

July 11, 2014

Ms. Bethany Rhodes, Director  
Ohio Retirement Study Council  
88 East Broad Street, Suite 1175  
Columbus, OH 43215

***Re: RFP for Provision of an Actuarial Audit of the Public Employees Retirement System of Ohio***

Dear Ms. Rhodes:

Please find enclosed one (1) unbound plus three (3) bound copies of Cheiron's proposal to provide actuarial audit services to the Ohio Retirement Study Council of the Public Employees Retirement System of Ohio.

If you have any questions, please feel free to call.

Sincerely,  
Cheiron



Janet Cranna, FSA, FCA, MAAA, EA  
Principal Consulting Actuary

Enclosures



**Proposal to Provide  
An Actuarial Audit**

**of the**

**Public Employees Retirement  
System of Ohio**

**Prepared by Cheiron  
July 11, 2014**

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Ohio Retirement Study Council  
88 East Broad Street, Suite 1175  
Columbus, OH 43215

***Re: RFP for Provision of an Actuarial Audit of the Public Employees Retirement System of Ohio***

Dear Ms. Rhodes:

Cheiron is pleased to present our proposal for actuarial audit services to the Ohio Retirement Study Council (ORSC) of the Public Employees Retirement System of Ohio (PERS). As you review our proposal, we hope the following will stand out:

- **Extensive Public Sector Experience:** Our consultants have years of experience addressing the unique needs of some of the largest public pension funds in the country. Current and past accounts include the statewide retirement systems of Maryland, California, Florida, Maine, Delaware, Montana, Kansas, Rhode Island, Connecticut, Vermont, Illinois, as well as the counties of Fairfax and Arlington, Virginia, and the city retirement systems of San Diego, San Francisco, San Jose, Los Angeles, Philadelphia, Miami, Phoenix, St. Louis, Kansas City, Baltimore, and the District of Columbia.
- **Unique:** Cheiron's success is based on creating imaginative, sophisticated and clearly understandable solutions to financial challenges that enable our clients to make the best policy, funding and design decisions. While other firms' actuarial reports and studies often focus on the present and the past, Cheiron's standard reports present projections under alternative economic scenarios and discuss the system's risks to allow our clients to focus on their risk management. As part of this audit, we will perform these projections of the PERS using our *P-Scan* model.
- **Dynamic:** Our interactive modeling skills are perhaps the single greatest differentiator between our firm and others. These dynamic models permit "what if" scenarios to be presented instantaneously at meetings, educating all interested parties of the impact of alternative assumptions and designs on the pension plan's funded status and contribution requirements. Thus, by the end of the meeting, you can make knowledgeable decisions based on the likelihood of the desired result.
- **Focused:** Our focus is on our clients. For more than 30 years, our consultants have developed lasting relationships with our clients and gained their respect through high-quality work and value-added services. That client orientation has been rewarded by the steady growth of our client base.
- **Integrity and Independence:** Cheiron's bedrock consulting philosophy is to always provide unbiased results. That philosophy has been strictly maintained, despite occasional



Ms. Bethany Rhoades

July 11, 2014

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challenges by interested parties. We approach each assignment with a singular focus on providing objective results.

We are confident that we can do a superior job in performing this service for the ORSC, and thank you for considering Cheiron. We look forward to answering any questions you may have.

Sincerely,

Cheiron



Janet Cranna, FSA, FCA, MAAA, EA  
Principal Consulting Actuary



Gene Kalwarski, FSA, FCA, MAAA, EA  
Principal Consulting Actuary

## **4.1 PROPOSAL SUMMARY**

**Provide a narrative summary of the proposal being submitted. This summary should identify all the services and work products that are being offered in the proposal and should demonstrate your firm's understanding of the project.**

Cheiron understands that the Ohio Retirement Study Council (ORSC) is seeking to award a contract for the performance of an actuarial audit for the purpose of independent verification and analysis of the assumptions, procedures, and methods used by the Public Employees Retirement System's (PERS) consulting actuary for the annual pension valuation as of January 1, 2014, the five-year experience investigation for the period January 1, 2006 through December 31, 2010, and the annual retiree health care actuarial valuation as of January 1, 2014, including GASB Statement 43 disclosures.

The audit will include the following:

1. **Data Validity – Assessment of the validity, completeness, and appropriateness for PERS's structure and funding objectives of the demographic and financial information used by the consulting actuary in the valuation of PERS.**
2. **Actuarial Valuation Method and Procedures – Assessment of whether the consulting actuary's valuation method and procedures are reasonable and consistent with generally accepted actuarial standards and practices appropriate for PERS' structure and funding objectives; and are being applied as stated by the actuary.**
3. **Actuarial Valuation Assumptions – Assessment of whether the actuarial valuation assumptions are reasonable and consistent with generally accepted actuarial standards and practices; are reasonable based on PERS' experience; and are appropriate for PERS's structure and funding objectives.**

Cheiron will also consider and address whether actual experience is appropriately evaluated in experience studies conducted by the consulting actuary and whether recent changes in assumptions are appropriate, reasonable, and supported by the experience studies. Cheiron will also review the gain/loss analyses from the last four actuarial valuation reports.

4. **Parallel Valuation – Perform parallel valuations of pension benefits as of December 31, 2013, and of retiree health care benefits as of December 31, 2013, using the validated member census data and the same actuarial assumptions disclosed in each report.**

As part of Cheiron's actuarial approach to valuation auditing we will also use our proprietary modeling and communication software model, *P-Scan*, to measure the accuracy of valuation results, their implications on future costs and funded status, and the areas of financial risk of a system. This model is tailored and used for each of our valuation clients as a form of quality control and provides insight to the effectiveness of the funding methods. Because we

regularly use *P-Scan* to provide projections for all our clients, we believe Cheiron is uniquely qualified to provide the independent verification of the results in the actuarial valuation.

5. Review of Health Care – Assessment of whether the system appropriately, consistently, and evenly determines retiree contributions to health care and whether the implementation of the system's health care policies differ from those determinations.

The results of the actuarial audit will be described in a formal report which will cover scope, process and recommendations. The results will be presented at meetings of various groups including the Board of Trustees of PERS and the ORSC. It is also anticipated that there will be an exit conference with the staff of PERS and the consulting actuary.



## **4.2 CAPABILITIES AND EXPERIENCE**

**Describe your firm's capabilities and recent experience (at least during the last five years) in performing actuarial valuations, audits, or studies of public employee retirement systems. You should include information on the types and sizes of public employee retirement systems for which past work has been performed, including whether the systems were defined benefit or defined contribution plans, the types and number of participating employers, number of participants, and other relevant indicators of plan type, size, and comparability to PERS. You should include other information you believe may be relevant in demonstrating your capabilities in performing the actuarial audit, including other professional experience and data processing capabilities.**

Cheiron's consultants have extensive consulting experience with dozens of multi-billion dollar, jointly and single trustee pension funds and health and welfare programs. Our largest specialty consulting area is for pension plans. Cheiron has a great depth of experience assisting major federal, statewide and local retiree benefit programs. Representative clients for whom we have performed actuarial audits include the following systems:

- The Washington State Pension Funding Council
- The California Public Employees Retirement System
- The California State Teachers Retirement System
- The Missouri Department of Transportation & Highway Patrol Employees Retirement System
- The Utah Retirement System
- The Maryland State Retirement and Pension System
- The Employees Retirement System of Rhode Island
- The Los Angeles City Employees' Retirement System
- The Los Angeles Fire and Police Pension System
- The Wichita Retirement Systems
- The Illinois Office of the Auditor General
- The New York State Teachers Retirement System
- The San Luis Obispo County Pension Trust
- The City of Richmond (VA) Audit Office
- The Miami (FL) Fire Fighters' and Police Officers' Retirement Trust
- The Pennsylvania Municipal Retirement System
- The Sonoma County Employees' Retirement Association
- The Texas State Auditor's Office

In addition, we have also performed in effect, audit functions on all of the pension plans we have transitioned to since forming Cheiron in 2002. We have recreated the former actuary's results, as required by our standards of practice, for dozens of defined benefit pension plans. Cheiron's public sector engagements have included projects with Maine Public Employees Retirement System, Delaware State Retirement System, Pennsylvania Municipal Retirement System, Montana Public Employees Retirement Board, the Maryland State Legislature, Oregon PERS,

San Diego City Employees Retirement System, City and County of San Francisco, the Cities of Annapolis and Baltimore, MD, the Philadelphia Retirement Board, the District of Columbia, the City of Chattanooga, the Army Non-Appropriated Fund, the Pension Benefit Guaranty Corporation, the U.S. Department of Defense, and the Counties of Arlington and Fairfax, Virginia.

The following is a representative list of public employee retirement systems, all of which are defined benefit plans, for which Cheiron currently provides actuarial consulting services:

<u>Client</u>	<u>Total Participants</u>	<u>Date of Hire</u>
• Alameda-Contra Costa Transit District Employees Retirement Plan	3,911	1/1/2013
• Amalgamated Transit Union Local 900 Pension Plan	121	1/1/2007
• Arlington County Retirement System	7,633	4/3/2003
• California Public Employees Retirement System	1,678,996	1/1/2013
• City and County of San Francisco Employees Retirement System	54,751	7/1/2008
• City of Alexandria Firefighters and Police Officers Pension Plan	3,170	11/30/2010
• City of Allentown Pension Plans	996	7/12/2010
• City of Annapolis Fire and Police Retirement System	487	7/1/2003
• City of Baltimore Fire and Police Employees	10,645	3/30/2012
• City of Falls Church Pension Plans	643	10/4/2013
• City of Harper Woods, MI	184	9/26/2013
• City of Kansas City, Missouri Employees Retirement System	5,639	1/1/2007
• City of Kansas City, Missouri Firefighters Pension System	1,833	1/1/2007
• City of Norfolk Employees Retirement System	8,679	6/1/2005
• City of Philadelphia Municipal Retirement System	64,958	8/7/2007
• City of Phoenix Employees Retirement System	14,702	9/15/2011
• City of Roanoke Pension Plan	4,283	7/1/2013
• City of San Jose Federated City Employees Retirement System	7,806	8/12/2010
• City of San Jose Police and Fire Department Retirement Plan	3,929	5/5/2011
• City of Torrington Pension Plans	467	1/1/2013
• City of Wilmington Pension System	2,100	12/28/2011
• City of Yorba Linda	225	1/1/2013
• DART Contributory Pension Plan	761	5/7/2007
• Delaware Public Employees Retirement System (9 plans)	69,639	6/1/2006
• Employees Retirement System of the City of Baltimore (2 plans)	18,894	5/5/2005
• Employees Retirement System of the City of St. Louis	12,115	10/1/2010
• Fairfax County Retirement Systems (3 plans)	28,976	7/1/2003
• Golden Gate Transit-Amalgamated Retirement Plan	616	2/4/2013
• Hampton Employees Retirement System	1,291	8/27/2009
• Knoxville Utilities Board Pension Plan	1,542	11/15/2011
• Maine Public Employees Retirement System (4 plans)	102,164	3/1/2005
• Marin County Employees Retirement Association	5,883	1/1/2013
• Maryland Transit Administration	4,824	1/1/2013
• Merced County Employees Retirement Association	4,567	1/1/2013
• Metropolitan Police Relief Association of the District of Columbia	772	1/1/2013
• Metropolitan Washington Council of Governments	194	4/1/2003
• Montana Public Employee Retirement Administration (8 plans)	68,490	1/1/2009

• Newport News Employees Retirement Fund	13,222	6/3/2010
• Oakland Police and Fire Retirement System	1,082	9/18/2013
• Pasadena Fire Fighters Association Benefit Trust	203	1/1/2013
• Pennsylvania Municipal Retirement System	11,751	10/1/2006
• Port Authority of Allegheny County Retirement and Disability Allowance Plan for Employees Represented by Local 85 of the Amalgamated Transit Union	5,199	1/1/2007
• Retirement Plan for Pace West Division Employees	424	1/1/2007
• Sacramento Regional Transit District	1,965	1/1/2013
• St. Louis Firefighters Retirement Plan	1,632	6/25/2014
• San Diego City Employees Retirement System (3 plans)	20,656	6/14/2006
• San Diego Transit Corporation Pension Plan	1,788	1/1/2013
• San Joaquin County Employees Retirement System	11,592	1/1/2013
• Santa Barbara County Employees Retirement System	9,032	1/1/2013
• Santa Clara Valley Transportation Authority ATU Pension Plan	2,882	1/1/2013
• Santa Monica Fire Fighters Association Benefit Trust	156	1/1/2013
• Stanislaus County Employees Retirement Association	8,098	1/1/2013
• The Police Retirement System of St. Louis	3,185	6/1/2012
• U.S. Court of Appeals for Veterans Claims	17	4/1/2003
• United States Army Nonappropriated Fund Employee Retirement Plan	50,129	8/1/2003
• Washington Metropolitan Area Transit Authority Retirement Plan	1,835	7/1/2009
• Washington Metropolitan Area Transit Authority, Local 2 Retirement Plan	445	7/1/2009
• Washington Metropolitan Area Transit Authority, Local 922 Retirement Plan	680	6/1/2004

### 4.3 REFERENCES

You must include a list of organizations that may be used as references for your work on actuarial valuations, audits, or studies. Selected organizations may be contacted to determine the quality of the work performed, personnel assigned to the project, and contract adherence. The following should be included for the references listed:

- Date of the actuarial audit work or valuation;
- Name and address of client;
- Name and telephone number of individual in the client organization who is familiar with the actuarial work; and
- Description of the work performed.

<b>Client:</b>	Illinois Office of the Auditor General (client since 2012)
<b>Contact Information:</b>	Jim Schlouch, Director, Performance Audits 740 East Ash St., Iles Park Plaza Springfield, IL 62703 217-782-0812
<b>Scope of Services:</b>	Serve as State Actuary for the Illinois Office of the Auditor General to provide statutory annual review of five state retirement systems

<b>Client:</b>	Maine Public Employees Retirement System (client since 2005)
<b>Contact Information:</b>	Sandra Matheson, Executive Director #46 State House Station Augusta, ME 04333 207-512-3190
<b>Scope of Services:</b>	Annual valuation services; periodic experience reviews; special projects as requested

<b>Client:</b>	State of Arkansas Employee Benefits Division (client since 2009)
<b>Contact Information:</b>	Robert Alexander, Executive Director 501 Woodlane, Suite 500 Little Rock, AR 72201 501-682-5502
<b>Scope of Services:</b>	Postretirement health benefits valuations; funding projections; determinations of active and retiree contribution rates; PPACA and State legislation analysis; IBNR calculations and other actuarial reserve calculations; monitoring reports; vendor negotiations.

<b>Client:</b>	Employees' Retirement System of Rhode Island (client since 2013)
<b>Contact Information:</b>	Frank J. Karpinski, Executive Director 40 Fountain Street, 1 <sup>st</sup> Floor Providence, RI 02903-1854 401-462-7600
<b>Scope of Services:</b>	Performed an actuarial audit of the June 30, 2012 valuations for both the Employees' Retirement System and the Municipal Employees' Retirement System. The audit called for a full replication of the liability and cost results of the valuation.

<b>Client:</b>	Los Angeles City Employees' Retirement System (client since 2013)
<b>Contact Information:</b>	Li Hsi, Assistant General Manager 202 W. First St., Suite 500 Los Angeles, CA 90012-4401 1-800-779-8328
<b>Scope of Services:</b>	Performed a full replication audit of the June 30, 2012 pension and OPEB valuations, and a review of the three-year experience study.

## **4.4 STAFF QUALIFICATIONS**

**Describe the qualifications of all management and lead professional personnel who will participate in the audit. Include: (1) a resume; (2) a summary of experience each has had in performing actuarial valuations, audits, or studies of public employee retirement systems; and (3) a management plan identifying the responsibilities each will have on the audit.**

**The resume should include information on the current and past positions held with your firm, educational background, actuarial and other relevant credentials, and other relevant information to demonstrate the personnel's qualifications.**

**The experience summaries should include information on the types and sizes of public employee retirement systems for which the designated staff have completed actuarial work, including whether the systems were defined benefit or defined contribution plans, the types and number of participating employers, number of participants, and other relevant indicators of plan type, size, and comparability to PERS. You may reference, rather than repeat, duplicative information provided in the *Vendor Capabilities and Experience* section. The experience summaries also should describe the work performed and detail the roles and responsibilities that the individual staff had on the projects.**

**The management plan should specify the roles and responsibilities each of the management and professional staff will have on the actuarial audit and include an estimated portion of the audit's time that will be spent by each on the audit.**

**Actuaries included on the project team should meet the following criteria:**

- **Be members of the American Academy of Actuaries;**
- **Be enrolled actuaries with experience in Governmental plans;**
- **Be, at a minimum, associates with at least five years of experience in public practice, although we prefer that actuaries are Fellows of the Society of Actuaries; and**
- **Have performed an actuarial valuation, audit, or study of a public employee retirement system within the last two years.**

The following actuarial professionals are proposed to serve the ORSC. Complete résumés for these individuals can be found in Appendix A.

- **Janet Cranna, FSA, FCA, MAAA, EA, Principal Consulting Actuary, is the proposed co-lead actuary for this engagement. Janet has 30 years of retirement consulting and actuarial experience with public sector and corporate clients. Her experience includes the New Jersey Retirement Systems and the Pennsylvania Public School Employees' Retirement System. Janet is a Fellow of the Society of Actuaries, a Fellow of the Conference of Consulting Actuaries, a Member of the American Academy of Actuaries, and an Enrolled Actuary under ERISA.**



Experience Summary of Significant Public Sector Engagements:

- New Jersey Retirement Systems: Lead actuary with previous employer for regular ongoing actuarial services for 7 statewide defined benefit pension plans. Approximately 520,000 participants and 2000 employers. Services included actuarial valuations, experience studies, GASB disclosures, testifying before Boards and Legislative Committees, and consulting on plan design and funding policy.
- Pennsylvania Public School Employees' Retirement System: Lead actuary with previous employer for regular ongoing actuarial services for statewide defined benefit pension plan. Approximately 598,000 participants. Services included actuarial valuations, experience studies, GASB disclosures, testifying before Boards and Legislative Committees, and consulting on plan design and funding policy.
- New York State Teachers' Retirement System: Lead actuary with previous employer for full replication audit of their defined benefit retirement plan. Approximately 430,000 participants.
- United States Army Nonappropriated Fund Employee Retirement Plan: Backup actuary for regular ongoing defined benefit pension plans. Approximately 50,000 participants.
- City and County of San Francisco Employees Retirement System: Backup actuary for regular ongoing actuarial services for defined benefit pension plans. Approximately 55,000 participants.
- **Gene Kalwarski, FSA, FCA, MAAA, EA, Principal Consulting Actuary**, is the proposed co-lead actuary for this engagement. Gene has over 35 years of experience and is a national specialist in public sector funding of retirement programs. Gene is the President and CEO of Cheiron and one of its founders, as well as the developer of Cheiron's consulting tools and methodologies. Gene has been the lead actuarial consultant to the retirement systems of Maine, Maryland, Delaware, Florida, Illinois (serving the Auditor General of the State), Kansas, as well as retirement systems for the cities of San Francisco, San Jose, Kansas City, and the District of Columbia. He has testified on several occasions before U.S. Senate Committees and regularly addresses state legislatures and boards of trustees on behalf of the numerous statewide pension funds he has represented. He is a Fellow of the Society of Actuaries, a Fellow of the Conference of Consulting Actuaries, a Member of the American Academy of Actuaries, and an Enrolled Actuary under ERISA.

Experience Summary of Significant Public Sector Engagements:

- Illinois Office of the Auditor General: State Actuary providing statutory annual review of five state retirement systems. Approximately 520,000 participants.
- Maine Public Employees Retirement System: Lead actuary for regular ongoing actuarial services for statewide defined benefit pension plans. Approximately 102,000 participants.

- Delaware Public Employees Retirement System: Lead actuary for regular ongoing actuarial services for statewide defined benefit pension plans. Approximately 70,000 participants.
- California State Teachers Retirement System: Audit actuary in 2007 and 2011; statewide defined benefit pension plan. Approximately 750,000 participants.
- Maryland State Retirement and Pension Systems: Lead actuary for 21 years with previous employer for regular ongoing actuarial services for statewide defined benefit pension plans, ending in 2002. Approximately 200,000 participants.
- Florida Retirement System: Lead actuary for 14 years with previous employer for statewide defined benefit pension plans, ending in 2002. Approximately 500,000 participants.
- Arlington County (VA) Employees Retirement System: Lead actuary for regular ongoing actuarial services for defined benefit pension plans. Approximately 7,600 participants.
- Fairfax County (VA) Supplemental Retirement System: Lead actuary for regular ongoing actuarial services for defined benefit pension plans. Approximately 29,000 participants.
- City and County of San Francisco Employees Retirement System: Backup actuary for regular ongoing actuarial services for defined benefit pension plans. Approximately 55,000 participants.
- San Diego City Employees Retirement System: Lead actuary for regular ongoing actuarial services for defined benefit pension plan. Approximately 20,000 participants.
- San Jose Federated City Employees Retirement System: Lead actuary for regular ongoing actuarial services for defined benefit pension plans. Approximately 7,800 participants.

In addition to the above, Gene has assisted the following public sector retirement systems as consulting actuary or consultant in special studies of various types: New York State Teachers Retirement System, CalPERS, Oregon PERS, Milwaukee County Employees Retirement System, Vermont Municipal Employees Retirement System, Texas State Legislature, New Jersey /State Legislature, Montana State Employees Retirement System, Kansas City Employees and Firemen Retirement System, and the Idaho Public Employees Retirement System.

- **Kevin Woodrich, FSA, MAAA, EA**, Principal Consulting Actuary, is the proposed project manager for this engagement. Kevin has 14 years of experience mainly in the employee benefits pension and health arena, which includes actuarial valuations, benefit calculations, benefit statements, government filings, experience studies and programming actuarial models. His public sector experience includes working with the Delaware Public Employees' Retirement System, the US Army Non-Appropriated Fund, Arlington County Employees' Retirement System, and the employee retirement systems for the cities of

Norfolk (VA), Roanoke (VA), and Hampton (VA). In addition, he was one of the lead actuaries involved in Cheiron's recent audit of the Employees' Retirement System of Rhode Island. He is a Fellow of the Society of Actuaries, a Member of the American Academy of Actuaries, and an Enrolled Actuary under ERISA.

Experience Summary of Significant Public Sector Engagements:

- United States Army Nonappropriated Fund Employee Retirement Plan: Lead actuary for regular ongoing actuarial services for defined benefit pension plans. Approximately 50,000 participants.
- Delaware Public Employees Retirement System: Special Resource for regular ongoing actuarial services for statewide defined benefit pension plans. Approximately 70,000 participants.
- Employees' Retirement System of Rhode Island: Co-lead actuary for performing a full replication actuarial audit of the June 30, 2012 valuations for both the Employees' Retirement System and the Municipal Employees' Retirement System. In addition, we commented on the most recent experience studies done for both Systems. Approximately 52,000 participants.
- Arlington County (VA) Employees Retirement System: Lead actuary for defined benefit pension plans. Approximately 7,600 participants.
- City of Hampton (VA) Employees Retirement System. Lead actuary for regular ongoing actuarial services for defined benefit pension plan. Approximately 1,300 participants.
- City of Norfolk (VA) Employees Retirement System. Lead actuary for regular ongoing actuarial services for defined benefit pension plan. Approximately 8,600 participants.
- City of Roanoke (VA) Pension Plan. Lead actuary for regular ongoing actuarial services for defined benefit pension plan. Approximately 4,200 participants.
- **John Colberg, FSA, MAAA, EA**, Principal Consulting Actuary, is the proposed health and welfare actuary for this engagement. He will provide analysis of the retiree medical plans and other health care services. John is one of Cheiron's founders and has over 23 years of actuarial experience in employee benefit plans and retirement plans including health care, group life and disability insurance, and employee leave plans. John has consulted to various public sector funds over his career and is presently the lead consultant to the State of Arkansas and the District of Columbia. John is a Fellow of the Society of Actuaries, an Enrolled Actuary under ERISA, and a Member of the American Academy of Actuaries.

Experience Summary of Significant Public Sector Engagements:

- Arkansas Employee Benefits Division. Lead actuary for health consulting including funding and rate projections; PPACA and State legislation analysis; IBNR calculations

and other actuarial reserve calculations; monitoring reports; vendor negotiations; postretirement liability calculations. Approximately 100,000 participants.

- District of Columbia. Lead actuary for health consulting including vendor negotiations; postretirement liability calculations; analysis of legislation. Approximately 27,000 participants.
- United States Army Family and MWR Command: Lead and backup actuary for health benefits program valuation, postretirement medical report, and special studies as requested. Approximately 10,500 participants.
- Delaware Public Employees Retirement System: Lead and backup actuary for regular ongoing actuarial valuations of statewide retiree health plans. Approximately 70,000 participants.
- United States Department of Defense: Lead Actuary for special study in 2005; Lead Actuary for 10 years with previous employer ending in 2002 for ongoing actuarial valuations of retiree health programs; special studies; train DoD Actuaries to perform valuations in house. Approximately 5,000,000 participants.
- State of Florida: Lead Actuary for 10 years with previous employer ending in 2002 for evaluation of active and retiree health costs for state employees; analysis of legislation; calculation of retiree and active employee contributions. Approximately 120,000 participants.
- **Gaelle Gravot, FSA, MAAA**, Consulting Actuary, is the proposed backup health and welfare actuary. She will also provide analysis of the retiree medical plans and other health care services. Gaelle has over 16 years of experience as an insurance and consulting health actuary. Her experience includes commercial (employee benefits and individual) and Governmental (Medicare/Medicaid) plans. Gaelle has worked on over a thousand Medicare Advantage and PDP bids. She has developed health cost assumptions, plan designs, and assisted several Medicare Advantage Organizations with managing their plans and strategies. Gaelle is in charge of Cheiron's Chicago office health practice, along with our benchmark and pricing tools. Gaelle is a Fellow of the Society of Actuaries and a Member of the American Academy of Actuaries.

Experience Summary of Significant Public Sector Engagements:

- Arkansas Employee Benefits Division. Backup actuary for health consulting including funding and rate projections; PPACA and State legislation analysis; IBNR calculations and other actuarial reserve calculations; monitoring reports; vendor negotiations; postretirement liability calculations. Approximately 100,000 participants.
- Pittsfield Charter Township (MI): Lead actuary for regular ongoing actuarial valuations of retiree health plan. Approximately 130 participants.

## Management Plan

The actuarial audit will be directed by the co-lead actuaries, **Janet Cranna**, **Gene Kalwarski**, and **John Colberg**, who will be the primary contacts to the ORSC, and will attend most meetings. Janet, Gene, and John will also be responsible for drafting reports and other communications regarding the audit.

The audit project will be co-managed by **Kevin Woodrich** and **Gaelle Gravot** who will supervise a team of actuarial analysts. Both will be available as day-to-day contacts regarding issues such as data collection and processing questions.

The estimated overall time allocation of these individuals to the audit is as follows:

Janet Cranna	10%
Gene Kalwarski	5%
John Colberg	10%
Kevin Woodrich	10%
Gaelle Gravot	10%

## **4.5 METHODOLOGY, WORK PRODUCT, AND TIMELINE**

**Describe the proposed methodology for each element of the components listed in the *Scope of Audit* section of the Proposal Specifications. The description should include specific techniques that will be used, including anticipated sampling techniques and sizes, and proposed sources of data and information. You may propose alternative ways of addressing the elements of the audit scope.**

**In describing your proposed methodology, also identify the type and level of assistance that you anticipate will be needed from the staff of PERS and Gabriel Roeder Smith & Company, including assistance to understand the operations and records of PERS; to understand the actuarial assumptions, method, and procedures; and to access, obtain, and analyze information needed for the audit. Identify meetings, interviews, programming support, space needs, etc., that you anticipate needing from PERS and Gabriel Roeder Smith & Company.**

### **1. *Data Validity***

***Assessment of the validity, completeness, and appropriateness for PERS's structure and funding objectives of the demographic and financial information used by the consulting actuary in the valuation of PERS.***

Cheiron will request the original census data from PERS which was provided to Gabriel Roeder Smith & Company (GRS). Cheiron will also request from GRS the processed edited data that was used to produce the valuations. By having these two sets of files, Cheiron will be able to determine whether the data used for the valuations were appropriate and complete. This process will include a review of records which have been adjusted for data discrepancies. Cheiron will pay particular attention to participants whose status has changed from active to retired status. We will request from GRS detailed sample life output for a few of the active to retiree transfers in order to determine whether the liability and reserves have been calculated consistently.

Cheiron will also request financial statements used to produce the valuations from PERS. These statements should include a reconciliation from the prior valuation date, contributions made to the system, benefits paid from the system, expenses, and investment returns.

Our review will also consider the requirements of Actuarial Standard of Practice No. 23, *Data Quality*.

### **2. *Actuarial Valuation Method and Procedures***

***Assessment of whether the actuary's valuation method and procedures are reasonable and consistent with generally accepted actuarial standards and practices appropriate for PERS's structure and funding objectives; and are applied as stated by the actuary. If deviations from accepted standards are found during the audit, the Contractor should obtain the rationale for the deviations and determine their effects, including their monetary impact.***



Cheiron's review of funding methods and procedures will encompass each of the items specified above and will consider all of the following:

- Relevant Actuarial Standards of Practice (ASOPs): These include primarily, ASOP No. 4 (*Measuring Pension Obligations*), No. 6 (*Measuring Retiree Group Benefits Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions*), and No. 44 (*Selection and Use of Actuarial Asset Methods for Pension Valuations*).
- GASB Statements No. 43, 45, 67 and 68: We will determine whether the methodology is appropriate for reporting results within the System's and the employers' financial statements.
- Goals and objectives of the retirement system and of the participating employers. In order to help determine these goals, we will speak with PERS staff.
- Long-term implications of the actuarial funding methods. For this analysis, Cheiron will use our proprietary projection software tools *P-scan* and *H-scan*, which will permit us to illustrate how the funding method will react to varying future economic scenarios. This process is described below.

We will request a number of sample lives from GRS to determine how the funding method(s) and assumptions have been applied in the determination of liabilities under the valuation. This will allow us to determine how well current methods and assumptions have been applied. We will also ask for sample lives of recent retirees to compare against actual benefits in payment status to determine if the assumptions are a fair predictor of the ultimate obligations of the System.

Our proprietary *P-Scan* and *H-scan* models will provide us with insight as to how well the measure of obligations under the system reflect the long-term obligations and allows us to perform a series of "what-if" projection scenarios as well as stochastic projections to determine the long-term implications of the current set of methods and assumptions. For this purpose we will request a full payout projection of the current participants of PERS from GRS to allow us to reflect projected benefit cash flow. This modeling will allow the ORSC and PERS to see how well the methods achieve given objectives under a variety of stresses.

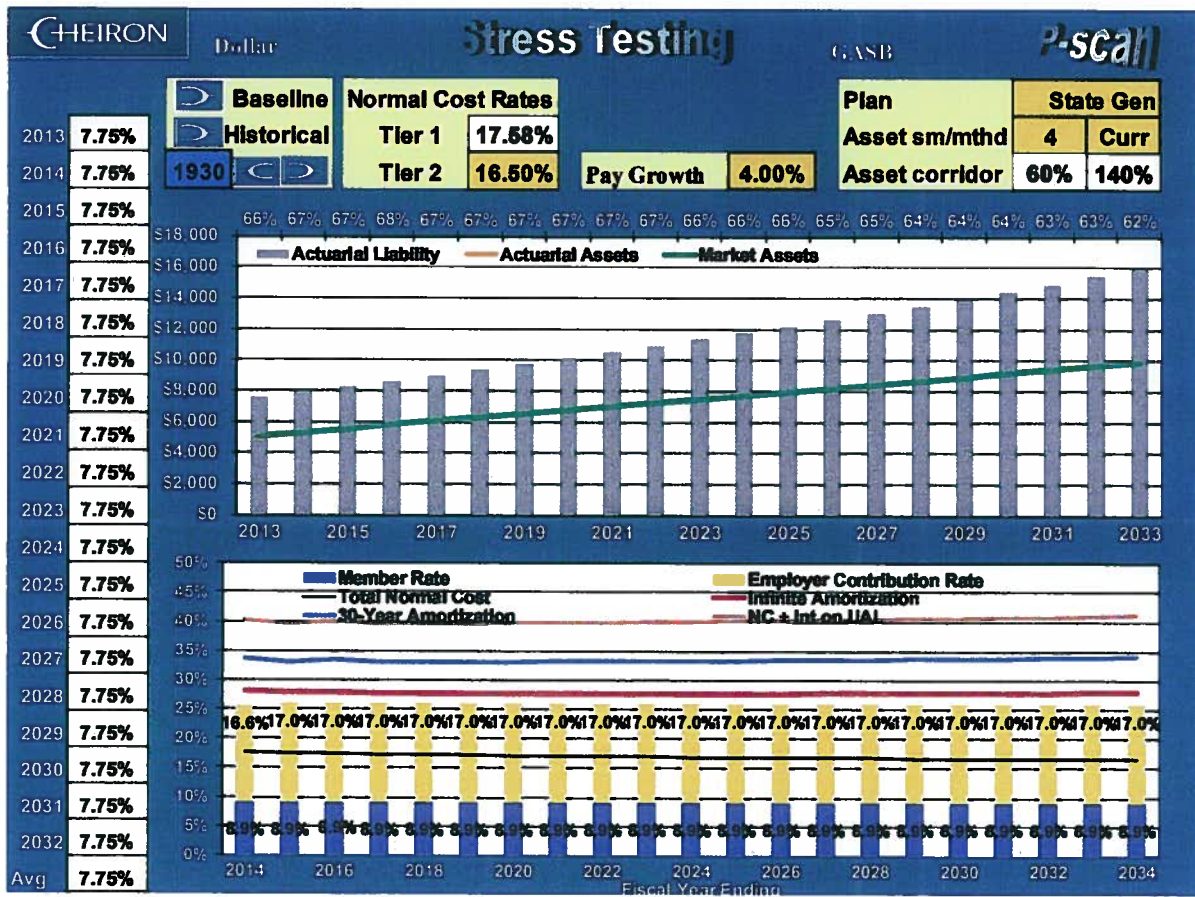
Each *P-Scan/H-scan* is customized so that it reflects the current operation of the plan and can have a variety of policy options programmed in to facilitate the Board's discussion of alternatives. The examples that follow have not been customized for PERS, but if we are selected as a finalist, we would be happy to demonstrate a version partially customized based on information in the valuation report. The *P-scan* example shows a defined benefit plan, but we have used *P-Scan* to model defined contribution plan designs as well as plans that include both types of benefits.

In general, the boxes across the top represent variables tailored for the System and programmed into the model that can be changed during the presentation. For example, we can program interest rate changes, salary scale changes, health care trends (*H-scan*), or even more complicated changes such as new tiers of benefits.

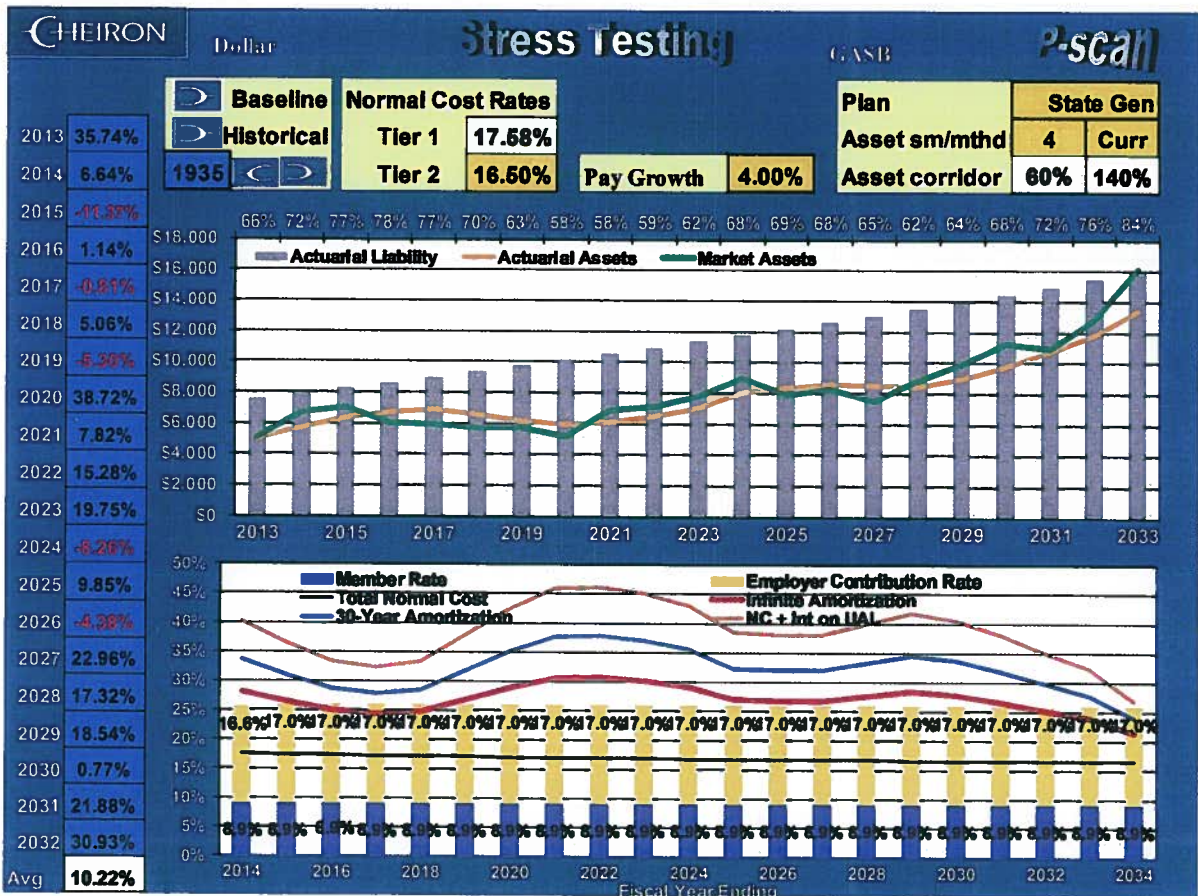
**Our P-Scan Interactive Model**

The top graph shows the projected actuarial liability (gray bars) and the actuarial and market value of assets (orange and green lines). The numbers at the top of the bars represent the projected funded status. The bottom graph shows the projected contribution rates for both the members and the employers. The lines on this graph represent various metrics used to assess the statutory contribution rates.

On the left hand side of the screen, the actual investment return is shown for each year of the projection. These returns can be changed to develop different economic scenarios. This particular scenario is the baseline projection using the assumed rate of return.



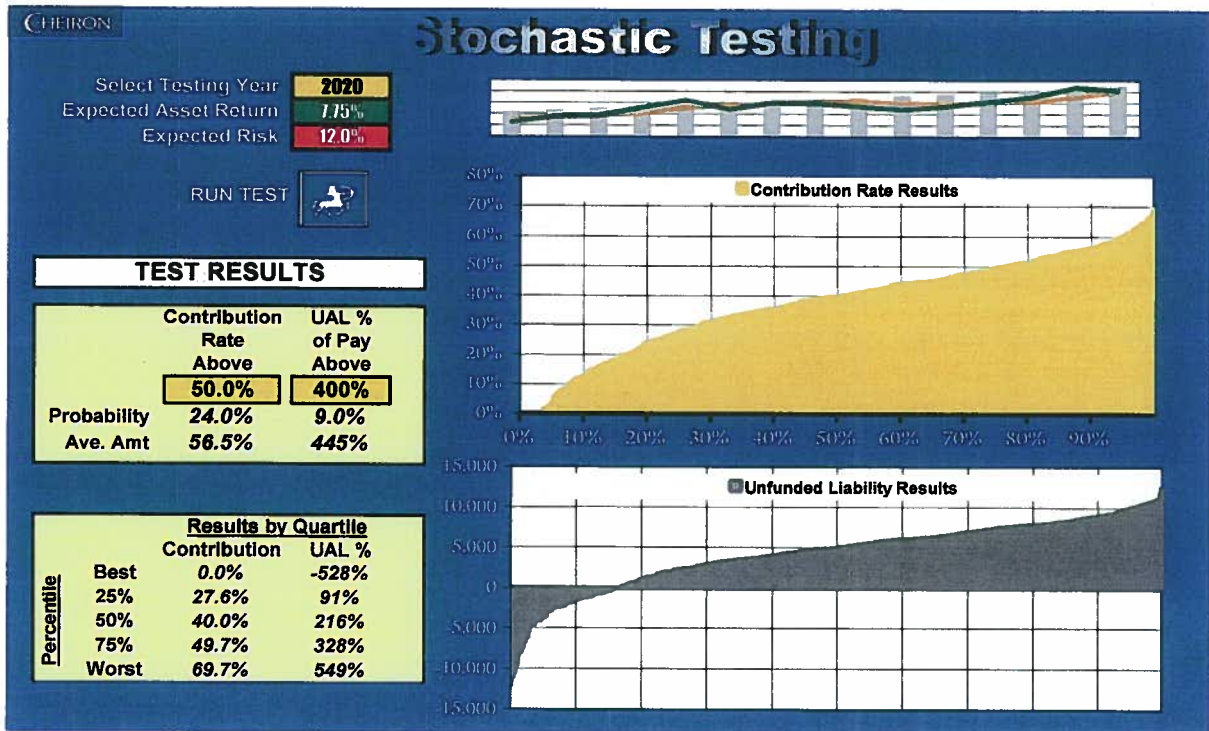
We believe communicating the potential risks in a system to the Board and staff is fundamental to our work with the system. This includes demonstrating the sensitivity to investment returns. The screenshot that follows shows the same Stress Test but using historical investment returns beginning in 1935. That is, the investment return shown for plan year beginning 2013 is actually the historical investment return for 1935 for a portfolio invested 65% in equities and 35% in bonds. This graphically demonstrates the sensitivity of both funded status and contribution benchmarks to varying return scenarios.



Any potential scenario of returns may be modeled, or we can use tools showing stochastic analysis to demonstrate the probability of specific contribution conditions or funded statuses given expected investment returns of the system’s portfolio of investments.

The next screenshot is from the Stochastic Testing page of *P-Scan*. Based on a given expected investment return and standard deviation, this test shows the distribution of contribution rates and unfunded actuarial liability (UAL) for a selected testing year (in this case 2020). Specific risk criteria can be entered in the test results box on the left to assess the likelihood of exceeding the specified criteria. For example, if the retirement committee wants to avoid a contribution rate above 50% of payroll, the box in the middle on the left shows a 24% probability of exceeding this rate and the average contribution rate from those stochastic trials that exceed 50% is 56.5%. The graphs and box on the lower left show the distributions at percentile points.





### *Our H-Scan Interactive Model*

*H-scan* provides similar interactivity as *P-scan* but applied to health plans, with the OPEB module focusing on retiree health (and other postemployment benefits). In the screen shot that follows, the left graph shows the projected actuarial liability (gray bars), the market value of assets (green lines), and the liability for the financial statements (the Net OPEB Obligation). The numbers at the top of the bars represent the projected funded status. The right graph shows the projected contribution rates for both the employer and (if any) employees, compared to the pay-as-you-go costs (benefits for retirees net of any retiree contributions). The line on this graph represents the accounting expense.

Top of the screen contains the key assumptions including health care trend, discount rate, and salary scale. Specific inputs are customized based on the client's plan and funding approach. The actual investment return and employer contribution rates are shown for each year of the projection, or we can model pay-as-you-go funding. As with *P-scan*, we can model changes in investment return; however, most retiree health care plans are less funded and, therefore, less sensitive to this assumption. Of more interest are usually changes to health care trends and the assumed discount rate.

Any potential scenario of health care trends, discount rates, and/or funding approaches may be modeled.

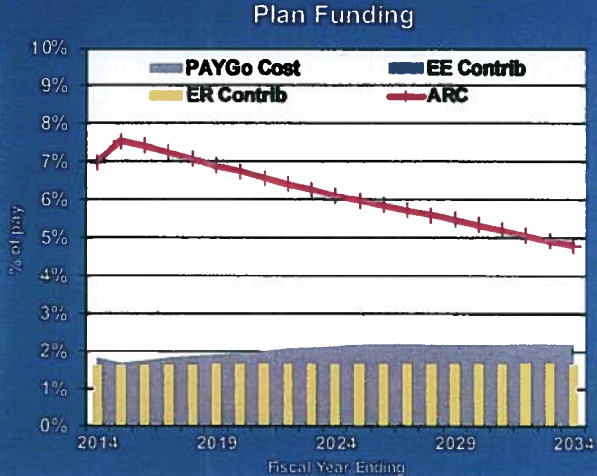
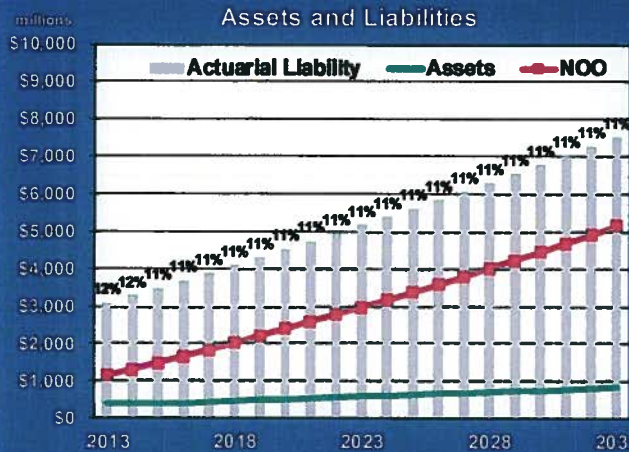
### Health Trends

	Initial	+ 1 year	+ 2 year	Ultimate Yrs to Ult
Pre-Medicare	8.50%	7.50%	6.50%	5
Post-Medicare	6.75%	6.50%	6.00%	5

### Other Assumptions

	2013-17	2018+
Inv Return - Trust	7.75%	7.75%
Inv Return - ER Assets	5.00%	5.00%
Sal Increases	4.00%	4.00%
Active Population Growth	0.0%	
Amortization Period	30	
1 = Fixed 2=Layers, 3= Rolling	3	
Amortization Type	% of Pay	

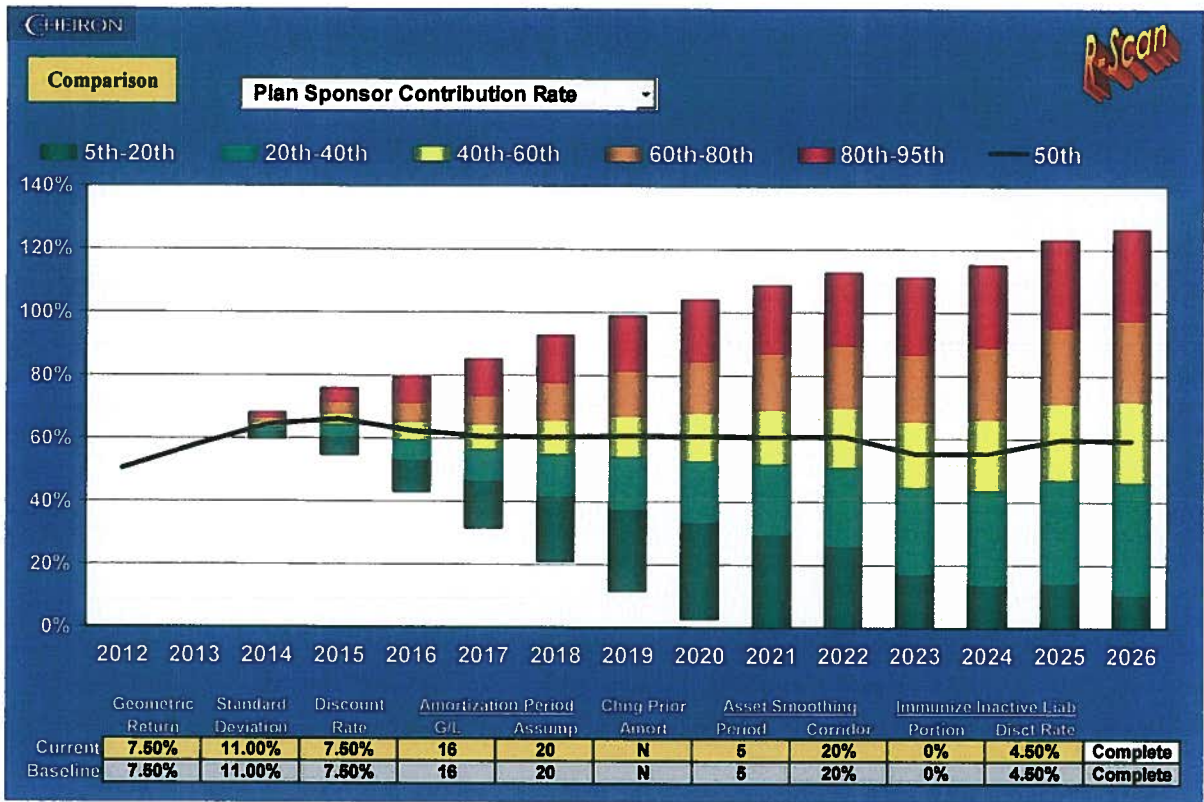
FY Ending	2014	2015	2016	2017	2018	2019+
Employer Contrib	1.64%	1.64%	1.64%	1.64%	1.64%	1.64%
Actual Inv Return	0.00%	0.00%	7.75%	7.75%	7.75%	7.75%
GASB Discount Rate	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%



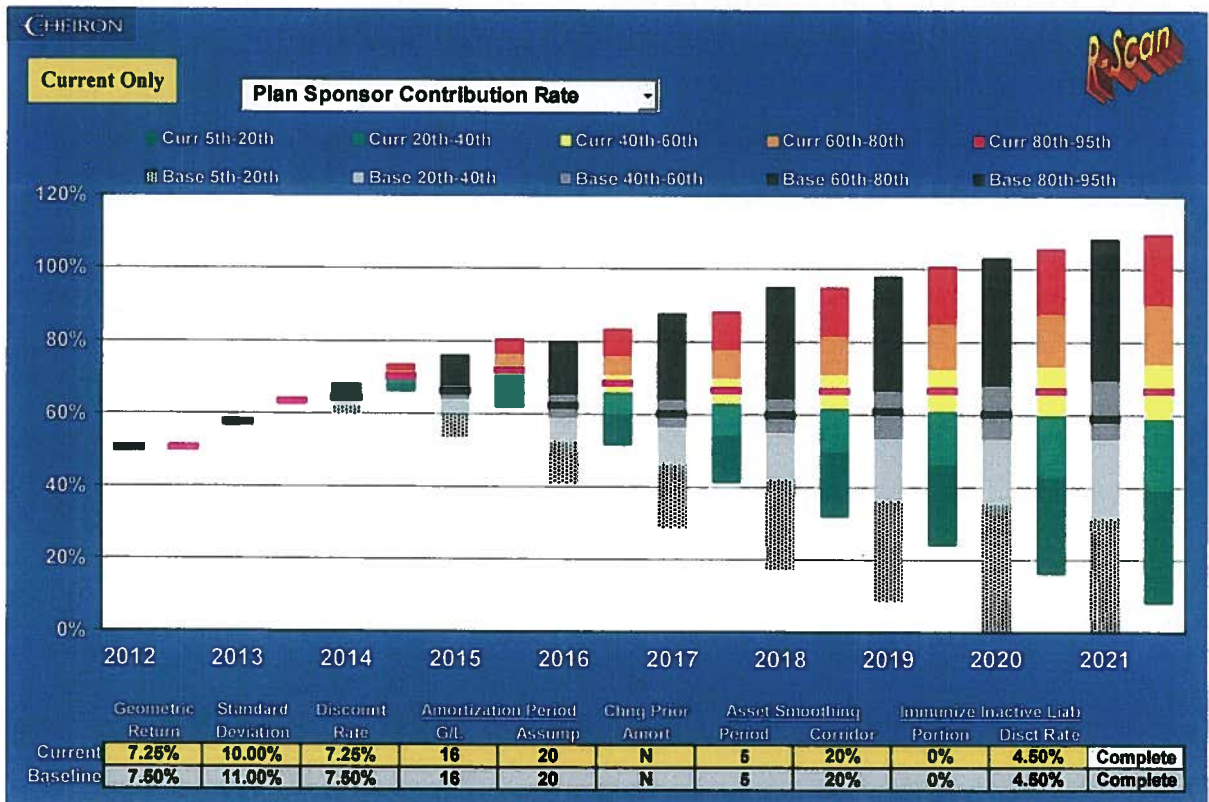
### Our R-Scan Interactive Model

Cheiron has recently modified its stochastic projection model to provide more options and more visual information. Cheiron’s *R-Scan* platform uses our base *P-Scan* model to demonstrate a likely range of potential future outcomes and how that picture changes if the funding, investment, or benefit policies are adjusted. The colored bars in the graph below represent the percentiles of possible results of a plan sponsor’s future contribution rates for the next fifteen years. Consultants can program any number of statistics (funded percentages, contributions rates, compounded returns, etc.) that are of interest to the client and quickly switch between them.



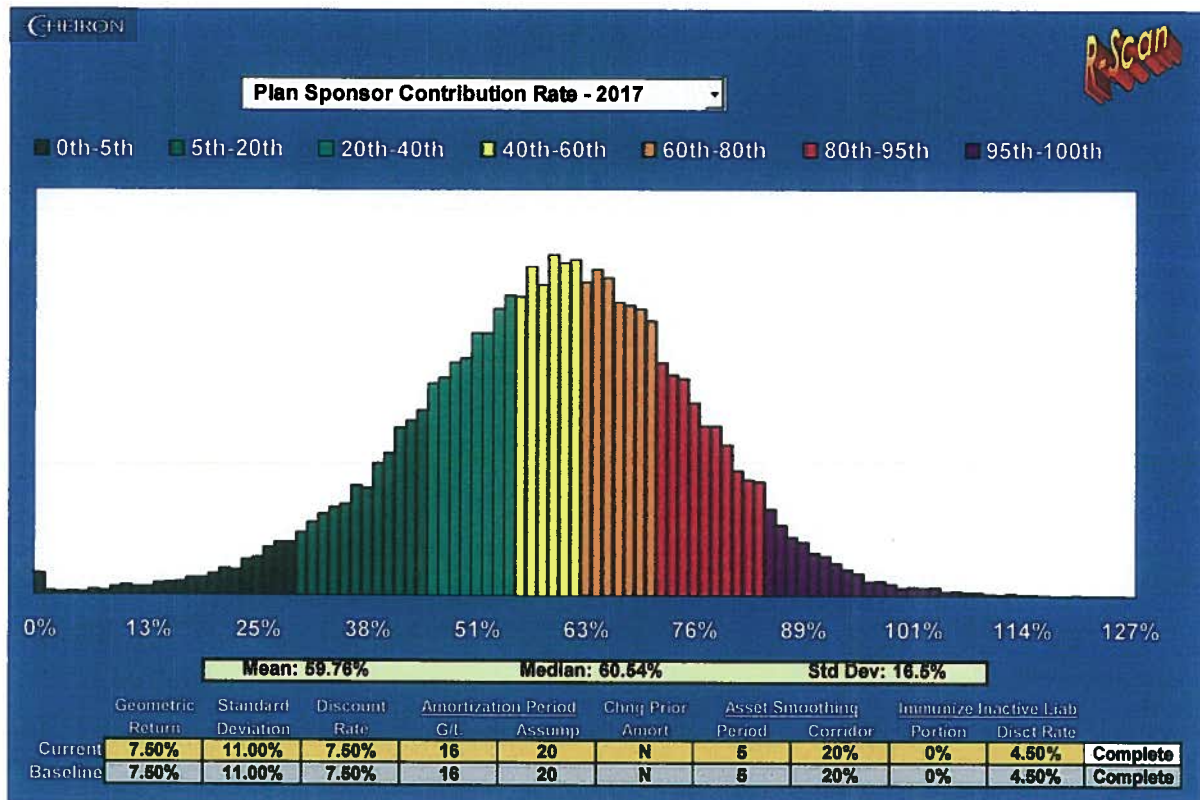


The next graph illustrates how *R-Scan* can be used to compare potential outcomes under two different sets of policies. In this case, the two policies represent two different investment portfolios with correspondingly different discount rate assumptions.





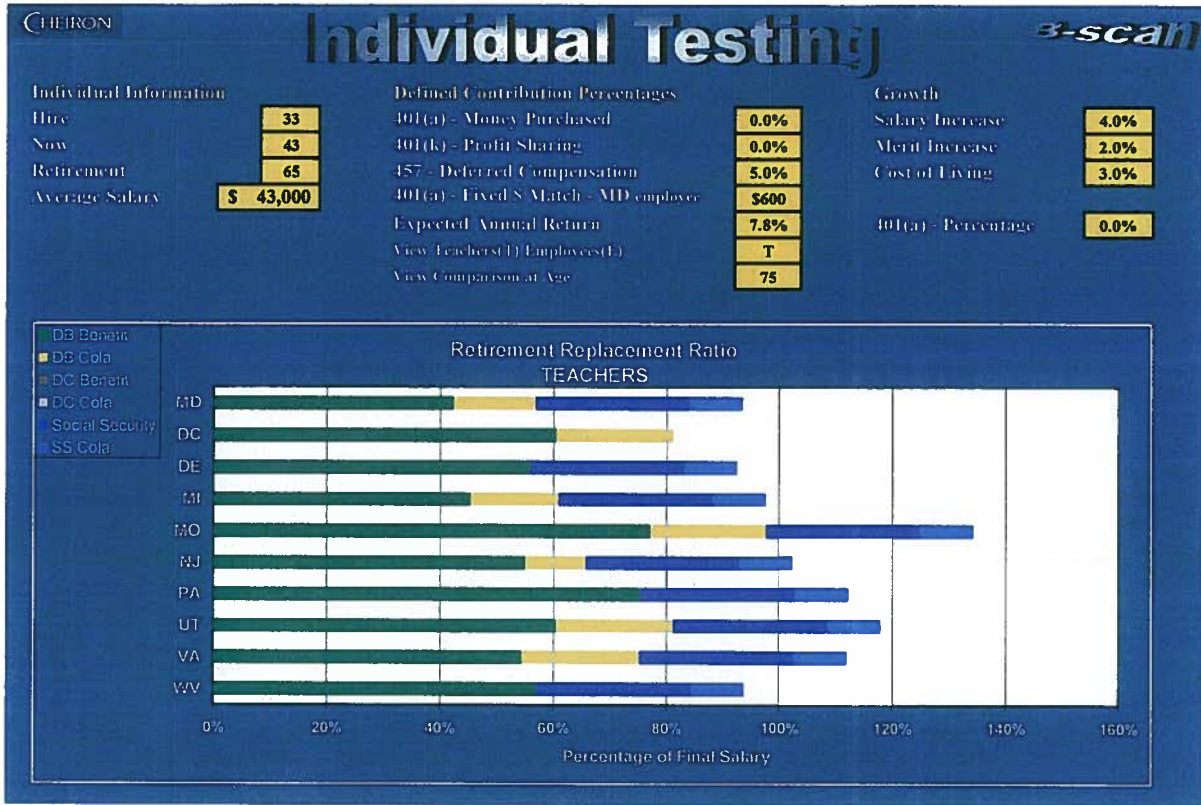
The final graph shows the probability distribution for a single year's results. This information can be isolated for any given test statistic and any year in the projection.



The costs of a defined benefit plan are fundamentally uncertain until investment returns, longevity, retirement behavior and other factors are known. Understanding the possible ranges of those costs is the first step in developing the appropriate policies to ensure the sustainability of the pension plan.

Each of the above models can be modified to include the costs of providing a defined contribution plan either as a supplement to the defined benefit plan, or as the only plan for a specified group of employees.

The following is an illustration of the type of modeling that we would use to provide comparative analysis of benefits, which is our Individual Testing Tool. We can vary any of the inputs at the top to demonstrate the implications of cost of living adjustments and combination defined benefit and defined contribution benefits.



Using this type of modeling, we have testified before the State Legislatures on the comparative benefits for the Teachers retirement system to define competitiveness of the current benefit structure. We have also used our model to demonstrate comparability with systems that have additional defined contribution plans as well as hybrid programs.

### 3. Actuarial Valuation Assumptions

*Assessment of whether the actuarial valuation assumptions are reasonable and consistent with generally accepted actuarial standards and practices; are reasonable based on PERS' experience; and are appropriate for PERS' structure and funding objectives. The assumptions evaluated should include both demographic and economic assumptions, such as mortality, retirement, separation rates, levels of pay adjustments, rates of investment return, and disability factors.*

*As part of this assessment, you should consider and specifically address whether actual experience is appropriately evaluated in experience studies conducted by the consulting actuary at least every five years and whether recent changes in assumptions are appropriate, reasonable, and supported by the experience studies. Also, you should review the gain/loss analyses from the last four actuarial valuation reports.*

Actuarial assumptions are intended to be the actuary's best estimate of future experience of the System. However, since the future is unknown, the actuaries develop these estimates based on a combination of historical experience, anticipated changes to historical patterns in the future, professional judgment, and the degree of conservatism desired.

For most demographic assumptions, historical experience is an appropriate guide, but this experience should be modified for any expected trends in the future. For example, there is a long historical trend of improvements in mortality, so mortality assumptions often include a continued trend of future improvements in mortality. Our analysis of demographic assumptions will rely heavily upon the results of the last experience study.

Similarly, for retiree health care costs, historical experience is a starting point. However, such experience must be adjusted for changes that have been adopted or are expected in this rapidly changing environment. The data collected for the review of retiree contributions will also be used to evaluate the assumptions for future retiree claims and expenses and for retiree contributions.

For some economic assumptions, such as inflation, there are measures in the market that provide a market consensus assumption about the future, which we take into account along with historical patterns. We will also ask for the capital market (or asset allocation assumptions) that are used by PERS in order to determine if the investment rate of return is consistent with such assumptions. The retiree health care trend and discount rate assumptions will be reviewed for consistency with the other economic assumptions. The economic assumptions will also be reviewed in comparison with assumptions used by other large public retirement systems as shown in recent surveys.

The actuarial assumptions will also be reviewed with respect to Actuarial Standards of Practice No. 27 (*Selection of Economic Assumptions for Measuring Pension Obligations*) and No. 35 (*Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*), and No. 6 (Measuring Retiree Group Benefits Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions).

The degree of conservatism will be assessed after considering the long-term objectives of the system and the employers and recognizing which assumptions present the greatest risk to the system.

#### **4. Parallel Valuation**

***Perform parallel valuations of pension benefits as of December 31, 2013, and of retiree health care benefits as of December 31, 2013, using the validated member census data and the same actuarial assumptions.***

***If you recommend assumption adjustments to more accurately reflect present and future assets, liabilities, and costs of PERS, you should provide detailed rationale for your recommendations, and describe the general effect on PERS' condition resulting from the proposed changes in assumptions.***

### **Methodology – (Full Replication of Actuarial Valuation)**

To audit the results of the actuarial valuations, including the development of actuarial liabilities and contribution rates as well as the proper application of the methods and assumptions, we propose the following methodology.

**Review Plan Provisions** – To start the project, we will review the provisions of the plan both as written in statute and as summarized in the actuarial valuation reports and member handbooks.

**Data Testing** – To test the validity of the data used in the actuarial valuation, we will collect the raw census data provided to GRS and the final census data used in the valuations. We will review the procedures used by GRS to process the data, and we will compare summary statistics between the raw and processed data to determine if they are substantially the same, reflecting the processing performed by GRS. We will also test the data to make sure it is complete and reasonable.

**Actuarial Assumptions** – We will collect the full set of actuarial assumption tables from GRS to compare to those reported in the valuation and experience study reports.

Our review of actuarial methods and assumptions will draw heavily from the analysis done in the most recent actuarial experience study supplemented by the gain/loss analysis in the last four valuation reports. We will opine on whether the conclusions and recommendations made from this study were reasonable. We will also review the assumptions for compliance with all applicable Actuarial Standards of Practice.

Specifically with regard to economic actuarial assumptions, we will also review these assumptions with respect to appropriate economic data as well as compare to assumptions being used by other public retirement systems.

To the extent that we might have a material disagreement in the selection of any assumptions, we will comment on the approximate effect on system liabilities.

**Replication of Liabilities** – To test the calculation of the actuarial liabilities, we will independently program the plan into our valuation systems using the data and assumptions provided by GRS. We will then compare our calculated liabilities, including present value of future benefits, actuarial liability and normal cost, with the liabilities calculated by GRS. The comparison will be made for active members and inactive members for both the pension and retiree health valuations. Calculations for individual decrements may also be compared as needed.

It should be noted that due to differences in valuation systems and other factors, it is common for the actual calculated values to differ slightly from one actuarial system to another. However, significant differences would require additional analysis to explain the source of the difference and verify the results of the valuation.



**Sample Life Review** – To further test the accuracy of the liability calculations and to ensure that all benefits are being properly valued, we will select some test cases from the data and ask GRS to provide full sample life output from their valuation systems on those individual test cases.

Some additional pension test cases will be selected for members who commenced benefits after the valuation date. For these test cases, we will request the sample life output from GRS and the final benefit calculation. By comparing the actual benefit calculation to the benefits valued, we can ensure that GRS's valuation is consistent with the manner in which the plan operates.

**Historical Review** – As part of our audit process we will ask for a minimum of five years of past valuation results to build what we refer to as a **Trend Model**. This model incorporates key results from past reporting and allows us to demonstrate if the results in the year of the audit are consistent with the past, and if not, why.

**Review of Actuarial Value of Assets** – Given the actuarial liabilities and normal costs calculated by GRS and the market value of assets (including historical data for the past five years), we will reproduce the calculation of the actuarial value of assets produced in the actuarial valuation report(s).

We will also build our **P-Scan** and **H-scan** models in this phase of the assignment. Our modeling is performed for all of our recurring client work as well as for actuarial audits. This modeling is an integral part of our quality control cycle because by projecting valuation results, we can make a determination of the implications of the current results into the future and identify results that are not intuitive and/or reflect inconsistencies in the methods and assumptions. This modeling, discussed previously, will be an integral part of our report in providing an assessment of the retirement system's risks and how the valuation process, methods and assumptions act in mitigating the risk.

**Review of Actuarial Methods** – The actuarial methods, including cost method, asset valuation method, amortization method and other processes used to develop contribution rates, must meet all applicable Actuarial Standards of Practice where they are not otherwise prescribed by law, as well as being consistent with the System's benefit structure and the objectives of the PERS Board. As we review the selection of the actuarial methods, we will form an opinion about whether the funding policies are appropriate and reasonable.

To illustrate the impact of the selected actuarial methods compared to alternatives on a macro level, we will again apply our proprietary **P-Scan** and **H-Scan** models to perform a series of "what if" projection scenarios as well as stochastic projections to determine the long-term implications of the current set of methods and assumptions. This modeling will allow PERS to see how well the current and alternative methods achieve given objectives under a variety of stresses.

**Review of Accounting Disclosures** – We will review the accounting disclosures included in the actuarial report to determine whether such disclosures follow the requirements of GASB .

## 5. *Review of Health Care*

*Assessment of whether the system appropriately, consistently, and evenly determines retiree contributions to health care and whether the implementation of the system's health care policies differ from those determinations.*

To start, we will meet with the appropriate parties to understand what the underlying goals and philosophies are regarding retiree contributions; to know what the intent is of the retiree contribution policy(ies). (For example: what portion of the costs are retirees supposed to pay? Does that portion vary for dependents? by Medicare status?)

We will then review the data and methods used to determine the retiree contributions, and review the actual calculations made to determine the retiree contribution rates. We envision this review will include several years of calculations to see how changes in the plans available, fluctuations in claims/premiums, and changes in enrollment affect the calculations. We will compare those to best practices in the industry, based on our consulting to other public sector entities. We will also stress test the calculation methods to identify any potential risks. (For example, is a plan at risk for a “death spiral” if enrollment drops.)

Finally we will compare the calculation of the retiree contributions to the data received for the retiree health valuation (as well as more recent data if the rates have changed since the valuation) to ensure the implementation is consistent with the retiree contribution rates determined.

If we find any issues, we would report the potential impact of making changes on both the retirees and on the system.

**Describe the final work product, including written reports, briefings, and availability of working papers. Include one or more examples of work products for actuarial valuations or audits that may help to illustrate the proposed methodology and final work product.**

The final work product will include the following:

- Draft and final actuarial audit reports covering the scope, process and recommendations.
- PowerPoint presentations summarizing the actuarial audit report for use at meetings. We expect that the required meetings will include the following:
  - Audit progress reports to the executive directors of PERS and ORSC as requested by the directors.
  - Presentation of the content of the preliminary draft of the report jointly to the executive directors prior to its release.
  - An explanation of the report at the conclusion of the engagement at separate meetings of the Board of Trustees of PERS and the ORSC.



- An exit conference with the consulting actuary and staff of PERS.

Please see Appendix B for a sample actuarial audit report.

**Provide an estimated date that the final report will be submitted and the projected timeline or the anticipated work requirements and milestone dates to reach that date.**

The timeline below is based upon our experience with other actuarial audits, but may be adjusted depending upon the needs of the ORSC or when data can be provided by the various bodies. In many of our actuarial audits, the time line is more compressed than for this audit, so some of the steps could be shortened. Please refer to Section 4.6 following this section regarding our general philosophy in conducting an actuarial audit.

1. Initial planning meeting, request data from PERS and actuary, and review plan provisions – Week 1
2. Perform data testing and request sample lives and benefit calculations; request retiree health contribution calculations – Weeks 2-3
3. Program our valuation system, and complete sample life review and historical review – Weeks 4-7
4. Complete review of actuarial value of assets, actuarial methods and assumptions, valuation reports, and retiree health contribution calculations – Weeks 8-9
5. Review draft findings with the ORSC – Week 10
6. Presentation of draft Results – Week 11
7. Presentation of final results – Week 12
8. Various educational briefings – as scheduled

## **4.6 ADDITIONAL INFORMATION**

**Include additional information that will be helpful to gain an understanding of the proposal. This may include diagrams, excerpts from reports, or other explanatory documentation that would clarify and/or substantiate the proposal. Any material included here should be specifically referenced elsewhere in the proposal.**

The typical actuarial valuation process contains elements that are very objective and analytical as well as elements which are subjective and require a great degree of judgment. For the former, the actuarial audit approach is fairly straightforward – that is, we need to numerically check the results. This includes the data checks and review of test lives.

For the judgmental portion of the valuation, such as review of methods and assumptions, our objective will be to determine whether the consulting actuary used a reasonable approach in developing such methods and assumptions. There may be instances where we might have reached a different conclusion and made a different recommendation, but we will not attempt to substitute our judgment for the judgment of the consulting actuary. However, there may be areas where we believe a fresh look is appropriate and we will cover these within our report as suggestions for improvement.

We believe that communication between the parties is essential to a successful actuarial audit. Within our typical audit process, we will schedule periodic conference calls between the ORSC, PERS, and the consulting actuary. This way concerns can be handled early on in the process rather than after the issuance of a draft or final audit report.

## 4.7 GLOSSARY

**Provide a glossary of all abbreviations, acronyms, and technical terms used to describe the services or products proposed. This glossary should be provided even if the terms are described or defined when first used in the proposal response.**

**Actuarial Asset Method** – The method used to determine the asset value used within the actuarial valuation. If the method does not use market value, it will normally smooth asset gains or losses over some period of future years.

**Actuarial Assumptions** – Assumptions with regard to the occurrence of future events. Actuarial assumptions are normally classified as demographic assumptions (such as turnover, retirement or mortality) or economic assumptions (such as investment return, inflation or salary growth).

**Actuarial Cost Method** – The procedure for allocating actuarial present values to time periods and to determine current year required contributions or expense.

**Actuarial Standards of Practice (ASOPs)** – ASOPs are issued by the Actuarial Standards Board. All credentialed actuaries are expected to comply with the ASOPs. Deviations from ASOPs within actuarial reports must be disclosed.

**Actuarial Valuation Method** – The general procedures of allocating cost within an actuarial valuation. The actuarial valuation method includes the actuarial cost method and the actuarial asset method.

**GASB** – Governmental Accounting Standards Board which issues statements regarding accounting standards for state and local governments.

**ProVal** – The actuarial software used by Cheiron for pension actuarial valuations. ProVal is leased from Winklevoss Technologies (WinTech).

**P-Scan** – Cheiron’s proprietary projection software for pension plans. *P-Scan* is used interactively during meetings to illustrate the effects of various changes in economic scenarios, plan provisions or actuarial methods and assumptions as well as being used to produce graphs for the reports.

**H-Scan** – Cheiron’s proprietary projection software for health plans. *H-Scan* is used interactively during meetings to illustrate the effects of various changes in economic scenarios, health trends, plan provisions or actuarial methods and assumptions as well as being used to produce graphs for the reports.

**R-Scan** – Cheiron’s proprietary stochastic projection model used to demonstrate a likely range of potential future outcomes and how that picture changes if the funding, investment, or benefit policies are adjusted.

## 4.8 COST INFORMATION

The cost estimates in the pricing summary must include all necessary charges to conduct the audit and must be a “not to exceed” figure. The pricing summary should include per element: personnel costs (including hourly rates and estimated hours for professional and clerical staff assigned to the audit), travel and lodging, data processing costs, materials, and any other potential costs.

The following is our best estimate and not to exceed fee and includes all expenses.

- Full Scope Actuarial Audit:

	Estimated Hourly Rate	Estimated Hours	Total
Principal Consulting Actuaries	\$ 390	100	\$ 39,000
Consulting Actuaries	\$ 365	35	\$ 12,775
Associate Actuaries	\$ 225	80	\$ 18,000
Senior Actuarial Analysts	\$ 185	150	\$ 27,750
Actuarial Analysts	\$ 165	150	\$ 24,750
Administrative Staff	\$ 95	15	\$ 1,425
			\$ 123,700

Includes travel, data processing costs and materials.

For services, if any, outside the stated requirements, the fee would be based on the extent of the project and the number of staff hours required based on standard hourly rates. Our hourly rates vary by the credentials of the person performing the service and are shown below.

2014 hourly rates:

Category/Consultant	2014 Hourly Rate
Principal Consulting Actuaries	\$340-\$465
Consulting Actuaries	\$260-\$395
Associate Actuaries	\$180-\$265
Senior Actuarial Analysts	\$170-\$195
Actuarial Analysts	\$145-\$180
Administrative Staff	\$ 85-\$105

Hourly billing rates are expected to increase approximately 3% to 5% per year.



*Appendix A*  
*Staff Résumés*



**Janet H. Cranna**  
**FSA, FCA, EA, MAAA**

Janet Cranna joined Cheiron in May 2013. She has over 25 years of retirement consulting and actuarial experience with public sector and corporate clients. Prior to joining Cheiron, Janet was with Buck Consultants for 24 years where she completed her tenure as a Principal, Consulting Actuary and a member of the Public Plan Practice Leadership Group. She was the lead actuary for several large state retirement systems, including the New Jersey Retirement Systems and the Pennsylvania Public School Employees' Retirement System. She has supervised, reviewed, and certified actuarial valuations and studies for retirement plans, including FASB disclosure for corporate plans and GASB disclosures for public plans. She has also performed experience studies and recommended changes to actuarial assumptions as needed, consulted on design and interpretation of plan provisions and their relationship to ERISA, IRS regulations, and state statutes.

Janet has presented and testified before boards and legislative committees regarding plan design and funding strategies. She has also been a speaker at professional conferences and organizations, including the National Council on Teacher Retirement Annual Convention and the Conference of Consulting Actuaries Annual Conference.

Janet is a Fellow of the Society of Actuaries, a Fellow of the Conference of Consulting Actuaries, an Enrolled Actuary under ERISA, and a Member of the American Academy of Actuaries. She graduated with a B.A. degree in Economics and a minor in Political Science from Bryn Mawr College.

**Gene M. Kalwarski**  
**FSA, FCA, MAAA, EA**

For over 30 years, Gene Kalwarski has been one of the nation's leading advisors to multi-billion dollar public sector pension funds. He has served as plan actuary to many such funds and is often retained as a specialist to help them address complex financial issues. He is an industry leader in the development of PC-based financial applications and interactive analytical tools that empower fund trustees to understand, evaluate, and strategize alternative solutions to their financial challenges. Gene's ideas and achievements have been chronicled in many industry publications, *Money* magazine, and at the annual *Business Week* CFO Forum.

Gene is noted for his ability to develop and present creative and complex actuarial strategies understandably to audiences with limited technical expertise. He has testified on several occasions before U.S. Senate Committees, and regularly addresses state legislatures and boards of trustees on behalf of the numerous state-wide pension funds he has represented.

Gene's experience with public sector pension funds includes:

- Serving as ongoing actuary to the San Diego City Employees Retirement System, the San Francisco City and County Employees' Retirement System, the Retirement Division of the City of Kansas City, MO, the San Jose Federated City Employees Retirement System, the retirement systems of Maine, Maryland, Delaware, Florida, Kansas, Connecticut, and West Virginia. In addition, he was actuary to the Vermont Municipal Employees' Retirement System and the retirement systems of the District of Columbia, Fairfax County, Virginia and Arlington County, Virginia.
- On special projects Gene has been retained by several other state-wide retirement systems in Iowa (IPERS), Massachusetts (SERS), New York State, New York City, Oregon, Rhode Island, and California (CalPERS, and CalSTRS).

In addition, Gene has been involved in several high-stakes and complex assignments including:

- Designing and developing interactive pension fund asset allocation tools for several public sector pension funds.
- At the request of the World Bank, creating a simulation strategy tool for Poland when the country was saddled with the mounting financial burden of honoring its Social Security obligations. After analyzing the options Gene presented, Poland confidently dissolved its Social Security system and moved to a defined contribution system that, ten years later, contributed to the country's improved financial stability.
- Designing a real-time Internet-based application for senior officials of the U.S. Department of Defense which allowed government executives to make strategic decisions on the creation of a Social Security-based retiree health insurance fund for all military personnel.

Gene began his career spending four years as an actuary at the Pension Benefit Guaranty Corporation (PBGC), where he first gained a detailed understanding not only of the PBGC, but all federal entities whose regulatory authority impacts pension design and cost. Thanks to his extensive contacts within the federal government that began with his service to the PBGC, Gene is able to help his clients anticipate regulatory actions that will impact their funds.

After the PBGC, Gene served as a consultant with Towers, Perrin for two years. In 1981 Gene began a 21-year career at Milliman, where he established the firm's Washington, DC office, became the firm's youngest Equity Principal in 1984, and by 1990 was the youngest Equity Principal to serve on the firm's Board of Directors. Gene left Milliman in 2002 in response to his concerns over policies relating to liability limitations being set on client work. He and his colleagues formed Cheiron in November 2002.

**Kevin J. Woodrich**  
**FSA, EA, MAAA**

Kevin Woodrich joined Cheiron in June 2003 after working for three years at Milliman. He began working in the actuarial field upon graduating from Bowling Green State University in 2000. He graduated *magna cum laude* with a Master of Science in Applied Statistics.

His 14 years of experience are primarily in the employee benefits arena including actuarial valuations, benefit calculations and benefit statements, government filings, experience studies and programming actuarial models, most recently including both *P-Scan* and *H-Scan*. Kevin has also done work with retiree medical valuations.

The consulting and actuarial profession has given Kevin the opportunity to creatively develop solutions for common situations. He enjoys meeting with clients to discuss these solutions and listen to any feedback or suggestions they may have to offer. Kevin takes pride in his ability to maintain a business relationship with his clients yet establish a personal rapport as well.

Some of his recent projects include:

- Assisting in the development of a projection model for several multiemployer plans to aid in the current funding crisis
- Developing a spreadsheet program to compute liabilities which will provide a check to Cheiron's valuation system
- Assisting in performing an actuarial audit for one of the very largest state retirement plans in the country
- Programming an interactive model which evaluates welfare plan design
- Assisting in performing retiree medical valuations
- Involvement in the development of Cheiron's new employee hiring policy and directly communicating with potential candidates

Some of Kevin's experience includes working directly with the Army Non-Appropriated Fund, the Arlington County (VA) Retirement System, the Norfolk (VA) Employees' Retirement System, the City of Roanoke (VA) Pension Plan, the City of Hampton (VA) Employees' Retirement System, the Teamsters Local 639 Employers' Pension Trust, Plumbers & Pipefitters National Pension Plan, National Wildlife Federation, United Association of Plumbers & Pipefitters Local 51 Pension Plan, and the UFCW Unions & Participating Employers Pension Fund.

**John L. Colberg**  
**FSA, MAAA, EA**

John Colberg has over 20 years of actuarial experience in retirement plans and other employee benefit plans including healthcare, group life and disability insurance, and employee leave plans. His experience includes healthcare and retirement consulting assignments for government employers at the Federal, state, and local levels, Taft-Hartley funds, private corporations, and non-profit organizations. Prior to joining Cheiron, John was employed by Milliman. John's style of consulting merges communication skills, actuarial expertise, and computer knowledge to present complex concepts in an easily understood format. Examples of recent projects include:

- Selecting a national PPO vendor and restructuring the benefit designs of a national union fund to provide better benefits to fund participants without increasing costs.
- Projecting health care costs and contribution rates for a state government under a redesign of benefits to match gold, silver, and bronze levels under the Affordable Care Act.
- Assisting in the pricing and incentives to transition a national employer from a predominantly HMO/EPO benefit structure to a consumer-driven model.
- Assisting Taft-Hartley funds in collective bargaining by developing, modeling, and communicating alternative benefit options or healthcare delivery systems.

In addition to the above projects, John has also assisted clients in the development of RFPs; evaluated the performance of and assisted in negotiations with vendors; developed and analyzed cost-containment strategies; analyzed legislative reform proposals; compliance with Other Post Employment Benefit disclosures; and helping clients with their Medicare options.

His governmental client work has included the U.S. Department of Defense, the U.S. Army Community and Family Support Center, the States of Arkansas, Florida, Maine, Delaware, and the District of Columbia. His Taft-Hartley and related clients include work for plans covering members of the Communication Workers of America, the United Food & Commercial Workers, the International Brotherhood of Teamsters, the International Brotherhood of Electrical Workers, and the Hotel Employees and Restaurant Employees.

John is a Member of the American Academy of Actuaries, a Fellow in the Society of Actuaries, and an Enrolled Actuary. He graduated *cum laude* from the Wharton School of the University of Pennsylvania with a B.S. in Economics with concentrations in actuarial science and insurance.



**Gaelle Gravot**  
**FSA, MAAA**

Gaelle Gravot joined Cheiron as Consulting Actuary in March 2011. She has over 15 years of experience in health insurance. Her prior experience as Managing Consultant with OptumInsight (formerly Ingenix Consulting) is proving to be very valuable in assisting our clients. Her experience includes:

- Medicare Part C and Part D bids where she assisted plan sponsors with strategy, plan design and pricing of their Medicare Advantage products.
- Medicare Supplemental pricing (Group and Individual).
- Part D audit: review of Prescription Drug Events (PDE) and their submission to CMS.
- Part D reporting: provides revenue and claims experience based on PDE accepted records, as well as estimates of the Part D settlement amounts for reinsurance, LICS and risk corridor.
- Part D bid tool development. Lead the Formulary Module development team for 2010 bid tool.
- Retiree Direct Subsidy (RDS) attestation of creditable coverage.
- Annual review of PBM financial performance and contractual guarantees.
- IBNR calculations and Actuarial Opinion for annual statement.
- Setting up contribution rate strategies for self-insured health plans.
- Evaluating renewal pricing from vendors for fully insured health plans.
- Providing collective bargaining support, including assistance in developing bargaining strategy, pricing the cost of various options, and presenting at the bargaining table as the client expert.
- Evaluating RFPs from vendors (medical, pharmacy, disease/utilization management), including developing contracting strategies, participating in negotiations, and proposal analysis.
- Medicaid pricing: Assisted clients with their filing with State.
- Commercial pricing: Development of an Excel based pricing tool for Commercial Group business.

Gaelle's experience also includes product development, rate filings, reserves calculations and analysis for Individual and Group health insurance. She has worked for both a consulting firm (Mellon, aka Buck Consultants) and some insurance companies (Trustmark Insurance Company, Blue Shield of California).

Gaelle is a Fellow of the Society of Actuaries, a Member of the American Academy of Actuaries, and a Member of the Chicago Actuarial Association. She received a Master in Mathematics and Fundamental Applications from the University of Le Havre, France, and graduated from Ball State University with a Master of Art in Actuarial Science.

**Karen Mallett**  
**FSA, MAAA**

Karen Mallett has over 30 years of actuarial experience in employee benefits as well as group and individual insurance. For the past 20 years, she has concentrated on employee benefits consulting. Prior to becoming one of the initial Cheiron founders, Karen was President of Fait Accomplis, a consulting company she started in 1994.

Karen's employee benefit consulting assignments have included:

- Developing annual contribution rates, cash flow projections, liability projections, and actual vs. projected analysis for health and welfare plans
- Evaluating and negotiating with healthcare providers, healthcare administrators, and investment managers
- Assisting in multiemployer negotiations for pension plans and health and welfare plans
- Developing plan design options and analysis for pension and health plans
- Providing competitive assessments of benefit programs including benefit surveys
- Providing total compensation analysis and options
- Benchmarking utilization, procedure costs, and total costs for health programs
- Developing financial management policies and asset allocation for pension plans
- Assisting in drafting and editing participant communications including newsletters, COBRA notices, Medicare Part D notices, Summary Plan Descriptions, Summary Annual Reports, etc.
- Completing government filings including Medicare Part D attestations and 5500 forms
- Calculating FAS106/158, SOP 92-6 (as amended), SSFAS 5, GASB 43/45 figures
- Providing annual health and welfare and pension valuations
- Calculating various reserves and underwriting procedures for the financial management of health and welfare plans
- Assisting the Pension Benefit Guaranty Corporation in negotiations with large pension and retiree health plan terminations
- Pricing of corporate takeovers / mergers for all employee benefits

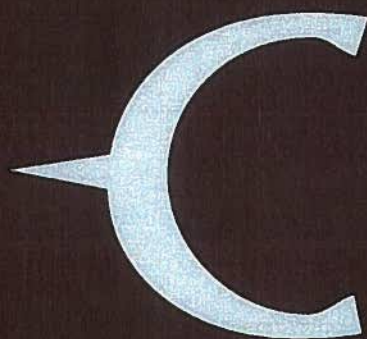
Karen's experience also includes product development, reserve calculations, underwriting, administration, and analysis for group and individual health insurance, including HMOs, PPOs, and indemnity insurance, group and individual life insurance, individual disability, and individual variable annuities. Her experience also includes product line profit and strategic planning and developing terminal funding proposals. She has developed internal corporate policies and procedures as well as assisted in the management and training of staff. She has worked for both a major consulting firm (Milliman) and a major insurer (Transamerica Occidental Life).

Karen's clients have included multiemployer funds, single employer funds, public sector funds, special regulated funds, labor unions, employers, non-profit organizations, quasi-government organizations, disease management firms, and law firms.

Karen is a Member of the American Academy of Actuaries and a Fellow in the Society of Actuaries. She graduated from the University of California, Los Angeles with a Bachelors degree in Math, Applied Science, Actuarial Plan.

*Appendix B*  
*Sample Actuarial Audit Report*





**State of Washington  
Pension Funding Council**

**June 30, 2011  
Actuarial Valuation Audit**

**Produced by Cheiron**

**February 2013**



Classic Values, Innovative Advice

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February 19, 2013

Pension Funding Council  
State of Washington  
Department of Retirement Systems  
PO Box 48380  
Olympia, WA 98504-8380

Cheiron is pleased to present the results of our actuarial audit of the June 30, 2011 actuarial valuation performed by the Office of the State Actuary (OSA) for the Pension Funding Council (PFC). The purpose of this report is to confirm the independent replication of the June 30, 2011 actuarial valuation results and to report to the PFC any recommendations to improve either the valuation or its related communications. The audit was performed based on the preliminary valuation report, and the OSA has incorporated some of the findings and recommendations in its final report. This report is for the use of the PFC and the OSA. Any other user of this report is not an intended user and is considered a third party.

The Executive Summary of our report highlights the key findings and recommendations of our review. The balance of the report provides details in support of these findings and recommendations along with supplemental data, background information and discussion of the process to audit the work performed by the OSA.

In performing this audit, Cheiron used actuarial assumptions and methods as specified in statute and, when not specified in statute, recommended by the OSA and adopted by the PFC. The appropriateness of the assumptions has not been reviewed as part of the audit.

The results of this audit report reflect a full replication of the June 30, 2011 actuarial valuation for the following Washington State retirement plans:

- Teachers' Retirement System Plan 1 (TRS 1)
- Teachers' Retirement System Plan 2/3 (TRS 2/3)
- Public Employees' Retirement System Plan 1 (PERS 1)
- Public Employees' Retirement System Plan 2/3 (PERS 2/3)
- School Employees' Retirement System Plan 2/3 (SERS 2/3)
- Public Safety Employees' Retirement System Plan 2 (PSERS 2)
- Washington State Patrol Retirement System Plans 1 and 2 (WSPRS 1/2)
- Law Enforcement Officers' and Fire Fighters' Retirement System Plan 1 (LEOFF 1)

In preparing our report, we relied, without audit, on information (some oral and some written) supplied by the Department of Retirement Systems (DRS) and the OSA. This information includes, but is not limited to, the plan provisions, employee data and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice #23. A detailed description of all information provided for this audit is provided in the body of our report.



While the data was not explicitly audited, we did compare the raw census data to the census data used in the actuarial valuation. Our report includes commentary on the results of this comparison.

We would like to take this opportunity to thank the members of DRS staff and the OSA for their assistance in providing the data and addressing our questions during this audit process.

This report was prepared for the Pension Funding Council of the State of Washington for the purpose described herein. This report is not intended to benefit any third party, and Chetron assumes no duty or liability to any such party.

We hereby certify that, to the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

Sincerely,  
Chetron

William R. Hallmark, ASA, FCA, EA, MAAA  
Consulting Actuary

Kenneth A. Kent, FSA, FCA, EA, MAAA  
Principal Consulting Actuary

Gaelle Grivot, FSA, MAA  
Consulting Actuary

STATE OF WASHINGTON PENSION FUNDING COUNCIL  
JUNE 30, 2011 ACTUARIAL VALUATION AUDIT

EXECUTIVE SUMMARY

Cheiron performed an audit of the June 30, 2011 actuarial valuation of the following Washington State retirement plans:

- Teachers' Retirement System Plan 1 (TRS 1)
- Teachers' Retirement System Plan 2/3 (TRS 2/3)
- Public Employees' Retirement System Plan 1 (PERS 1)
- Public Employees' Retirement System Plan 2/3 (PERS 2/3)
- School Employees' Retirement System Plan 2/3 (SERS 2/3)
- Public Safety Employees' Retirement System Plan 2 (PSERS 2)
- Washington State Patrol Retirement System Plans 1 and 2 (WSPRS 1/2)
- Law Enforcement Officers' and Fire Fighters' Retirement System Plan 1 (LEOFF 1)
- Law Enforcement Officers' and Fire Fighters' Retirement System Plan 2 (LEOFF 2)

The audit was based on the preliminary actuarial valuation report, and some of the findings and recommendations in this report have been incorporated into the final actuarial valuation report published by the OSA. In our review, we focused on the accuracy of the calculations and the extent to which the assumptions and methods serve to meet the intent and objectives described in statute. RCW 41.45.010 establishes the intent or goals of the funding process as follows:

- *Fully fund PERS 2/3, TRS 2/3, SERS 2/3, PSERS 2 and LEOFF 2 as provided by law;*
- *Fully amortize the unfunded actuarial liability in PERS 1 and TRS 1 within a rolling 10-year period using methods and assumptions that balance:*
  - *increased benefit security,*
  - *decreased contribution rate volatility, and*
  - *affordability of pension contribution rates;*
- *Establish long-term employer contribution rates which will remain a relatively predictable proportion of the future state budgets; and*
- *Fund, to the extent feasible, all benefits for plan 2 and 3 members over the working lives of those members so that the cost of those benefits are paid by the taxpayers who receive the benefit of those members' service.*

**Key Finding**

The key finding from our actuarial audit is that there is no material difference in our replication of the data, the calculation of liabilities, the calculation of the actuarial value of assets, or the calculation of contribution rates. The table below summarizes some of the key measures for all of the retirement plans combined. Additional detail is provided in the remainder of the report.

Item	OSA	Cheiron	Variance
Present Value of Future Benefits	\$ 77,146.3	\$ 77,186.7	0.1%
Present Value of Future Salaries	146,596.1	146,996.0	0.3%
Actuarial Value of Assets	60,653.9	60,686.7	0.1%

EXECUTIVE SUMMARY

**Technical Findings and Recommendations**

The following additional technical findings and recommendations do not have a material impact on the valuation results.

- The PFC and OSA should consider disclosing the plan's funded status in the valuation report on an Entry Age basis instead of a Projected Unit Credit basis. This change would result in the same funded status disclosure in the valuation report as is required to be disclosed for GASB purposes.
- The market value of assets used in the actuarial valuation does not match and is not reconciled with the net assets available for pension benefits reported in the CAFR. They should either match or the valuation report should include a reconciliation of the difference.
- In the calculation of the actuarial value of assets, the beginning-of-year balances are weighted for 364/365ths of a year instead of a full year.
- The entry age normal cost is spread as a level percentage of pay over each decrement instead of over each employee's career resulting in a normal cost rate that decreases once the member is eligible for retirement.
- The entry age used for the entry age normal calculation is the date the member entered any of the plans instead of the date the employee entered the current plan. As a result, the cost of the member's benefit in the current plan is spread over a period of time the member was not in the plan.
- The application of the assumed ratio of survivors selecting an annuity is not entirely correct.
- The special load to increase the ratio of survivors selecting an annuity by 4 percentage points for LEOFF 1 and WSPRS 1 doesn't make sense to us and is not applied exactly as described.
- The refund benefit is understated for certain WSPRS 2 and LEOFF 2 members who suffer a duty death.
- On WSPRS 1, the survivor benefit for an inactive disabled member has a 6% COLA adjustment that doesn't make sense to us.
- On WSPRS 2, the early retirement reduction for a non-duty related death benefit should start at the earlier of age 55 or 25 years of service. It is being applied only based on the number of years from age 55 regardless of the number of years of service.
- LEOFF 2 and WSPRS provide certain health benefits through a 401(h) account. There were a number of issued identified in the valuation of these liabilities.
- Disabled retiree benefits use a flat trend rate instead of the blended trend rates used in the Other Post Employment Benefit (OPEB) valuation report.
- For active employees, disability benefits are only increased for trend up to the time of disability.
- The valuation assumes that all active employees have spouses, but the assumption is stated as 85%.
- The probability of death for an active employee is based on the age and gender of the employee's spouse instead of the employee.
- The survivor benefits do not reflect Medicare-eligible premium rates once the survivor reaches age 65.
- Liabilities for surviving children are not valued.

STATE OF WASHINGTON PENSION FUNDING COUNCIL  
JUNE 30, 2011 ACTUARIAL VALUATION AUDIT

**EXECUTIVE SUMMARY**

- The use of the pension census to value the health liabilities potentially limits the accuracy of the valuation.
  - The fiscal note valuing these health benefits states an assumption that 50% of employers provide retiree medical coverage. The assumption is actually that 50% of plan members are eligible for retiree medical coverage from their employers, and the assumption was based on a 2005 survey. Because this is a significant assumption for the valuation of these benefits, we encourage an updated survey to verify that the assumption is still appropriate.
  - The valuation report should include a description of the OPEB benefits, assumptions, and methods including that they are being funded through a 401(h) account.
- Some methods and assumptions are not disclosed in the preliminary valuation report.

SAMPLE



ACTUARIAL VALUATION AUDIT PROCESS

Cheiron was retained by the Pension Funding Council (PFC) and the LEOFF Plan 2 Retirement Board to conduct an actuarial audit replicating the 2011 actuarial valuations performed by the Office of the State Actuary.

With an independent replication, the PFC can be confident that the OSA's results are reasonable and accurate. In addition, other aspects of the valuation process are reviewed and our independent opinions help to ensure that valuation and funding issues have been addressed and additional expert perspectives have been considered.

Our audit process includes the following:

- **Review of the census data used.** There are typical and anticipated adjustments made to the raw data in preparing the valuation that impact the final results. That treatment should be consistent and rational, and explicitly defined in the valuation reporting. By comparing summary statistics from the raw data to the final data used by the OSA in the valuation, we can highlight differences in the underlying processed data and the likely impact on cost.
- **Replication of the liability and calculation of contribution rates.** By separately programming our valuation system for the same benefits, using the same census data, actuarial cost methods and assumption as reported in the 2011 valuation, we can compare and contrast the results developed by the OSA. This provides an explicit check of the "black-box" nature of the valuation process.

- **Comparison of recent retirees.** As an additional check on the calculation of liabilities, we compare the benefits anticipated by the OSA in its valuation to the actual benefits received by some recent retirees. This check verifies that projected benefit under the plan is being valued in a manner consistent with the actual operation and experience.

- **Deterministic projections.** To test the effectiveness of the actuarial funding method in providing a systematic and smooth pattern of contributions to fund the plan, we build our interactive projection model, *P-scan*. With *P-scan* we explore different potential economic scenarios to illustrate how the actuarial funding method behaves prospectively when stressed and that the funding process is structurally sound.

The audit process is conducted in accordance with generally accepted actuarial principles and methods. The balance of our report presents our detailed findings and recommendations.

STATE OF WASHINGTON PENSION FUNDING COUNCIL  
JUNE 30, 2011 ACTUARIAL VALUATION AUDIT

**DATA REVIEW**

As part of the valuation process the OSA takes the *raw data* from DRS, applies default minimums and maximums, and performs reasonability tests. These tests look for missing or inconsistent data elements and result in adjustments to the data used in the valuation. In addition there are often certain data elements that require adjustment before the valuation is run.

We received copies of both the raw data that the OSA received from DRS and the final data file that the OSA used for the valuation. We applied the default minimums and maximums provided by the OSA to the active data file and compared key statistics between the files. The tables below summarize the results. The first column summarizes the raw data provided by DRS. The second column summarizes the data after applying the default minimums and maximums to the raw data, and the third column summarizes the final data used by the OSA in the valuation. The fourth and fifth columns show the percentage change due to applying the defaults and in the final OSA data.

PERS 1, TRS 1, and LEOFF 1					
	Raw Data	Apply OSA Defaults	Final OSA Data	Effect of Defaults	Ratio of Final / Defaults
<b>Active Members</b>					
<u>Minimums</u>					
Entry Age	17	18	17	5.9%	-5.6%
Current Age	23	23	50	0.0%	117.4%
Valuation Salary	\$ -	\$ 18,000	\$ 18,000	-	0.0%
<u>Maximums</u>					
Entry Age	75	75	76	0.0%	1.3%
Current Age	91	91	91	0.0%	0.0%
Service	62.75	50.00	62.75	-20.3%	25.5%
Valuation Salary	\$ 291,007	\$ 424,027	\$ 424,027	45.7%	0.0%
<u>Averages</u>					
Entry Age	35.41	35.41	35.44	0.0%	0.1%
Current Age	61.02	61.02	61.02	0.0%	0.0%
Service	25.58	25.57	25.58	0.0%	0.0%
Valuation Salary	\$ 62,257	\$ 63,159	\$ 63,172	1.4%	0.0%
<b>Vested Terminated Members</b>					
<u>Minimums</u>					
Current Age	45	45	51	0.0%	13.3%
Current Service	5.00	5.00	5.00	0.0%	0.0%
<u>Maximums</u>					
Current Age	80	80	80	0.0%	0.0%
Current Service	45.00	45.00	45.00	0.0%	0.0%
<u>Averages</u>					
Current Age	60.90	60.90	60.89	0.0%	0.0%
Current Service	13.09	13.09	13.09	0.0%	0.0%

DATA REVIEW

PERS 1, TRS 1, and LEOFF 1						
	Raw Data	Apply OSA Defaults	Final OSA Data	Effect of Defaults	Ratio of Final / Defaults	
<b>Service Retirees</b>	Current Age	51	51	51	0.0%	0.0%
	Minimums	-	120	91	-	-23.9%
	Maximums	107	107	107	0.0%	0.0%
	Current Age	222,251	222,251	222,251	0.0%	0.0%
	Benefit Amount	\$ 222,251	\$ 222,251	\$ 222,251	0.0%	0.0%
<b>Disabled Retirees</b>	Current Age	73.08	73.08	73.08	0.0%	0.0%
	Benefit Amount	\$ 24,649	\$ 24,649	\$ 24,685	0.0%	0.1%
<b>Beneficiaries</b>	Current Age	53	53	53	0.0%	0.0%
	Minimums	-	120	-	-	-100.0%
	Maximums	99	99	99	0.0%	0.0%
	Current Age	\$ 90,244	\$ 90,244	\$ 90,244	0.0%	0.0%
	Benefit Amount	\$ 90,244	\$ 90,244	\$ 90,244	0.0%	0.0%
<b>Averages</b>	Current Age	69.42	69.42	69.42	0.0%	0.0%
	Benefit Amount	\$ 29,846	\$ 29,847	\$ 29,850	0.0%	0.0%
<b>Minimums</b>	Current Age	17	20	17	17.6%	-15.0%
	Benefit Amount	\$ 114	\$ 120	\$ 114	5.7%	-5.4%
<b>Maximums</b>	Current Age	105	105	105	0.0%	0.0%
	Benefit Amount	\$ 117,614	\$ 117,614	\$ 117,614	0.0%	0.0%
<b>Averages</b>	Current Age	78.42	78.42	78.42	0.0%	0.0%
	Benefit Amount	\$ 17,145	\$ 17,145	\$ 17,145	0.0%	0.0%

STATE OF WASHINGTON PENSION FUNDING COUNCIL  
 JUNE 30, 2011 ACTUARIAL VALUATION AUDIT

DATA REVIEW

<u>All Other Plans (Excluding LEOFF 2)</u>					
	Raw Data	Apply OSA Defaults	Final OSA Data	Effect of Defaults	Ratio of Final / Defaults
<b>Active Members</b>					
<u>Minimums</u>					
Entry Age	-	18	16	-	-11.1%
Current Age	-	16	16	-	0.0%
Valuation Salary	\$ -	\$ 12,000	\$ 12,000	-	0.0%
<u>Maximums</u>					
Entry Age	85	80	85	-5.9%	6.3%
Current Age	87	87	87	0.0%	0.0%
Service	41.83	41.83	41.83	0.0%	0.0%
Valuation Salary	\$ 590,860	\$ 500,000	\$ 500,000	-15.4%	0.0%
<u>Averages</u>					
Entry Age	35.83	35.83	35.86	0.0%	0.1%
Current Age	47.26	47.26	47.25	0.0%	0.0%
Service	11.39	11.39	11.39	0.0%	0.0%
Valuation Salary	\$ 51,169	\$ 53,023	\$ 53,023	3.6%	0.0%
<b>Vested Terminated Members</b>					
<u>Minimums</u>					
Current Age	25	25	25	0.0%	0.0%
Current Service	2.44	2.44	2.44	0.0%	0.0%
<u>Maximums</u>					
Current Age	89	89	89	0.0%	0.0%
Current Service	33.25	33.25	33.25	0.0%	0.0%
<u>Averages</u>					
Current Age	53.35	53.35	53.34	0.0%	0.0%
Current Service	11.30	11.30	11.30	0.0%	0.0%

DATA REVIEW

All Other Plans (Excluding LEOPF 2)					
	Apply OSA	Final OSA	Effect of Defaults	Ratio of Final / Defaults	
	Raw Data	Defaults	Data	Defaults	
<b>Service Retirees</b>					
Minimums	47	47	47	0.0%	0.0%
Current Age	\$ -	\$ 120	\$ 35	-	-70.6%
Maximums	98	98	98	0.0%	0.0%
Current Age	\$ 203,031	\$ 203,031	\$ 203,031	0.0%	0.0%
Benefit Amount	70.41	70.41	70.41	0.0%	0.0%
Averages	\$ 13,285	\$ 13,285	\$ 13,290	0.0%	0.0%
Current Age	33	33	33	0.0%	0.0%
Minimums	\$ 69	\$ 120	\$ 69	73.0%	-42.2%
Current Age	89	89	89	0.0%	0.0%
Maximums	\$ 33,401	\$ 33,401	\$ 33,401	0.0%	0.0%
Benefit Amount	64.87	64.87	64.86	0.0%	0.0%
Averages	\$ 5,067	\$ 5,067	\$ 5,067	0.0%	0.0%
Current Age	21	21	21	0.0%	0.0%
Minimums	\$ 53	\$ 120	\$ 53	125.2%	-55.6%
Current Age	97	97	97	0.0%	0.0%
Maximums	\$ 74,106	\$ 74,106	\$ 74,106	0.0%	0.0%
Benefit Amount	68.25	68.25	68.24	0.0%	0.0%
Averages	\$ 8,120	\$ 8,120	\$ 8,120	0.0%	0.0%
Current Age	8,120	8,120	8,120	0.0%	0.0%
Benefit Amount					

None of the differences are significant.





STATE OF WASHINGTON PENSION FUNDING COUNCIL  
JUNE 30, 2011 ACTUARIAL VALUATION AUDIT

**REPLICATION OF LIABILITIES**

With the collected census data and actuarial assumptions from the OSA, we programmed our valuation system based on our understanding of the plan provisions. We collected sample lives from the OSA to verify their programming and compare it to ours. The present value of future benefits and present value of future salaries are the foundation for developing the aggregate normal cost. The tables below show the comparison of our independent calculations of these values to those of the OSA. All of the differences are well within a reasonable range (defined, as a minimum, of being within 5.0% for small plans and within 3.0% for large retirement systems) for an actuarial audit.

	<b>Present Value of Future Benefits</b>		
	<b>OSA</b>	<b>Cheiron</b>	<b>Variance</b>
<b>PERS 1</b>			
Active Members	\$ 2,044.6	\$ 2,035.8	-0.4%
Inactive Members	10,677.5	10,842.0	1.5%
Total	\$ 12,722.2	\$ 12,877.9	1.2%
<b>PERS 2/3</b>			
Active Members	\$ 21,579.7	\$ 21,521.4	-0.3%
Inactive Members	5,756.8	5,721.4	-0.6%
Total	\$ 27,336.5	\$ 27,242.8	-0.3%
<b>SERS 2/3</b>			
Active Members	\$ 2,834.0	\$ 2,838.6	0.2%
Inactive Members	862.1	853.2	-1.0%
Total	\$ 3,696.0	\$ 3,691.8	-0.1%
<b>PSERS 2</b>			
Active Members	\$ 448.7	\$ 441.9	-1.5%
Inactive Members	6.1	6.1	0.1%
Total	\$ 454.8	\$ 448.1	-1.5%
<b>WSPRS 1/2</b>			
Active Members	\$ 452.5	\$ 452.9	0.1%
Inactive Members	541.2	536.3	-0.9%
Total	\$ 993.7	\$ 989.2	-0.5%

REPLICATION OF LIABILITIES

Present Value of Future Benefits		OSA	Chevron	Variance
<b>TRS 1</b>	Active Members	\$ 1,378.9	\$ 1,379.0	0.0%
	Inactive Members	7,934.2	7,761.3	-2.2%
	Total	\$ 9,313.1	\$ 9,140.3	-1.9%
<b>TRS 2/3</b>	Active Members	\$ 8,245.3	\$ 8,320.9	0.9%
	Inactive Members	1,516.3	1,506.6	-0.6%
	Total	\$ 9,761.6	\$ 9,827.5	0.7%
<b>LEOFF 1</b>	Active Members	\$ 251.7	\$ 251.6	0.0%
	Inactive Members	3,898.6	3,938.8	1.0%
	Total	\$ 4,150.3	\$ 4,190.4	1.0%
<b>LEOFF 2</b>	Active Members	\$ 7,551.9	\$ 7,614.0	0.8%
	Inactive Members	1,166.1	1,164.7	-0.1%
	Total	\$ 8,718.1	\$ 8,778.8	0.7%
<b>Grand Total</b>	Active Members	\$ 44,787.4	\$ 44,856.3	0.2%
	Inactive Members	32,358.9	32,330.4	-0.1%
	Total	\$ 77,146.3	\$ 77,186.7	0.1%

Present Value of Future Salaries		OSA	Chevron	Variance
<b>PERs 1</b>		\$ 1,504.5	\$ 1,505.9	0.1%
<b>PERs 2/3</b>		70,721.4	71,020.4	0.4%
<b>SERS 2/3</b>		11,480.1	11,526.0	0.4%
<b>PSERS 2</b>		2,526.2	2,488.2	-1.5%
<b>TRS 1</b>		788.7	788.8	0.0%
<b>TRS 2/3</b>		41,832.6	41,813.6	0.0%
<b>WSPRS 1/2</b>		771.5	773.9	0.3%
<b>LEOFF 1</b>		60.8	60.8	0.0%
<b>LEOFF 2</b>		16,910.3	17,018.5	0.6%
<b>Grand Total</b>		\$ 146,596.1	\$ 146,996.0	0.3%



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**REPLICATION OF LIABILITIES**

Minimum contribution rates for the open plans depend on the entry age normal cost. The table below compares our independent calculation of the entry age normal cost for these plans to the calculation performed by the OSA. The differences are, except for PSERS, well within a reasonable range for an actuarial audit. For PSERS, the difference is discussed later in the report, but it did not affect the contribution rate as the minimum rate was not applicable.

	Entry Age Normal Cost		
	OSA	Cheiron	Variance
<b>PERS 2/3</b>	\$ 693.4	\$ 705.2	1.7%
<b>SERS 2/3</b>	102.6	104.5	1.9%
<b>PSERS 2</b>	22.9	29.9	30.6%
<b>WSPRS 1/2</b>	14.5	14.7	1.3%
<b>TRS 2/3</b>	262.5	270.5	3.0%
<b>LEOFF 2</b>	257.7	260.7	1.2%

REPLICATION OF CONTRIBUTION RATES

Contribution rates for the open Plans are composed of a basic contribution rate subject to a minimum contribution rate, plus, for employers, an amortization of any unfunded liability in the related closed plan. The calculation requires several inputs from the valuation of the open plans including the Present Value of Future Benefits (PVFB), the Present Value of Future Salaries (PVFS), and the Entry Age Normal Cost (EANC). In addition, the calculation calls for inputs from the valuation of the closed plans. But, before using the liabilities calculated in the valuation, the market value of assets for both open and closed plans are converted to a smoothed actuarial value of assets.

Development of Actuarial Value of Assets

The market value of assets represents a "snap-shot" value as of the last day of the fiscal year that provides the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace. Because these fluctuations would cause volatility in employer contributions, an actuarial value of assets is developed.

The actuarial value of assets is calculated by spreading recognition of the gain or loss on the investment return over a period from 1 to 8 years depending on how much the actual rate of return deviated from the expected rate of return. The maximum smoothing period of 8 years is reached if the actual return deviates from the expected return by 700 basis points (7.0%) or more. Only two years in the last 8 has been smoothed over less than 8 years.

We replicated the OSA's calculation of the actuarial value of assets. A comparison of results is shown in the table below. The differences are discussed in the technical findings and recommendations of the report, but none are significant.

Actuarial Value of Assets			
	OSA	Chetron	Variance
PERS 1	\$ 8,883.4	\$ 8,889.3	0.1%
PERS 2/3	20,996.7	21,006.9	0.0%
SERS 2/3	2,872.1	2,873.5	0.0%
PSERS 2	140.7	140.7	0.0%
TRS 1	7,485.0	7,489.9	0.1%
TRS 2/3	7,140.6	7,144.1	0.0%
WSPRS 1/2	949.5	950.0	0.1%
LEOFF 1	5,565.3	5,568.6	0.1%
LEOFF 2	6,620.7	6,623.6	0.0%
Grand Total	\$ 60,653.9	\$ 60,686.7	0.1%

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REPLICATION OF CONTRIBUTION RATES

**Calculation of Contribution Rates**

The basic contribution rate for the open Plans is equal to the Aggregate Normal Cost Rate. Members pay 50% and the employers pay 50% of the total contribution rate. In addition to the basic contribution rate, the open Plans are subject to a minimum contribution rate generally equal to 80% of the entry age normal cost rate.

We replicated the OSA's calculation of contribution rates. A comparison of results is shown in the table below.

	<b>Employer Contribution Rates</b>		
	<b>OSA</b>	<b>Cheiron</b>	<b>Difference</b>
<b>PERS 1</b>	4.00%	4.17%	0.17%
<b>PERS 2/3</b>	5.03%	4.93%	-0.10%
<b>SERS 2/3</b>	5.64%	5.58%	-0.06%
<b>PSERS 2</b>	6.22%	6.18%	-0.04%
<b>WSPRS 1/2</b>	7.63%	7.70%	0.07%
<b>TRS 1</b>	4.48%	4.03%	-0.45%
<b>TRS 2/3</b>	5.73%	5.86%	0.13%
<b>LEOFF 1</b>	0.00%	0.00%	0.00%
<b>LEOFF 2</b>	7.57%	7.65%	0.08%

The differences in contribution rates are due to the slight differences in liability measurements as opposed to any difference in the calculation of contribution rates based on those liability measurements. The largest difference (TRS 1 amortization rate) is primarily due to a 1.9% difference in the measurement of the TRS 1 present value of future benefits. We do not view any of these differences as material.

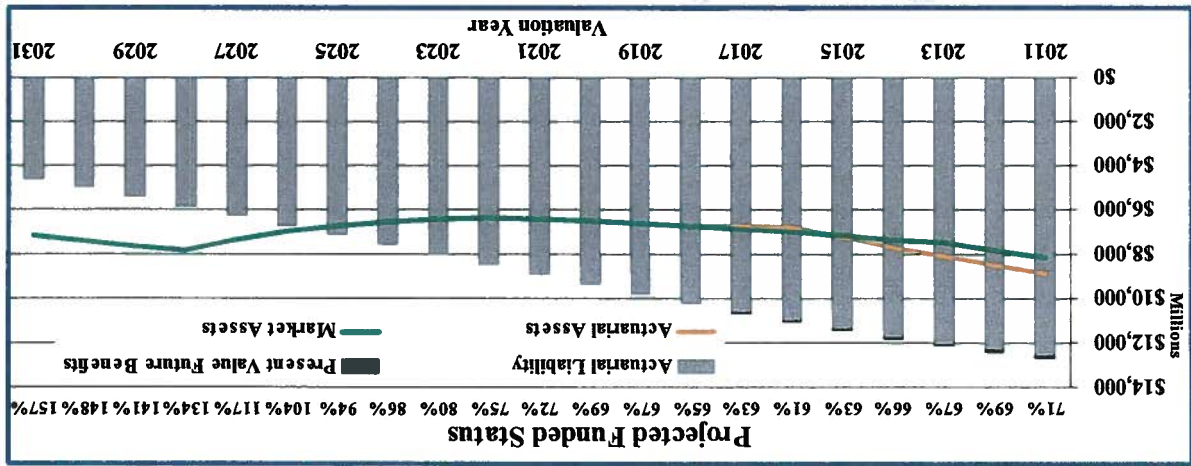


**DETERMINISTIC PROJECTIONS**

Deterministic projections can be used to assess the actuarial method employed and how it behaves prospectively to a variety of economic scenarios in terms of managing the volatility of contribution rates and the funded status of the plan. In the sections below, projections for each of the plans are provided assuming all actuarial assumptions are met, including investment returns of 7.9% in each and every year.

**PERS 1**

The graph below shows the actuarial liability (gray bars), the present value of future benefits (black bars), the actuarial value of assets (orange line) and market value of assets (green line). The percentages along the top of the graph show the funded status that would be reported in the CAFR (actuarial value of assets divided by entry age actuarial liability). The graph assumes that all projected contributions are made when due as projected below.



Because PERS 1 is a closed plan with mostly retirees, the difference between the present value of future benefits and the actuarial liability is minimal. As benefits are paid out, the actuarial liability decreases from approximately \$13 billion to approximately \$5 billion by the end of the projection period. The funded status is projected to decline from 71% down to 61% as the recent investment losses are fully recognized and as contribution rates are increased. Then, funded status is projected to improve, reaching 100% funding in about 2026 and continuing to improve thereafter.

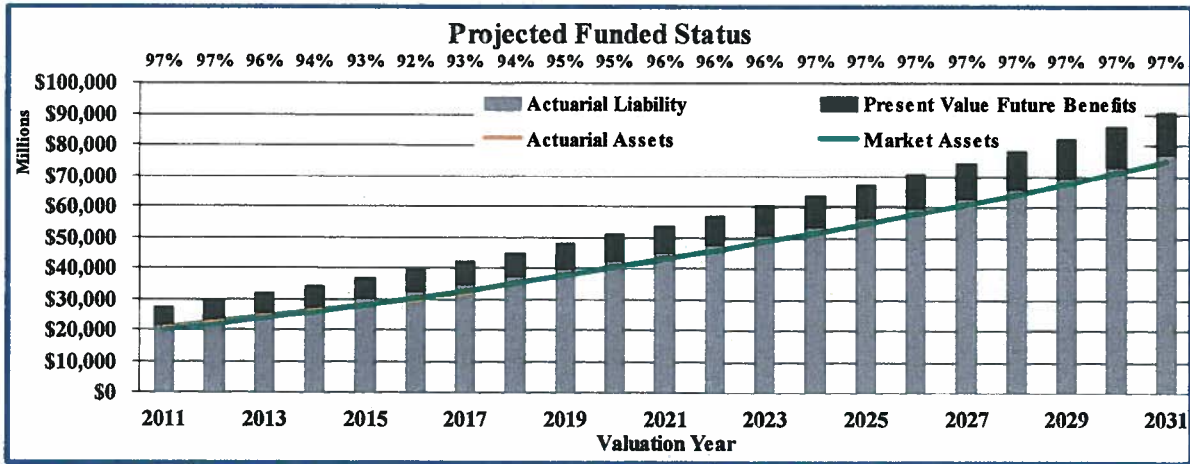
Because the PERS 1 contribution rates are calculated over the payroll of PERS 2/3, SEKS 2/3, and PERS 2, the funded status improves rapidly at the end of the projection period as the minimum contribution rate on the growing payroll (including projected membership growth) is more than sufficient to fund the declining liability.

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DETERMINISTIC PROJECTIONS

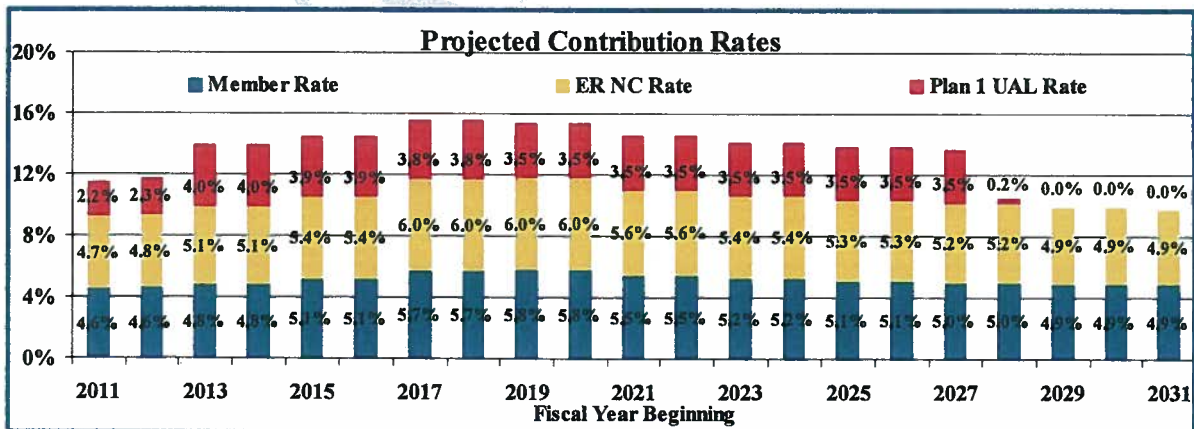
**PERS 2/3**

The chart below shows the projected growth of liabilities and assets for the PERS 2/3 plan. As noted at the top of the chart, the funded status is projected to decline from 97% to approximately 92% as the recent investment losses are recognized before increasing back to 97% by the end of the projection.



While PERS 1 declines in liability, as shown earlier, from \$13 billion to \$5 billion over the projection period, the open PERS 2/3 plan is projected to increase in liability from approximately \$22 billion to approximately \$80 billion over the same projection period.

The graph below shows the contribution rates for PERS 2/3 with PERS 2 member contribution rates on the bottom (in teal), employer PERS 2/3 contribution rates in the middle (the yellow bars), and the PERS 2/3 payroll contribution rate to Plan 1 on top (in red).

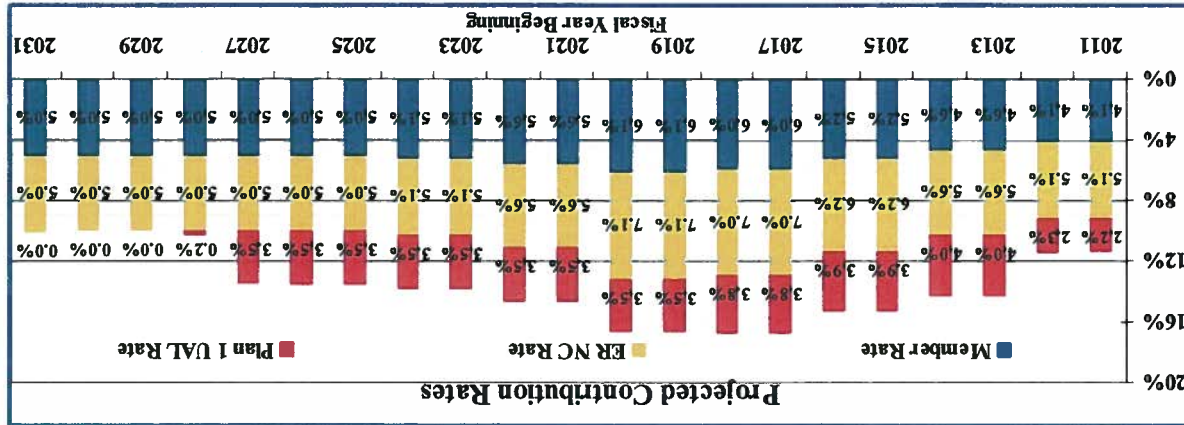
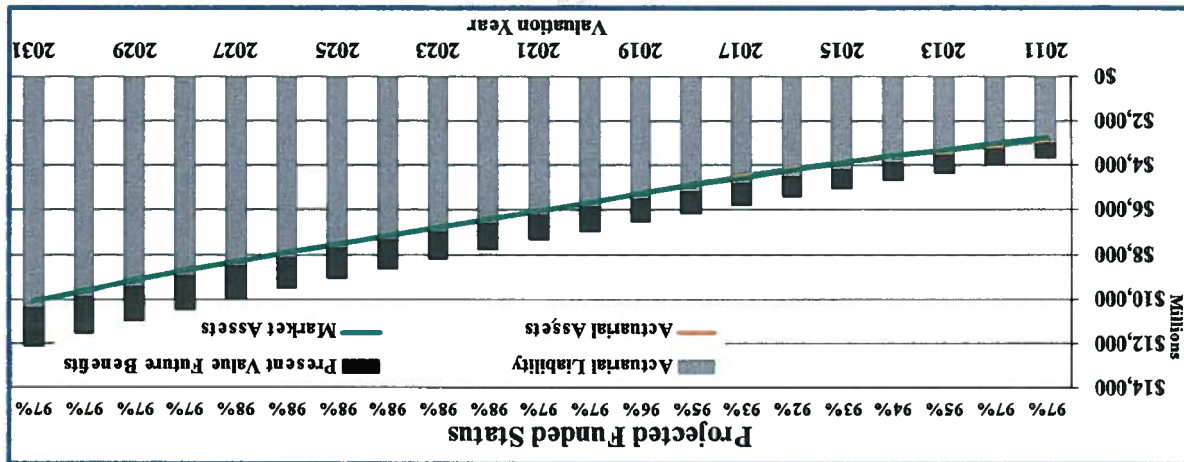


DETERMINISTIC PROJECTIONS

Contribution rates are expected to increase as the recent investment losses are fully recognized. The Plan 1 rate is limited by a maximum rate in the early years of the projection and a minimum rate in the later years of the projection.

SERS 2/3

The charts for SERS 2/3 shown below illustrate a very similar dynamic to that shown for PERS 2/3, but with a peak contribution rate somewhat higher than PERS 2/3. The Plan 1 UAL rate is, by definition, identical to the rate shown for PERS 2/3.

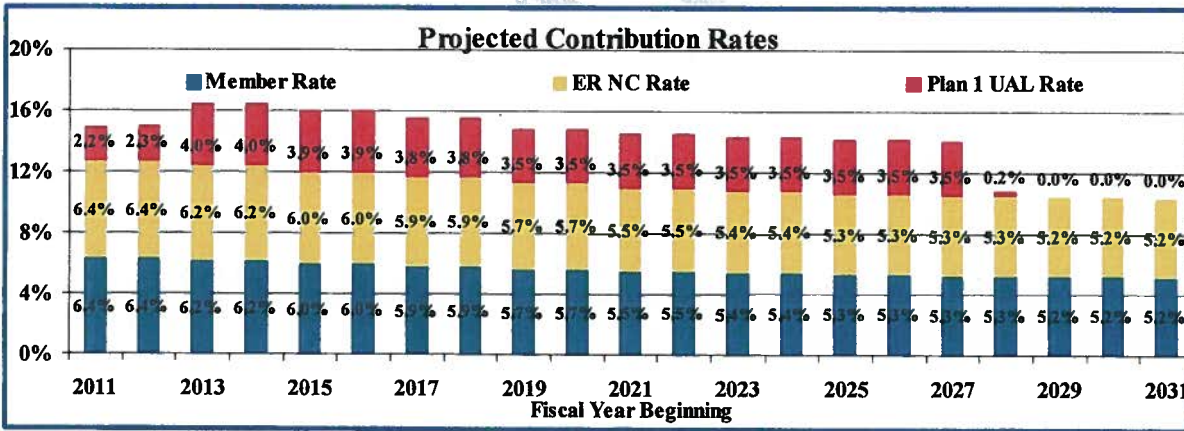
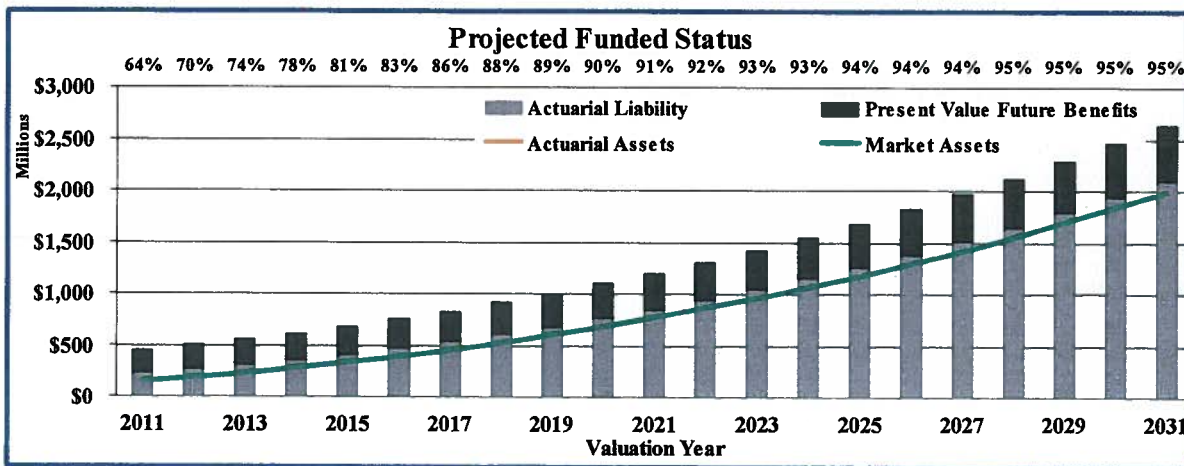


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DETERMINISTIC PROJECTIONS

**PSERS 2**

The charts below show that PSERS 2 can expect a different dynamic than PERS 2/3 and SERS 2/3. The Plan 1 UAL rate is, by definition, identical to the rate shown for PERS 2/3 and SERS 2/3, but because PSERS 2 is a relatively new plan, the impact of the investment losses is less severe, and contributions are a much more significant part of the projected growth of the plan.

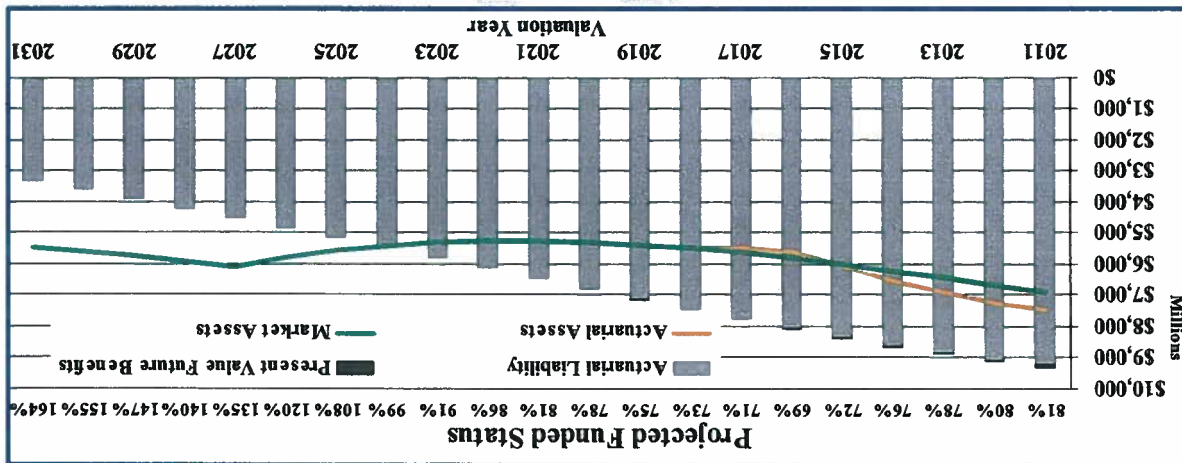




DETERMINISTIC PROJECTIONS

TRIS 1

Because TRS 1 is a closed plan with mostly retirees, the difference between the present value of future benefits and the actuarial liability is minimal. As benefits are paid out, the actuarial liability decreases from approximately \$9 billion to approximately \$3 billion by the end of the projection period. The funded status is projected to first decline from 81% down to 69% as the recent investment losses are fully recognized and as contribution rates are increased.



The funded status improves rapidly at the end of the projection period as the minimum contribution rate (5.75%) on the growing combined payroll of TRS 1, 2, and 3 (including projected membership growth) is more than sufficient to fund the declining liability. If the minimum rate is not employed to override the underlying amortization method, the funded status at the end of the projection would be 84% instead of 164%.

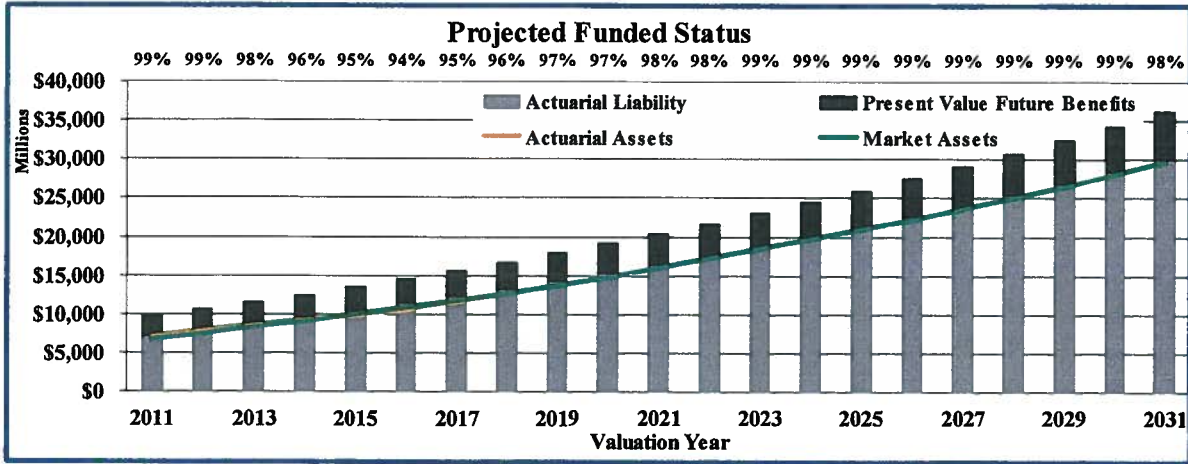
TRIS 2/3

The chart below shows the projected growth of liabilities and assets for the TRS 2/3 plan. As noted at the top of the chart, the funded status is projected to decline from 99% to approximately 94% as the recent investment losses are recognized before increasing back to 98% by the end of the projection.



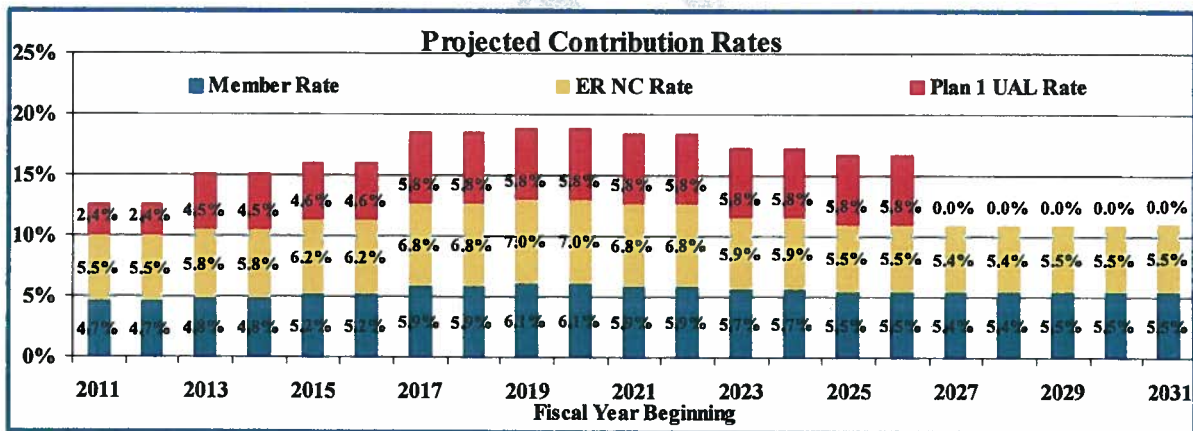
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DETERMINISTIC PROJECTIONS



It is also worth noting that while TRS 1 declines in liability from \$9 billion to \$3 billion over the projection period, the open TRS 2/3 plan is projected to increase in liability from approximately \$7 billion to approximately \$30 billion by the end of the projection.

The graph below shows the contribution rates with member contribution rates on the bottom, employer Plan 2/3 contribution rates in the middle, and Plan 1 contribution rates on top.

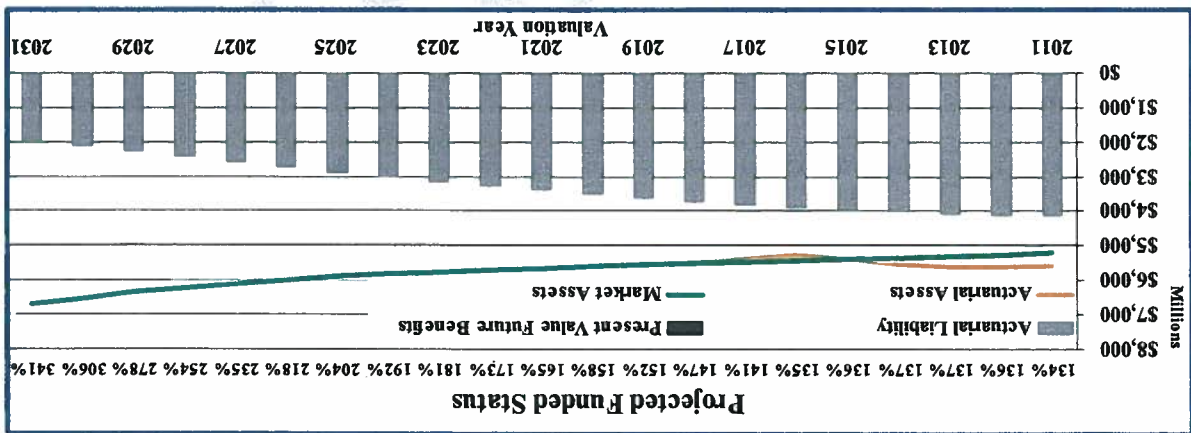


Contribution rates are expected to increase as the recent investment losses are fully recognized. The Plan 1 rate is limited by a maximum rate in the early years of the projection and a minimum rate in the later years of the projection.

DETERMINISTIC PROJECTIONS

**LFOFF 1**

LFOFF 1 is currently more than 100% funded and is projected to remain fully funded, so there is no contribution rate.



## TECHNICAL FINDINGS AND RECOMMENDATIONS

### Assets

The market value of assets used in the actuarial valuation does not match and is not reconciled with the plan net assets held in trust for pension benefits reported in the CAFR. We understand that the difference is due to operating funds, fixed assets and long-term obligations such as compensated absences. However, our understanding of the reporting under Government Accounting Standards Board Statement No. 25 is that the plan net assets held in trust for pension benefits that is reported in the CAFR should be the amount actually available to pay plan benefits and expenses. If a portion of those assets are committed to another purpose, we understand that the plan should report the full amount of assets in the trust and a liability amount for any obligations for the items described above.

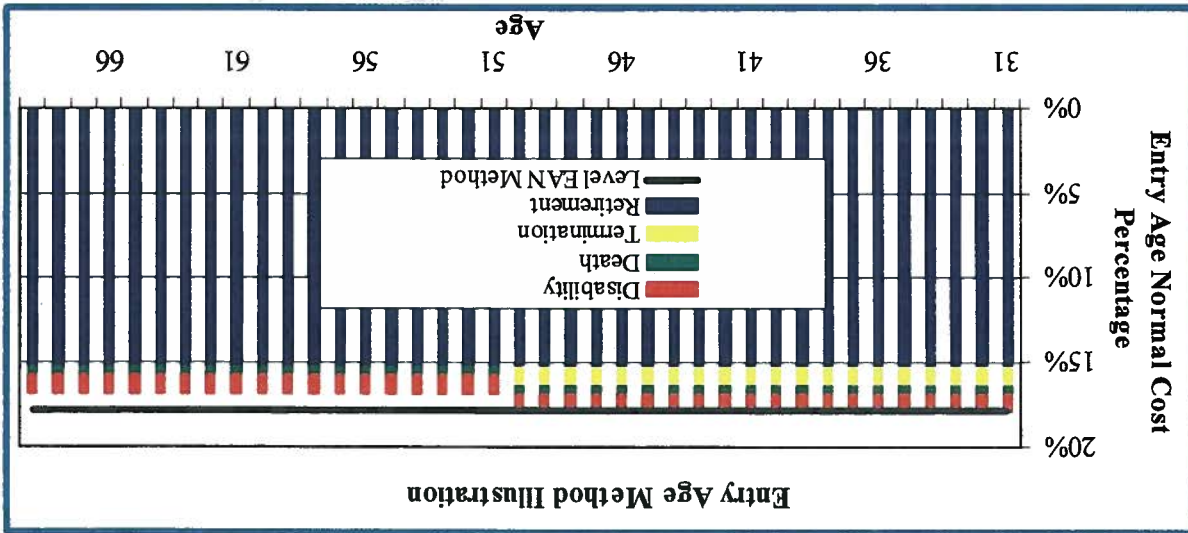
The fact that the CAFR reports a different amount of plan assets than the actuarial valuation may also cause confusion for the users of the CAFR and valuation reports. Consequently, we recommend that the market value of assets in the actuarial valuation report should match the plan net assets reported in the CAFR. If a portion of those assets are dedicated to another purpose, the plan should recognize a liability for that other purpose.

In the calculation of the actuarial value of assets, the beginning-of-year balances are weighted for 364/365ths of a year instead of a full year. This difference changes the expected investment earnings for the year, the calculated actual rate of return for the year, the gain or loss for the year, and the actuarial value of assets. The effect, however, is very minor.

### Entry Age Normal Cost

The entry age normal cost as applied by the OSA is spread as a level percentage of pay over each decrement instead of over each employee's career. For example, the cost of termination benefits are spread as a level percentage of pay from plan entry until the member is eligible for retirement, and the cost of retirement benefits are spread as a level percentage of pay from plan entry until the last assumed retirement age. Consequently, for an individual member, the normal cost is one percentage of pay until the member is eligible for retirement and a lower percentage of pay while the member is eligible for retirement. The more traditional interpretation is to have the cost of each benefit spread over the full expected career of an individual member resulting in a constant normal cost rate from entry age until expected decrement/retirement.

TECHNICAL FINDINGS AND RECOMMENDATIONS



We do not have a particular objection to the method used, but we note that the method should be clearly explained in the report. Also, it is not the version of the entry age method adopted by GASB in Statements 67 and 68. The OSA may wish to use the version adopted by GASB to avoid the need to calculate two entry age measurements and to avoid the confusion that could result with two entry age measurements.

The entry age used for the entry age normal calculation is the date the member entered any of the plans instead of the date the employee entered the current plan. For most plans, this difference has a very minor impact on the minimum contribution rate as most members do not transfer from one plan to another. However, for PSERS, this issue has a significant impact on the minimum contribution rate, increasing the entry age normal cost by approximately 30 percent as shown in the section of this report on the replication of liabilities. However, it had no impact in this valuation because the regular contribution rate was greater than the minimum.

**Death Benefits**

The application of the assumed ratio of survivors selecting an annuity is not entirely correct. The assumption is described as the ratio of survivors of an active or terminated member's death who select annuity payments rather than a lump sum payment. Consequently, we would expect the benefit to be valued as:

$$\text{Ratio x value of annuity} + (1 - \text{ratio}) \times \text{value of lump sum}$$

For plans other than LEOF 1, the benefit is valued as:

$$\text{Value of lump sum} + \text{ratio} \times \text{maximum}(\text{value of annuity} - \text{value of lump sum}, 0)$$

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**TECHNICAL FINDINGS AND RECOMMENDATIONS**

These formulas are equivalent except when the value of the lump sum exceeds the value of the annuity. The formula used by the OSA ensures that the value is always at least equal to the value of the lump sum.

For LEOFF 2, the situation is a little more complex as the lump sum benefit is 1.5 times greater if the member was married or had minor children than if the member was single with no minor children. The higher lump sum is payable only if a member has more than 10 years of service or is eligible to retire or dies in the line of duty. We would expect an additional assumption to value the lump sum separately for those assumed married and those not. However, the OSA modified their formula to value the benefit as follows:

$$\text{Value of lump sum} \times (1.5 \times \text{ratio} + (1 - \text{ratio})) + \text{ratio} \times \text{maximum}(\text{value of annuity} - 1.5 \times \text{value of lump sum}, 0)$$

If the value of the lump sum and value of annuity are equal, this formula is equivalent to assuming two-thirds of those electing a lump sum were married or had minor children. However, the formula results in other differences if the lump sum and annuity have different values.

The table below illustrates the differences between the OSA application of the assumption and our application of the assumption for three hypothetical scenarios.

<b>Illustration of Differences in Application of Ratio of Survivors Selecting an Annuity</b>			
<b>Illustration</b>	<b>A</b>	<b>B</b>	<b>C</b>
<u>Assumptions</u>			
Annuity Value	\$ 200,000	\$ 400,000	\$ 200,000
Single Lump Sum	200,000	200,000	400,000
Ratio Selecting Annuity	0.4	0.4	0.4
Percent Married	67%	67%	67%
<u>Non-LEOFF Plans</u>			
OSA Value	\$ 200,000	\$ 280,000	\$ 400,000
Cheiron Value	<u>200,000</u>	<u>280,000</u>	<u>320,000</u>
Difference	0	0	80,000
<u>LEOFF Plan 2</u>			
OSA Value	\$ 240,000	\$ 280,000	\$ 480,000
Cheiron Value	<u>240,000</u>	<u>320,000</u>	<u>400,000</u>
Difference	0	(40,000)	80,000

We recommend that the OSA review the application of this assumption or alternatively, the greater of the lump sum or the annuity could be valued which would eliminate the need for all of the assumed ratios of survivors selecting an annuity.



**TECHNICAL FINDINGS AND RECOMMENDATIONS**

The special load to increase the ratio of survivors selecting an annuity by 4 percentage points for LEOF 1 and WSPRS 1 doesn't make sense to us and is not applied exactly as described. First, it is not applied in the WSPRS 1 valuation. The stated purpose of using this ratio is to account for the valuation software applying mortality assumptions to potential survivors. The load is applied to refunds as well as annuity benefits. In the case of a refund, the adjustment reduces the percentage assumed to elect a refund rather than providing a load to the annuity. However whether survivors elect a refund or an annuity, they are eligible for immediate benefits so the load is not required.

The refund benefit is understated for certain WSPRS 2 and LEOF 2 members who suffer a duty death. Members are entitled to 150% of their employee contributions with interest if they elect a refund. However, the refund benefit for these members is only the employee contributions with interest.

On WSPRS 1, the survivor benefit for an inactive disabled member has an adjustment increasing the benefit by 6% which was noted as a COLA adjustment. To our knowledge, there is no special adjustment needed for these members.

On WSPRS 2, there is a reduction in the survivor's benefit if a member should die from a non-duty related incident and the member is not eligible for normal retirement. The reduction should be based on the number of years the member is less than age 55, or if less, the number of years the member's service is less than 25. The reduction is based on the number of years from age 55; regardless of the years of service the member has when they die.

**OPFB Valuation**

LEOF 2 and WSPRS provide certain health benefits that are funded through a 401(h) account. There were issues identified in the valuation of these liabilities. Note that our review does not address implicit subsidies between the active, disabled and retiree population benefit costs as these are addressed in the OPFB report.

The table below shows the degree to which we were able to match the OSA's valuation using the OSA's methodology (Matching) and the results after fixing some theoretical and application issues (Cheiron). The issues may be significant in the context of just the 401(h) account, but are not significant in the context of the full valuation, with the impact of the differences ranging from less than 0.001% of the total liabilities for the Matching case and 0.007% for the Cheiron case.

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**TECHNICAL FINDINGS AND RECOMMENDATIONS**

LEOFF Plan 2 and WSPRS Plans 1/2						
Reimbursement of Medical Premium - Duty related Disability & Death Benefits (\$ in Millions)						
	OSA	Matching	% Change	Cheiron	% Change	
<b>Present Value of Future Benefits</b>						
Actives - Death	\$ 15.2	\$ 15.5	1.8%	\$ 13.4	-11.8%	
Actives - Disability	13.7	14.0	2.2%	20.9	52.6%	
Inactives - Death	8.4	8.4	-0.1%	7.8	-7.5%	
Inactives - Disability	1.4	1.3	-2.3%	2.1	52.7%	
<b>Total</b>	<b>\$ 38.7</b>	<b>\$ 39.2</b>	<b>1.3%</b>	<b>\$ 44.2</b>	<b>14.2%</b>	
<b>Entry Age Normal Cost</b>						
Actives - Death	1.1	1.1	-0.9%	0.8	-27.0%	
Actives - Disability	0.7	0.7	3.4%	1.2	62.1%	
<b>Total</b>	<b>\$ 1.8</b>	<b>\$ 1.8</b>	<b>0.0%</b>	<b>\$ 2.0</b>	<b>11.1%</b>	

The issues we identified are as follows:

- **Death & Survivor benefits:**
  - The stated assumption is that 85% of active employees have spouses, but the OSA valued 100% with spouses. Either the ProVal coding should be changed to match the stated assumption or the stated assumption should be changed to match the ProVal coding.
  - The probability of death for an active employee is based on the age and gender of the employee's spouse instead of the employee.
  - The survivor benefits do not reflect Medicare-eligible premium rates once the survivor reaches age 65. Instead, the survivor benefits continue to use the pre-Medicare premium rates.
  - Liabilities for WSPRS surviving children are not valued.
- **Disability Benefits:**
  - For actives, the benefit amounts are only trended up to the time of disability. The benefit amounts should continue to increase after the employee becomes disabled at the same rate as used in the OPEB valuation.
  - The trend used in the valuation of benefits for disabled retirees is 3%; however the trend stated in the corresponding assumptions is 5%. Either the assumptions need to be updated to reflect the 3% trend, or the benefits valuation needs to be recalculated using a 5% trend.
- The use of the pension census to value the health liabilities limits the accuracy of the valuation. Assuming the full health census is not available, assumptions should be developed for the percentage of employees with a spouse, percentage of employees with children, and average number of children based on the health census. The assumptions used for pension purposes may be different for health purposes due to the potential for dual health coverage.
- We recommend that the retiree-paid portion of the premium be assumed to increase at the same blended trend rate as is used in the Other Postemployment Benefits (OPEB) valuation report regardless of current status (active or inactive) and reason for benefits (disability or death). The OSA uses a flat trend for disabled retirees currently receiving benefits.

**TECHNICAL FINDINGS AND RECOMMENDATIONS**

- The fiscal note valuing these health benefits states an assumption that 50% of employers provide retiree medical coverage. The assumption is actually that 50% of plan members are eligible for retiree medical coverage from their employers, and the assumption was based on a 2005 survey. Because this is a significant assumption for the valuation of these benefits, we encourage an updated survey to verify that the assumption is still appropriate.
- The valuation report should include a statement that the OPFB benefits are being funded via a 401(h) account, a description of the OPFB assumptions and methods, and a summary of the OPFB plan provisions.

**Methods and Assumptions Not Disclosed in the Preliminary Valuation Report**

In a valuation report of this size, there are many assumptions and methods to describe. One advantage of an independent replication is that the assumptions and methods that may not be described in the valuation report may get uncovered. Based on our replication audit, we noticed that the following assumptions and methods were not disclosed in the preliminary valuation report and should be considered for inclusion in the future.

- The assumed retirement age for deferred vested members is not disclosed:

Current inactive and actives

WSPRS 1/2:	Age 60
LEOFF 1:	Age 50
LEOFF 2:	Age 53 with less than 20 years service
	Age 50 with 20 or more years of service
PERs, TRS, SERS, PSERS Plan 2/3:	
	Age 55 with 30 or more years of service
	Age 65 with less than 30 years of service

Plan 3 actives only:

- 1) If the member has less than 20 years, their assumed retirement age is 65
- 2) If the member has 30 or more years of service, they are assumed to retire at age 55 or immediately if they are older than 55 due to the heavily subsidized early retirement factors.
- 3) If the member has 20 or more years of service and less than 30, a percentage are assumed to defer their retirement to 65 and receive an increase of 3% per year until age 65. The rest are assumed to retire at 55 or their current age if greater and forego the increases.

- The value of the special lump sum death benefit of \$216,622 effective 7/1/2011 is not disclosed for WSPRS 1/2 and LEOFF 1.
- Employee contribution rates used to accumulate account balances are not disclosed.

### TECHNICAL FINDINGS AND RECOMMENDATIONS

- Duty death rates that are applied to the special lump sum death benefit are not disclosed.
- For LEOFF 1 - Disabled members may receive an additional benefit of 5 percent of their final average salary for each dependent child. Surviving spouses of members who die in service also receive an additional 5 percent of FAS for each child. Both benefits have a maximum of 10% of FAS. These additional benefits are being valued based on the assumption that the member will receive the maximum additional benefit of 10% of FAS. This assumption along with the assumed probability that a member will have a dependent child is not disclosed.
- For LEOFF 1 and WSPRS 1 - The probability that an active or terminated member will have a qualified survivor who is entitled to survivor annuity benefits upon death after retirement is not explicitly disclosed. The probability is the same as the Ratio of Survivors Selecting Annuities for ages greater than or equal to 62 (plus 4% for WSPRS 1), but is applied at all ages for deaths after retirement.
- For WSPRS 1 - The normal form of benefit provides the survivor with a benefit that is the lesser of 100% of the member's benefit including all COLAs or 50% of FAS with no COLAs. The assumptions that all survivors receive the 50% of FAS benefit (and not the 100% of member's benefit) and that 64% of retirees are married are not disclosed.
- For PERS 1 – For duty disability, the flat \$350 benefit is being loaded for military service.
- For PERS 1 – The maximum compensation limit is using an inflation rate of 3.5%, instead of 3%.

#### **Unresolved Issues from Prior Audit**

The PFC and OSA should consider disclosing the plan's funded status in the valuation report on an Entry Age basis instead of a Projected Unit Credit basis. As noted in our prior audit, GASB requires the disclosure under the Entry Age basis, and the Projected Unit Credit basis is not used for any other purpose. Disclosing two different funded status numbers creates unnecessary work and may create unnecessary confusion among users of the valuation reports and CAFR.

The minimum contribution rate for PERS 2/3, SERS 2/3 and TRS 2/3 defined in the statute is 80 percent of the entry age normal cost for each system. However, the methodology used by the OSA does not result in a minimum contribution equal to 80 percent of the entry age normal cost. Since these minimum rates do not apply in this valuation, there is no impact. In our prior valuation audit, we described three potential interpretations of the statute including the interpretation used by the OSA. A decision should be made as to the appropriate interpretation.

EXAMPLES

The statute specifies that a membership growth assumption be used in the development of the amortization payment for the closed plan unfunded liabilities. Use of such an assumption is inconsistent with traditional actuarial practice and has the effect of reducing the contribution rate. In effect, contributions are deferred further into the future and there is a risk of not collecting sufficient contributions if this assumption is not met. The minimums and maximums tend to control the Tier 1 UAL rates, but Legislation should be considered to remove this assumption from the calculation.

**TECHNICAL FINDINGS AND RECOMMENDATIONS**



STATE OF WASHINGTON PENSION FUNDING COUNCIL  
JUNE 30, 2011 ACTUARIAL VALUATION AUDIT

APPENDIX A  
BASIS FOR REPORT

**Plan Provisions**

A detailed description of the plan provisions on which this replication is based can be found in the appropriate member handbook on the Washington State Department of Retirement Systems' website at the following URL: <http://www.drs.wa.gov/member/>. There is a separate handbook for each system and plan number.

**Actuarial Assumptions and Methods**

The actuarial methods and assumptions are the same as those described in the OSA's June 30, 2011 actuarial valuation report which can be found on their website at the following URL: [http://osa.leg.wa.gov/Actuarial\\_Services/Publications/Valuations.htm](http://osa.leg.wa.gov/Actuarial_Services/Publications/Valuations.htm).

SAMPLE

APPENDIX B  
GLOSSARY OF TERMS

1. **Actuarial Assumptions**  
Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, investment income and salary increases. Demographic assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.
2. **Actuarial Gain (Loss)**  
The difference between actual experience and actuarial assumption anticipated experience during the period between two actuarial valuation dates, as determined in accordance with a particular actuarial funding method.
3. **Actuarial Liability**  
The Actuarial Liability is the difference between the present value of all future system benefits and the present value of total future normal costs. The Actuarial Liability represents the budgeted cost for benefits attributed to service prior to the valuation date by the Actuarial Funding Method. It is also referred to by some actuaries as the "accrued liability" or "actuarial accrued liability".
4. **Actuarial Present Value**  
The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest, and by probabilities of payment.
5. **Actuarial Value of Assets**  
The Actuarial Value of Assets equals the Market Value of Assets adjusted according to the short-term volatility of investment returns in order to stabilize contribution rates and the funded status reported under GASB 25 and 27.
6. **Entry Age Normal Actuarial Funding Method**  
A mathematical budgeting procedure that allocates the cost of an individual's retirement plan benefits as a level percentage of pay over his or her working career.

**APPENDIX B  
GLOSSARY OF TERMS**

**7. Funded Status**

The Actuarial Value of Assets divided by the Actuarial Liability. The Funded Status represents the percentage of assets in the Plan compared to the budgeted amount under the Actuarial Funding Method. The Funded Status can also be calculated using the Market Value of Assets.

**8. Governmental Accounting Standards Board**

The Governmental Accounting Standards Board (GASB) defines the accounting and financial reporting requirements for governmental entities. GASB Statement No. 25 defines the plan accounting and financial reporting for governmental pension plans, and GASB Statement No. 27 defines the employer accounting and financial reporting for participating in a governmental pension plan.

**9. Market Value of Assets**

The fair value of the Plan's assets assuming that all holdings are liquidated on the measurement date.

**10. Normal Cost**

The actuarial present value of retirement system benefits allocated to the current year by the actuarial funding method.

**11. Present Value of Future Benefits**

The estimated amount of assets needed today to pay for all benefits promised in the future to current members of the Plan assuming all Actuarial Assumptions are met.

**12. Present Value of Future Normal Costs**

The Actuarial Present Value of retirement system benefits allocated to future years of service by the Actuarial Funding Method.

**13. Projected Unit Credit Actuarial Funding Method**

A mathematical budgeting procedure that allocates an individual's projected retirement plan benefits over his or her working career in proportion to service.

**14. P-scan**

Cheiron's proprietary modeling software used to project pension plan assets, liabilities, funded status, contribution rates, etc. under a variety of economic scenarios.

SAMPLE

The difference between Actuarial Liability and the Actuarial Value of Assets. The UAL represents the shortfall of assets in the plan compared to the budgeted amount under the Actuarial Funding Method. The UAL can also be calculated using the Market Value of Assets.

**15. Unfunded Actuarial Liability (UAL)**

**GLOSSARY OF TERMS**

**APPENDIX B**

