduce the valuation interest rate with our gradual reduction plan to the appropriate level dictated by currently unknown future conditions.

Effect of 2011 Pension Reform & Valuation Interest Rate Reduction on Normal Cost

Valuation Year	Assumption Loss	New Member Gain
June 30, 2012	0.6468%	0.6228%
June 30, 2013	0.8347%	0.9155%
June 30, 2014	0.8579%	0.8773%
June 30, 2015	0.9198%	0.8674%
June 30, 2016	0.8947%	0.5877%
June 30, 2017	0.9197%	0.6000%