

KENTUCKY RETIREMENT SYSTEMS

TO: Members of the Board

FROM: William A. Thielen
Executive Director

DATE: May 15, 2014

SUBJECT: Oath of Office

The new member of the KRS Board of Trustees, Mr. William Summers, will be introduced and the oath of office will be administered at the May 15, 2014 meeting. There are no materials to be distributed for this agenda item.

RECOMMENDATION: This memorandum is presented for informational purposes only.

KENTUCKY RETIREMENT SYSTEMS

TO: Members of the Board

FROM: William A. Thielen
Executive Director

DATE: May 15, 2014

SUBJECT: Affirmative Action Plan

Pursuant to Section 3.03 of the Kentucky Retirement Systems Personnel Policies, the Kentucky Retirement Systems has implemented an Affirmative Action Plan to promote and assure equitable treatment of all persons who are now employed, being considered for employment, seeking employment, and who will be recruited for employment in the future. The Kentucky Retirement Systems has already taken substantial steps towards fulfilling the requirements of the Affirmative Action Plan, as described in Section 3.03(3) of the Personnel Policy.

The Kentucky Retirement Systems provides periodic training to its leadership team to ensure compliance with federal and state laws. Such training covers harassment based on all legally protected categories (race, color, sex, religion, national origin, age, and disability), anti discrimination laws in general, and reasonable accommodation and inquiries under the ADA.

The Kentucky Retirement Systems continues to seek appropriate recruitment sources for females and minorities.

The current employment statistics for the Kentucky Retirement Systems show that as of March 31, 2014, there are 254 full-time employees. There are 154 female employees, representing 60.63 % of the staff, and 27 employees who are members of minority groups, representing approximately 10.63% of the staff. Females make up 58.82% of the leadership positions in the Kentucky Retirement Systems, while employees who are members of minority groups hold 3.92% of the leadership positions in the Kentucky Retirement Systems.

In order to establish clear long term-hiring goals for minorities and females, Kentucky Retirement Systems will follow the goals previously published by the Commonwealth of Kentucky's Personnel Cabinet. The long-term hiring goal for minorities is 10 percent with a long-term female hiring goal of 52.42 percent.

RECOMMENDATION: This memorandum is presented for informational purposes only.

KENTUCKY RETIREMENT SYSTEMS

OVERALL AND MINORITY FULL TIME EMPLOYMENT
BY TYPE OF EMPLOYMENT AND DIVISION
AS OF MARCH 31, 2014

KRS AREA/DIVISION	KRS EMPLOYMENT CATEGORY											
	<u>LEADERSHIP</u>			<u>PROFESSIONAL</u>			<u>SUPPORT</u>			<u>TOTALS</u>		
	<u>Total</u>	<u>Minor.</u>	<u>(%)</u>	<u>Total</u>	<u>Minor.</u>	<u>(%)</u>	<u>Total</u>	<u>Minor.</u>	<u>(%)</u>	<u>Total</u>	<u>Minor.</u>	<u>(%)</u>
Executive Staff	5	0	0.0%	0	0	0.0%	3	0	0.0%	8	0	0.0%
Communications	1	0	0.0%	4	1	25.0%	0	0	0.0%	5	1	20.0%
Legal	3	1	33.3%	7	1	14.3%	4	1	25.0%	14	3	21.4%
Human Resources	1	0	0.0%	3	1	33.3%	0	0	0.0%	4	1	25.0%
Internal Audit	1	0	0.0%	2	1	50.0%	0	0	0.0%	3	1	33.3%
Information Security	1	0	0.0%	2	0	0.0%	0	0	0.0%	3	0	0.0%
Administration	12	1	8.3%	18	4	22.2%	7	1	14.3%	37	6	16.2%
Accounting	5	0	0.0%	12	0	0.0%	0	0	0.0%	17	0	0.0%
Disability & Death	4	0	0.0%	18	0	0.0%	4	0	0.0%	26	0	0.0%
Employer Reporting Compliance & Education	2	0	0.0%	17	1	5.9%	2	0	0.0%	21	1	4.8%
Information Technology	4	0	0.0%	26	4	15.4%	5	0	0.0%	35	4	11.4%
Investments	4	0	0.0%	3	0	0.0%	0	0	0.0%	7	0	0.0%
Member Services	7	0	0.0%	31	3	9.7%	2	0	0.0%	40	3	7.5%
Membership Support	4	0	0.0%	19	3	15.8%	6	2	33.3%	29	5	17.2%
Procurement & Office Services	4	1	25.0%	0	0	0.0%	12	4	33.3%	16	5	31.3%
Retiree Health Care	3	0	0.0%	13	1	7.7%	2	0	0.0%	18	1	5.6%
Retiree Services (Payroll)	2	0	0.0%	6	2	33.3%	0	0	0.0%	8	2	25.0%
TOTALS	51	2	3.92%	163	18	11.04%	40	7	17.50%	254	27	10.63%

KENTUCKY RETIREMENT SYSTEMS

TO: Members of the Board

FROM: William A. Thielen
Executive Director

DATE: May 15, 2014

SUBJECT: Human Resources Committee Report

The Human Resources Committee will meet immediately prior to the Board meeting. The Committee Chair will give a report, including any recommendations, to the Board at the meeting.

RECOMMENDATION: This memorandum is presented for informational purposes.

KENTUCKY RETIREMENT SYSTEMS

TO: Members of the Board

FROM: William A. Thielen
Executive Director

DATE: May 15, 2014

SUBJECT: Retiree Healthcare Plan Committee Report

The Retiree Healthcare Plan Committee quarterly meeting is scheduled for May 13, 2014. The Committee Chair will give a report, including any recommendations, to the Board at the meeting.

RECOMMENDATION: This memorandum is presented for informational purposes.

KENTUCKY RETIREMENT SYSTEMS

TO: Members of the Board

FROM: William A. Thielen, Esq.
Executive Director

DATE: May 15, 2014

SUBJECT: Quarterly Reports of the Audit Committee

The Audit Committee held its quarterly meeting on May 1, 2014. The purpose of the meeting was to review and discuss, among other miscellaneous audit related items, the following items listed below. However, a quorum was not present. The attending members unanimously decided to review the documents, but not approve any action items, and to bring the action items to the full board for approval.

➤ *Review of Remote Access System*

FINDINGS

Remote access account to KRS' system for a medical examiner no longer with KRS is still open.

Level of Severity: High

During the review of the remote access listing of users the auditor noted that one user id is still open for a medical examiner that no longer maintains a contract with KRS. This medical examiner stopped working for KRS as of July 2012 and returned the KRS issued laptop at that time. The account has not been disabled or removed, but the account is no longer accessible due to the automatic expiration of the password. The typical employee departure process includes Human Resources (HR) requesting the removal of access rights for the departing employee through a service desk ticket. However, the same process does not appear to be used for ensuring medical examiners are removed from the system.

Good internal control over the remote access system dictates that all user ids for individuals no longer working for KRS be removed promptly.

RECOMMENDATIONS

Internal audit recommends that this account be removed immediately.

Internal audit also recommends that the IT division develop a procedure for identifying user ids for third party vendors or contractors no longer under contract to KRS and remove them promptly based on their end date. The IT division should ensure that all other departments involved in this procedure are aware of their responsibility for notifying IT of the departure.

MANAGEMENT'S COMMENTS

*(Mr. Jeffrey F. Lockett, Division Director of Information Technology)
The IT Division has disabled the inappropriate account.*

Active accounts for terminated employees and third parties were also noted in the 2013 APA audit. New security account procedures to address this issue will be developed by March 31, 2014.

FINDINGS

Staff remote access request/approvals are not always documented.

Level of Severity: Medium

During testing of staff remote access request/approval documentation the auditor found that no documentation was on file for eight of the 18 staff selected. Two of the eight were new employees and should have been documented under the current process and the other six employees were already in the system before the 2009 process was implemented. A Front Range ticket was provided as documentation for the other 10 staff members.

Good internal control over remote access dictates that staff request/approval documentation be maintained to ensure all access is appropriate for KRS business purposes.

RECOMMENDATIONS

Internal audit recommends:

- a. *That all staff remote access request/approval documentation be maintained on file. Proper documentation could include a Front Range ticket or email request.*
- b. *IT should verify the accuracy of the current remote access listing by having management in each division verify that current employees listed from their department are approved for remote access. This process should be documented.*
- c. *IT should consider verifying the accuracy of the remote access listing with divisional management at least twice a year.*

MANAGEMENT'S COMMENTS

(Mr. Jeffrey F. Luckett, Division Director of Information Technology)

Similar issues were also noted in the 2013 APA audit. New security account procedures being developed by March 31, 2014 will include documentation requirements for new accounts. In addition, the IT Division initiated a quarterly review of START, FileNet, and Great Plains accounts as part of the APA audit corrective actions. IT management will include a review of remote access users starting with the Q2 2014 quarterly review.

FINDINGS

***System access log reviews are not documented and do not contain the required information as stated in the remote access policy.
Level of Severity: Medium***

During the FYE 6/30/2013 external audit performed by the Auditor of Public Accounts (APA), it was noted that KRS is not documenting the review of access logs to the KRS' systems. The IT department is currently in the process of developing a checklist for this review. Internal audit also noted that the current logs being reviewed are for after normal business hours only and does not contain all the information required by the remote access policy. According to the remote access policy section 1 #4, "Remote

sessions shall be logged and reviewed regularly. The log(s) shall include the user name/UserID, data accessed, duration of session and unsuccessful login attempts.” The current logs reviewed do not show the data accessed or duration of session.

Good internal control over remote access dictates that access logs contain sufficient information and be reviewed on a regular basis to determine access is being used appropriately for KRS business.

RECOMMENDATIONS

Internal audit recommends that the remote access logs contain all the information as noted in the remote access policy section 1 #4 and a documented review of the log be filed.

Internal audit also recommends that remote access entries for all times of the day be reviewed and documented, not just for after normal business hours.

MANAGEMENT'S COMMENTS

(Mr. Jeffrey F. Luckett, Division Director of Information Technology)

New security account procedures being developed by March 31, 2014 will include instructions for provisioning of accounts with temporary access.

FINDINGS

Proper vendor documentation was not obtained prior to remote access being granted.

Level of Severity: Medium

During review of documentation for a vendor granted remote access to KRS' system it was noted that this vendor is missing the Business Associate Agreement (BAA) as required by HIPAA for contracted vendors with potential access to private health information. This vendor was procured through a state wide contract/master agreement, which does not cover the HIPAA BAA

requirements. Therefore, KRS needs to maintain their own BAA for this vendor. The Information Security Division has turned over a request for this documentation to the Legal Division, but at the time of the audit the BAA had not been obtained.

Good internal control over remote access dictates that all required vendor documentation be signed and documented prior to access being granted.

RECOMMENDATIONS

Internal audit recommends that the proper documentation be obtained for this vendor and for all vendors going forward.

MANAGEMENT'S COMMENTS

(Mr. Brian C. Thomas, General Counsel)

A request to complete a Business Associate Agreement (“BAA”) has been forwarded to the vender identified in the audit. Management agrees that proper documentation should be obtained prior to allowing vender access to KRS systems and plans to work closely with Information Technology to determine the situation where access to KRS systems will occur.

FINDINGS

Access log contains inaccurate failed log on attempts on the remote access server.

Level of Severity: Low

During review of the failed logons after normal business hours report it was noted that there were 111 failed logons for one account. This account is not noted as an open account on the remote access listing obtained by the auditor from IT and IT confirmed that this account does not have remote access permissions. This account is not locking after three failed attempts because it's not a true attempt to login, even though it is showing up on this particular report. IT has been researching this issue. However, due to this issue we cannot be sure that this report is running correct information for the intended purpose of ensuring

all failed attempts to the remote access server are legitimate log in attempts.

Good internal control over remote access dictates that access be monitored and reviewed to ensure only appropriate personnel is accessing KRS information.

RECOMMENDATIONS

Internal audit recommends that IT work to resolve this issue to ensure that this monitoring report is accurate for the review of remote access.

MANAGEMENT'S COMMENTS

(Mr. Jeffrey F. Luckett, Division Director of Information Technology)

The account with the failed logins is a service account that is used for starting programs in the background. The account is not used for interactive logins by any person. These accounts are configured for non-expiring passwords due to the level of effort required to change the password and the increased risk of operational problems by requiring password expiration.

IT Division management will review service account policies and procedures by April 30, 2014. Appropriate corrective action will be taken based on the results of the review.

FINDINGS

***Security exemption safeguards have not been adhered to.
Level of Severity: Low***

During the Remote Access System Audit, it was noted that the additional security safeguards of an access termination date and monitoring of login times for a contractor/vendor were not adhered to. A contractor/vendor was granted remote access to KRS' system for implementation of a new system with an access termination date of December 31, 2013. However, access has not been disabled for this vendor. Some issues with the implementation of this system have occurred requiring an extension period. The extension period had been discussed with the Information Security

Officer (ISO), but was not documented as approved by the ISO at the time of the audit. The processing of the security exemption approval was delayed until January 28, 2014 due to the start of the new IT Director in early January 2014. Since there are issues with access logs as noted in finding #3, it has been determined that the monitoring of the vendors login times have not been fully reviewed.

Good internal control over vendor remote access dictates that supporting documentation is obtained to verify security safeguards are in place for vendor remote access to KRS' systems.

RECOMMENDATIONS

Internal audit recommends:

- a. That security exemption termination dates be adhered to unless an extension exemption has been approved and documented.*
- b. That vendor access logs be thoroughly reviewed and documented.*
- c. That the Information Security department continue tracking exemptions and ensure all access for expiring exemptions are removed or updated exemption forms are on file.*

MANAGEMENT'S COMMENTS

*(Mr. Mark McChesney, CISM, CISA, CISSP, CGEIT, CRISC,
Information Security Officer)*

The Information Security Office will continue to track all security exemptions. The division requesting an exemption is responsible for requesting new exemptions if necessary. The Information Security Office performs random audits of exemptions.

(Mr. Jeffrey F. Luckett, Division Director of Information Technology)

IT Division management in conjunction with Information Security management will define a remote access log review process by April 30, 2014. These procedures will address remote access during normal business hours.

➤ *Review of Maintenance Contracts*

Internal Audit is recommending that this audit be moved to the Audit Plan for FYE 6/30/2014 for review after the APA recommendations have been fully implemented.

➤ *Review of Quarterly Financial Statements – 3/31/2014*

➤ *Review of Management Follow up on Audit Findings and Recommendations Summary Dashboard*

➤ *Review of Statewide Single Audit of the Commonwealth of Kentucky for the Fiscal Year Ended June 30, 2013*

➤ *Review of Employer Penalty/Waiver List*

➤ *Review of Internal Audit Budget 3/31/2014*

➤ *Review of Anonymous Reporting*

➤ *Review of Investment Compliance Report*

➤ *Request for third-Party Assessment of KRS' IT Infrastructure*

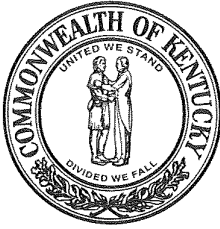
➤ *Review of Annual Audit Plan for Fiscal Years 2015, 2016, 2017*

➤ *Kentucky Employees Retirement System Board Election Memoranda*

➤ *State Police Employee Retirement System Board Election Memoranda*

➤ *Kentucky Retirement Systems Travel Policy and Procedures (Amendment)*

RECOMMENDATION: The Audit Committee requests that the Board approve the action items reviewed by the attending members of the Audit Committee.



KENTUCKY RETIREMENT SYSTEMS

William A. Thielen, Executive Director

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MEMORANDUM

Date: May 1, 2014

To: Chair,
Audit Committee of the Board of Trustees

From: Connie A. Davis, CIA, CGAP, CRMA, *CAD*
Director of Internal Auditor

Subject: Annual Audit Plan – FYE 2015, 2016, & 2017

Please find attached the Annual Audit Plan for the Fiscal Years Ended June 30, 2015, 2016, and 2017. Each audit area has been reviewed for risk scoring. Please keep in mind that this is a working document and subject to change each fiscal year. However, the Annual Audit Plan provides Internal Audit a guide to follow each fiscal year to ensure that risks are mitigated, on a selected basis, and that internal controls are operating effectively and efficiently, on a selected basis.

Should you have any questions regarding the audit areas, or the calculations performed, please do not hesitate to contact me at (502) 696-8459 or by e-mail connie.davis@kyret.ky.gov.

Action required: Internal Audit request that the Audit Committee approve the Annual Audit Plan.

Enclosure

cc: Sec. Timothy Longmeyer, Esq., Member
Audit Committee of the Board of Trustees

Dr. Daniel L. Bauer, Member
Audit Committee of the Board of Trustees

Mike Cherry, Member
Audit Committee of the Board of Trustees

, Member
Audit Committee of the Board of Trustees

William A. Thielen, Esq.
Executive Director

Brian C Thomas, Esq.
General Counsel



Kentucky Retirement Systems
Division of Internal Audit

Annual Audit Plan
For the Fiscal Years Ended June 30, 2015, 2016, and 2017

Connie A. Davis, CIA, CGAP, CRMA
Internal Audit Director

Division of Internal Audit

Annual Audit Plan

For the Fiscal Year Ending June 30, 2015, 2016, & 2017

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I. Introduction

The Division of Internal Audit recognizes that an overall audit strategy and plan is important to meet the goals and objectives of the Division of Internal Audit, and contribute to the mission of Kentucky Retirement Systems (KRS). The Division also agrees with the professional standards developed by the Institute of Internal Auditors, the International Standards for the Professional Practice of Internal Auditing, which recognize that an annual audit plan and work schedule benefits the organization by:

- providing an identifiable basis for the role of the Division of Internal Audit and justification for obtaining budgetary funds and approval;
- establishing what divisions or areas will be prioritized for audits on an annual basis;
- permitting an efficient allocation of limited resources;
- providing a flexible basis for managing the Division;
- projecting an estimated timetable for initiating and completing audits for the year; and,
- eliminating potential for overlapping audits within KRS and with other auditing entities (i.e., external auditors or the State Auditor's Office).

With the accumulated knowledge of KRS operations and internal controls, the Division of Internal Audit is applying an approach based upon risk assessment to identify audits of high priority in the annual plan.

Risk assessment is a process used to assign a number or score to potential audits based upon specific risk factors related to KRS's operations, internal controls, and estimated liability to the Commonwealth of Kentucky. Examples of risk factors used to formulate the audit plan include dollar amounts of receipts, complexity of operations, quality of internal controls, time since last audit, and management accountability. The complete list of risk factors and the assessment process are described in this report.

The development of an annual audit plan, using risk assessment as an integral component, is a dynamic process. Throughout the year, the Division of Internal Audit has the opportunity to provide current information about divisions and areas to

audit for use in the risk assessment process. The risk factors and scoring process may be reviewed and refined periodically or as needed. The risk assessment process may be applied to potential audits such as expenditure contracts, specific financial statement accounts, and transaction cycles, or other areas deemed necessary.

As an additional tool for assessing risk in KRS, a self-audit tool for use by division directors is in Section V. This self-assessment tool recognizes the fact that directors are responsible for establishing and maintaining internal controls within their respective operating environments. The Division of Internal Audit will evaluate whether the controls are in place and working as designed. The tool will facilitate the review of KRS divisions and will be discussed with all division directors.

II. Principles for Audit Plan development

In order to provide practical guidance and an authoritative framework for the development of this annual audit plan, the Division of Internal Audit recognized and observed the following basic principles:

- in the audit plan, consideration is given to the unique responsibilities of the Division of Internal Audit and to the need to incorporate a risk factor which, when applied to a particular audit, would supersede proposed audits with higher risk scores;
- the approach to developing the annual audit plan recognizes the fact that audit resources of personnel and dollars are limited which prohibits one hundred percent audit coverage each year. This limiting factor is inherent in the concept of utilizing risk assessment to help prioritize audits;
- the audit plan gives consideration to work performed by other auditors;
- the risk assessment criteria used in the ranking of the audit plan places an emphasis on perceived or actual knowledge of KRS's system of internal controls; and,
- the audit plan has been developed with the awareness that there are inherent risks associated with any method or system of prioritizing audits. The risk factors and scoring process will be periodically evaluated and modified, if necessary, in order to improve the audit plan.

III. Audit Universe

The first step leading to development of the audit plan is to establish an audit universe representing potential audits. The Division also recognized other potential audit segments of the universe such as business processes, expense contracts, or functional areas that may cross over operational units. Examples of these other segments are:

- organizational units with KRS;
- a transaction cycle or items common “horizontally” across a universe, such as payroll, contract compliance issues, personal service contracts, etc.;
- individual financial statement accounts such as fixed assets or annual leave liability;
- performance or operational audits; and,
- fraud and defalcation audits.

In the final analysis, the risk assessment factors were applied to all major areas within KRS.

IV. Preparing the Annual Audit Plan

The objectives of the annual planning process determine what audit activities will be scheduled for the year and help ensure qualified audit staff is assigned to the highest priority assignments. The principles and procedures discussed in this document have been developed to provide a process for fulfilling these objectives.

The individual entities or activities within the audit plan are risk rated using the risk assessment methodology discussed in Section V on an annual basis. Taken into account is input from the Division of Internal Audit, the Audit Committee, Board of Trustees, and management. Special emphasis should be placed on the following areas throughout the year:

- the importance of updating and maintaining an accurate audit plan; and,
- providing current and relevant information.

Actual audit scheduling may be affected by personnel turnover, audits requested by the Audit Committee, special projects, and unforeseen circumstances in a scheduled

audit. In keeping with current policy, the actual status of each audit, in terms of percent of completion, will be conveyed to the Executive Director, Audit Committee, and appropriate Chief Officer on a timely basis.

V. Risk Assessment Methodology

The Risk Assessment Methodology consists of the following six-part process:

- developing the risk assessment model;
- identifying KRS division activities;
- scoring risks using impact and probability factors and weights;
- ranking the auditable areas;
- developing the audit plan; and,
- submitting the audit plan for management review and approval.

The risk assessment model is based upon both impact and probability risk factors. Impact evaluates the effect resulting from a break down in the operation's environment, processes, and/or controls. Probability looks at the likelihood that an event will occur. Impact is broken down into five (5) evaluation factors and probability contains three (3) evaluation factors. Each factor is given a weight based on its importance in evaluating the overall risk of a process. The following are the evaluation factors for both impact and probability:

Impact

1. Level of Authority Involved
2. Volume of Transactions
3. Materiality
4. Regulatory Involvement
5. Internal Environment

Probability

1. Complexity of Systems
2. Management and Control Environment
3. Internal Control System

The table below lists a description of the impact and probability factors and the related assigned weight.

IMPACT RISK FACTORS

<u>Factor</u>	<u>Definition</u>	<u>Weight</u>
1. Level of Authority Involved	Impact on Decision Making.	5%
2. Volume of Transactions	As transaction volume increases, controls must be added to reasonably assure accurate and complete processing.	10%
3. Materiality	Impact on Financial Statements	25%
4. Regulatory Involvement	Impact of applicable regulatory requirements.	15%
5. Internal Environment	Impact of business changes.	10%

PROBABILITY RISK FACTORS

<u>Factor</u>	<u>Definition</u>	<u>Weight</u>
1. Complexity of Systems	The greater the complexity of a system, the more important will be the controls necessary to reasonably assure that the system achieves its objectives.	10%
2. Management and Control	The probability of undue pressure on management to meet objectives.	10%

PROBABILITY RISK FACTORS

<u>Factor</u>	<u>Definition</u>	<u>Weight</u>
3. Internal Control System	Measures the adequacy and effectiveness of the system of internal control.	15%

Identifying KRS Division Activities is accomplished by using various research techniques. Some of the techniques used to identify and develop division activities included interviewing division heads and other personnel, internet research, and auditor experience.

Scoring Division Activity Risk is the central process of the risk assessment. Once the audit areas of a division are identified, each of the areas is weighed according to the significance to the overall division's mission and objective. Each impact and probability factor is then separately evaluated and assigned a point level (1-5) with one representing the lowest level of risk and five the highest. The individual factor scores are then multiplied by the risk weight factor. The weighted risk factor elements are added together to obtain the respective total impact and probability score for each division.

Ranking the Auditable Areas is achieved by sorting each auditable area by its respective total risk score.

Developing the Audit Plan is achieved by scheduling audits for the highest risk areas. However, since the internal audit function is small and all divisions have not been reviewed, audits were scheduled using a combination of risk score, and available audit resources to ensure all auditable areas of KRS will be audited.

Submitting the Audit Plan for Review and Approval is achieved by providing the risk assessment and audit plan to the Audit Committee of the Board of Trustees.

VI. Risk Scoring by Division

FYE 2015

Division	Audit Area	Score
Investments	Investment Reporting (BNY Mellon)	4.70
	Equity – Stock, International	4.20
	Cash Management	4.05
Executive Management	HIPPA (Outsource)	4.70
	Anonymous Reports	x.xx
Information Technology/ Security	Business Continuity/ Disaster Recovery	3.85
	Bearing Point/Deloitte	3.25
	Telephone System	3.95
	IT Support of Great Plains	3.60
Employer Compliance & Education	Employer Reporting	3.75
	ER – (Cooperatives Audit – Management Request)	x.xx
Retiree Services	Death Audit – Lexis Nexis Report (Annual)	x.xx
	Refund Payments (Annual) (Inactive Members)	x.xx
Accounting	Travel & P- Card Exp. (Annual)	x.xx
	Succession Planning	3.05
Human Resources	Voting Leave	x.xx
	Maintenance Contracts	x.xx
Procurement & Office Services Retiree Health Care	Health Insurance Billings To Agencies (under 65)	4.70

FYE 2016

Investments	Alternative Investment Due Diligence Process	3.75
	Investment Performance	4.30
	Contracting & Execution Process	4.25
Executive Management	Anonymous Reports	x.xx
Information Technology/ Security	Physical Security	4.20
	Policy Compliance	4.45
Retiree Services	Monthly Payroll Sampling And Review	3.75
Member Services	Refund Payments (Annual) (Inactive Members)	x.xx
	Processing Service Retirements	3.20
Retiree Health Care	Health Care Dependent III	4.95
	Health Insurance Billings To Agencies (over 65)	4.70
Accounting	Travel & P-card Exp. (Annual)	x.xx
	Great Plains System	4.95
	Qualification of Funds (BNY Mellon)	4.30
Human Resources	Compensation Classification Organization	
	Structure Study – Wage & Hour FLSA	3.90
	Voting Leave	x.xx
Disabilities/Death	START Project (Procedures/Process)	4.70
	Death Audit – Lexis Nexis Report (Annual)	x.xx

FYE 2017

Investments	Alternative - Venture	
	Capital	4.20
	Wiring Authority	4.05
	Internal Account Trading	
	Process	4.10
Executive Management	Fiduciary Language in	
	Contracts	1.98
	Corporate Governance	2.88
	Anonymous Reports	x.xx
	2013 Legislative Enactments	3.95
Information Technology/ Security	Firewalls for Web Apps.	4.65
	Encryption - Data	4.65
	Non-HIPAA Disclosures	4.10
Disabilities/Death	Death Audit – Lexis Nexis	
	Report (Annual)	x.xx
Member Services	Refund Payments (Annual)	
	(Inactive Members)	x.xx
Employer Compliance & Education	Employer Reporting	
	Agency Audits	2.83
Accounting	Travel & P-card	
	Exp. (Annual)	x.xx
	Great Plains – Customer	
	Accounts	4.65
Benefits	Backlogs – Catch –up	3.75
Retiree Health	Health Benefits – DEI	
	KHRIS to KRS START	
	Process	3.50
Human Resources	Voting Leave	x.xx

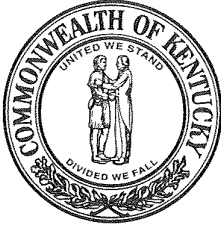
VII. Approvals

We, the undersigned of Kentucky Retirement Systems, do certify that this Revised Annual Audit Plan was approved by the Audit Committee and the Board of Trustees on this 15 day of May, 2014.

Connie A. Davis, CIA, CGAP, CRMA
Internal Audit Director

William A. Thielen, Esq.
Executive Director

Chair, Audit Committee



KENTUCKY RETIREMENT SYSTEMS

William A. Thielen, Executive Director

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MEMORANDUM

Date: May 1, 2014

To: Chair,
Audit Committee of the Board of Trustees

From: Connie A. Davis, CIA, CRMA, *CAD*
Internal Audit Director

Re: Request for Third-Party Assessment of KRS' IT Infrastructure

Please see the attached Request for Third-Party Assessment of KRS' IT Infrastructure. Management will present the request to the committee, and will answer any questions the committee may have.

Action is required of the Committee.

Enclosure

cc: Sec. Timothy Longmeyer, Esq., Member
Audit Committee of the Board of Trustees

Dr. Daniel L. Bauer, Member
Audit Committee of the Board of Trustees

Mike Cherry, Member
Audit Committee of the Board of Trustees

J. T. Fulkerson, Member
Audit Committee of the Board of Trustees

David Rich, Member
Audit Committee of the Board of Trustees

William A. Thielen, Esq.
Executive Director

Brian C. Thomas, Esq.
General Counsel



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Kentucky Retirement Systems Experience Study July 1, 2008 to June 30, 2013





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- Key Findings
- Demographic Assumptions
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 - County Employees Retirement System
 - State Police Retirement System
- Retiree Healthcare Assumptions
- Economic Assumptions
- Impact of Recommendations



Key Findings



- Recommended Demographic Assumption Changes
 - Adjust withdrawal, retirement and mortality decrements for all Systems to better match experience
 - Adjust disability decrements for KERS Non-Hazardous, KERS Hazardous, and CERS Non-Hazardous to better match experience
 - Adjust certain coverage assumptions for retiree healthcare benefits to better match experience



Key Findings



➤ Recommended Economic Assumption Changes

Item	Current	Proposed
Price Inflation	3.50%	3.25%
Investment Return	7.75%	7.50%
Wage Inflation	4.50%	4.00%



Demographic Assumptions

- Assumptions Reviewed
 - Rates of Withdrawal
 - Rates of Pre-Retirement Mortality
 - Rates of Disability Retirement
 - Rates of Retirement
 - Rates of Post-Retirement Mortality
 - Rates of Salary Increase

- Actuarial Standard of Practice (ASOP) No. 35, *“Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations”*, which provides guidance to actuaries in selecting demographic assumptions for measuring obligations under defined benefit plans.



Demographic Assumptions

- Study compares what actually happened during the study period (7/01/2008 through 6/30/2013) with what was expected to happen.
- Assumption changes recommended if actual experience differs significantly from expected.
- Judgment required to extrapolate future experience from past experience.



Demographic Assumptions

- Funds reviewed (pension and healthcare)
 - KERS Non-Hazardous
 - KERS Hazardous
 - CERS Non-Hazardous
 - CERS Hazardous
 - SPRS

- Results compare actual and expected decrements and present recommended changes, if any.

- Next slides use KERS Non-Hazardous as an example.



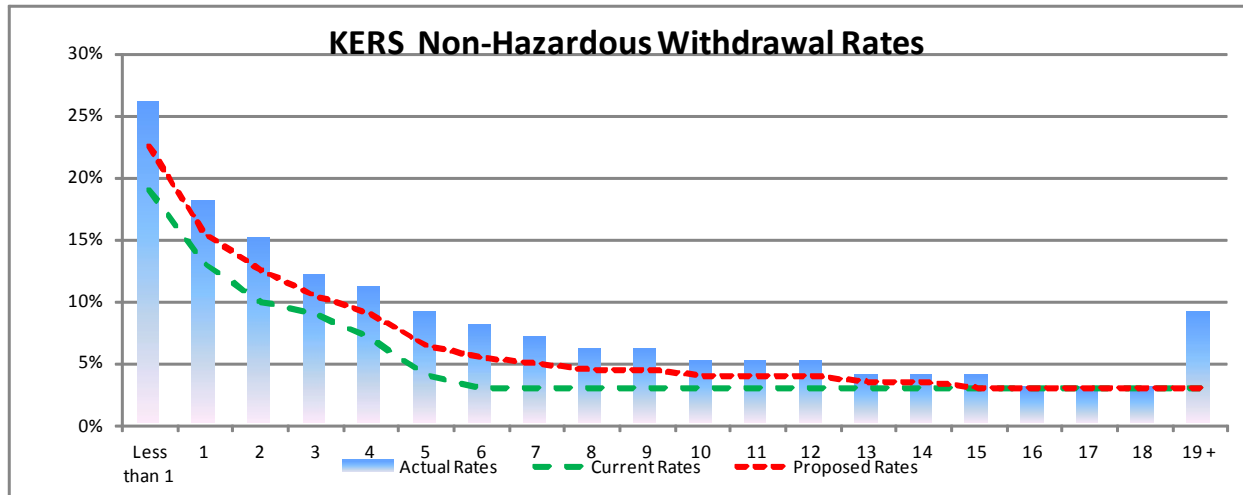
Demographic Assumptions



- Withdrawal –
 - Eliminated a specific Select Period as all rates were moved to service based.
 - Increased all effective rates through 15 years of service.



Demographic Assumptions





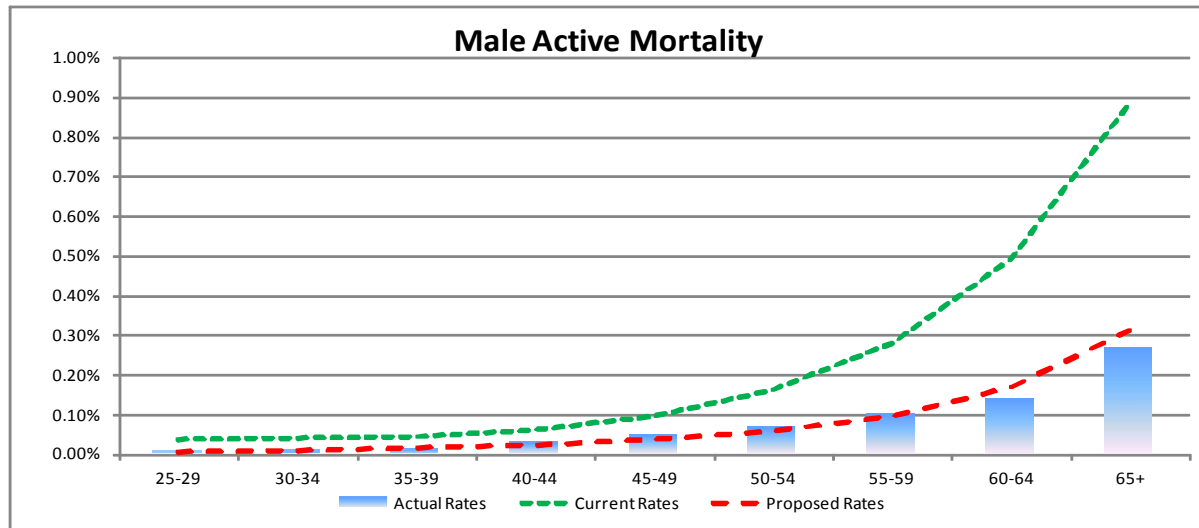
Demographic Assumptions



- Pre-Retirement Mortality
 - Compared Actual versus Expected in Aggregate
 - Much less actual deaths in active service than expected.
 - Recommend using half the post-retirement mortality assumption (RP-2000 Combined Mortality Table)

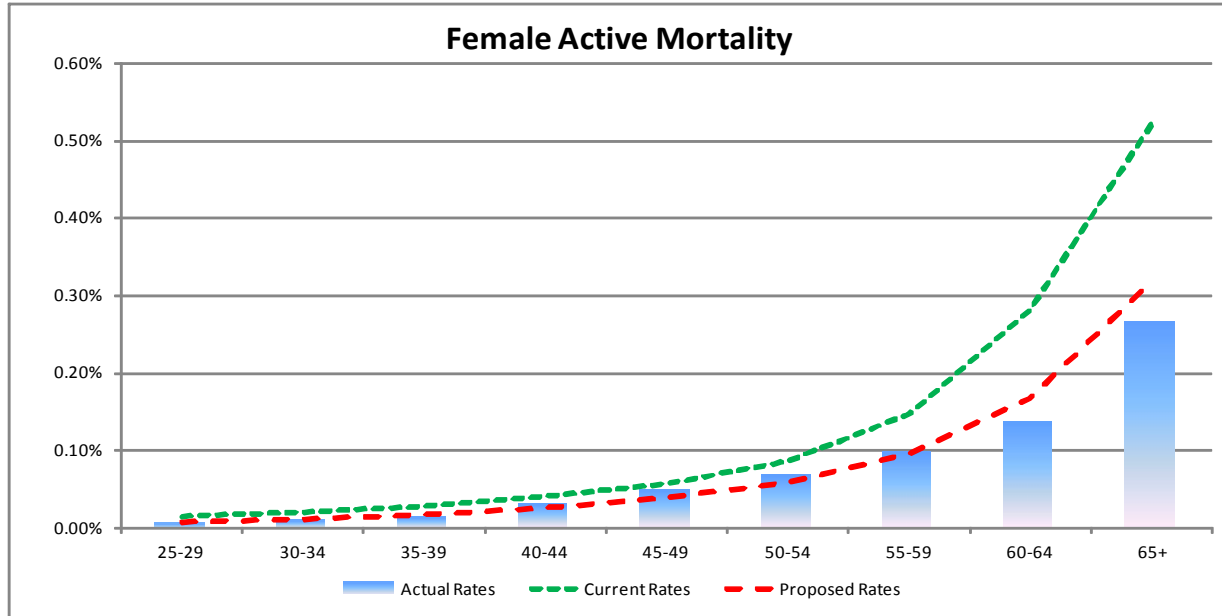


Demographic Assumptions





Demographic Assumptions



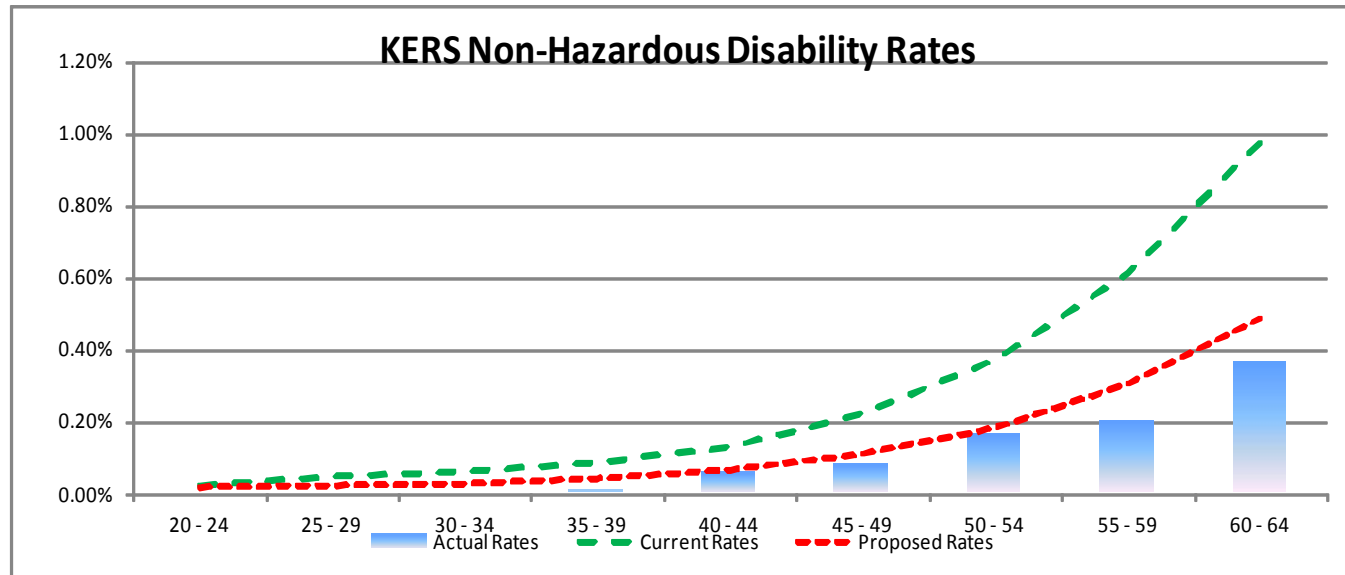


Demographic Assumptions

- Disability Retirement
 - Compared Actual versus Expected by Fund
 - For all funds except SPRS, there were far fewer actual disability retirements than expected.
 - Previous study showed a similar pattern.
 - Lowered disability rates for KERS Non-Hazardous, KERS Hazardous and CERS Non-Hazardous but not as much as current experience would suggest.
 - Exposures for CERS Hazardous and SPRS were not sufficient to generate a recommended change.



Demographic Assumptions





Demographic Assumptions

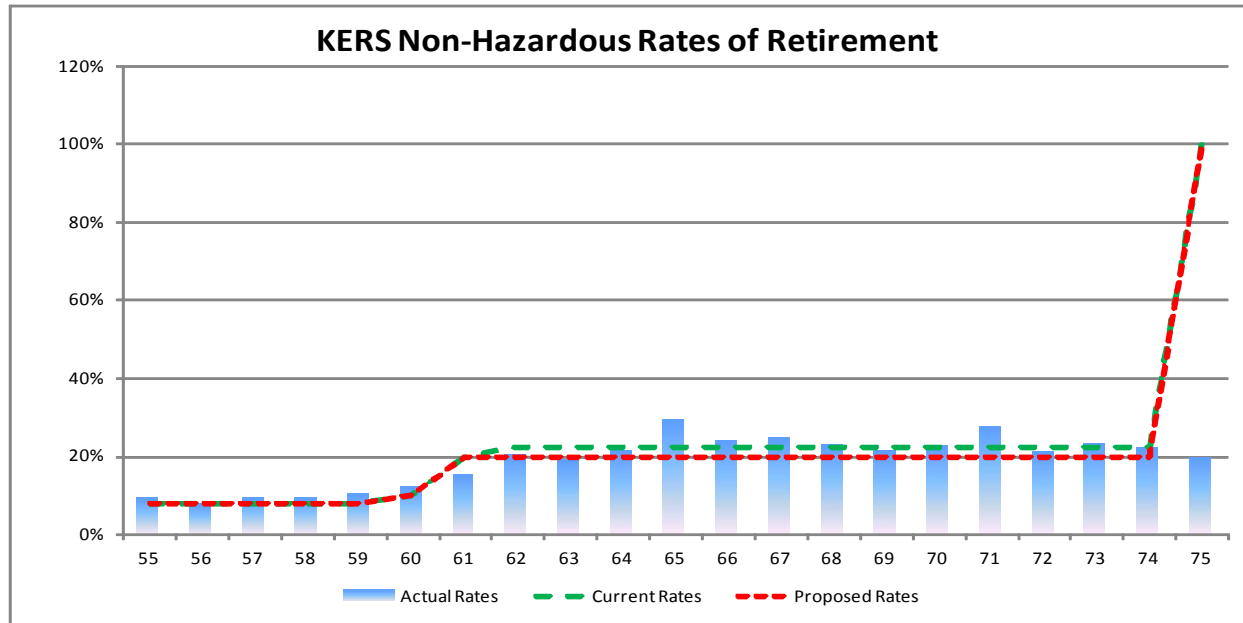


➤ Service Retirement

- In general, there were fewer actual retirements than expected for the non-hazardous groups and more than expected for the hazardous groups.
- We recommend adjustments in rates to more accurately reflect the experience at each retirement age.



Demographic Assumptions





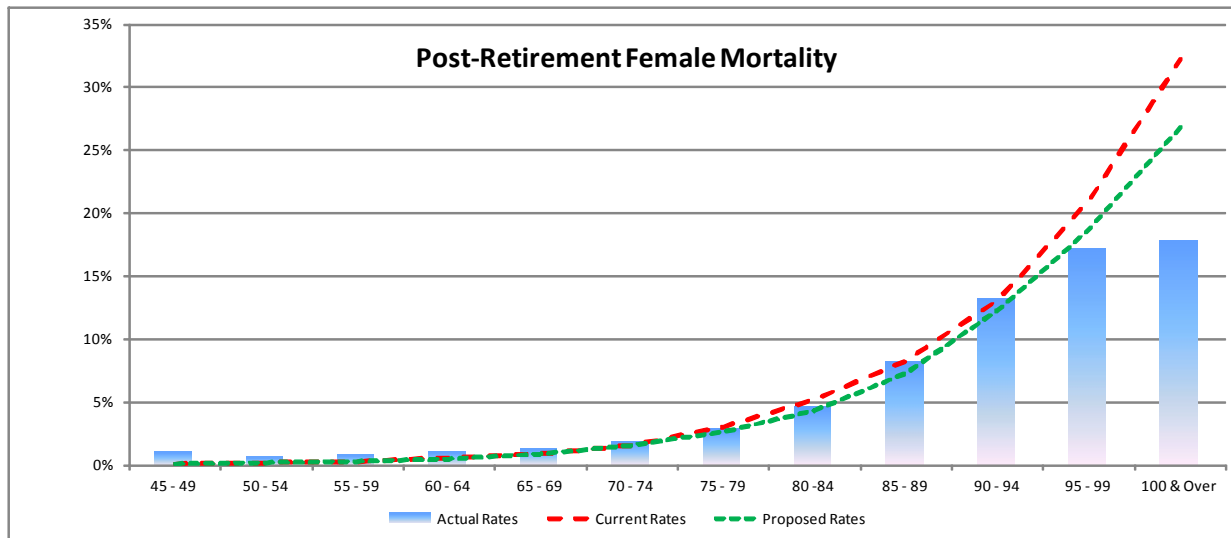
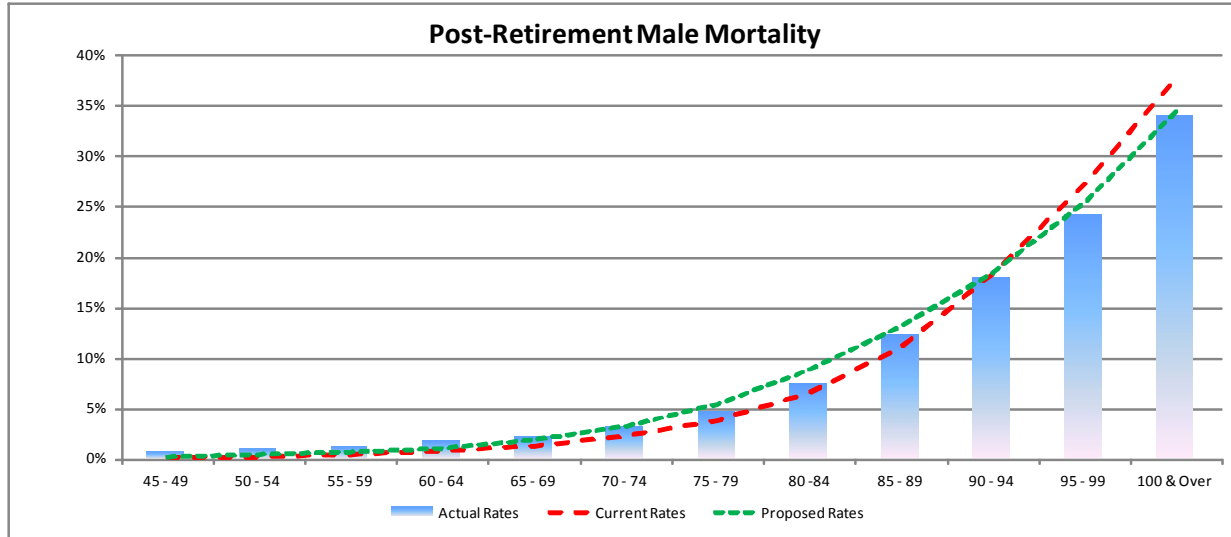
Demographic Assumptions

➤ Post-Retirement Mortality

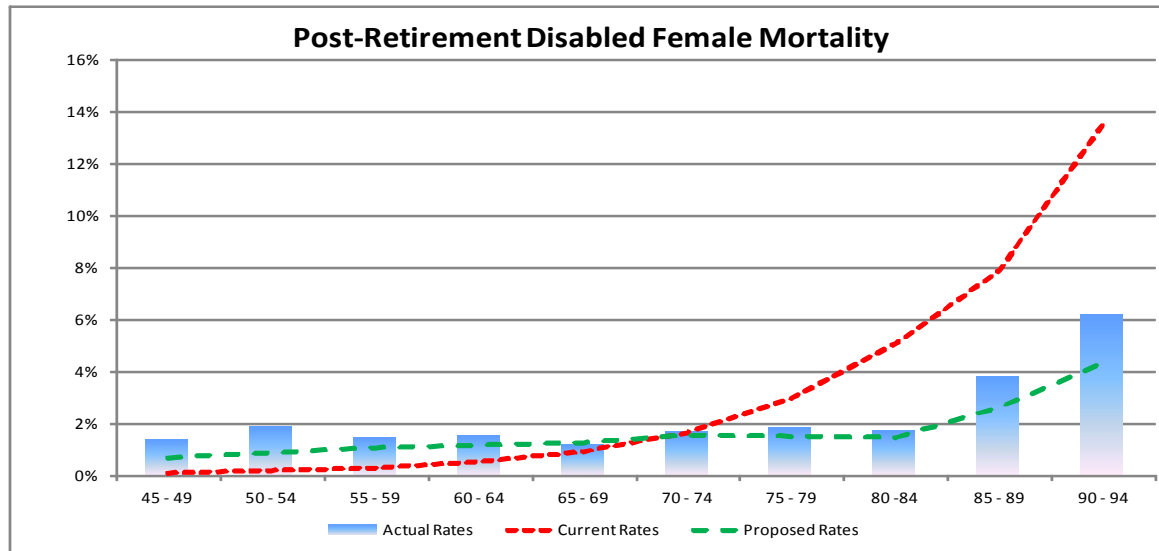
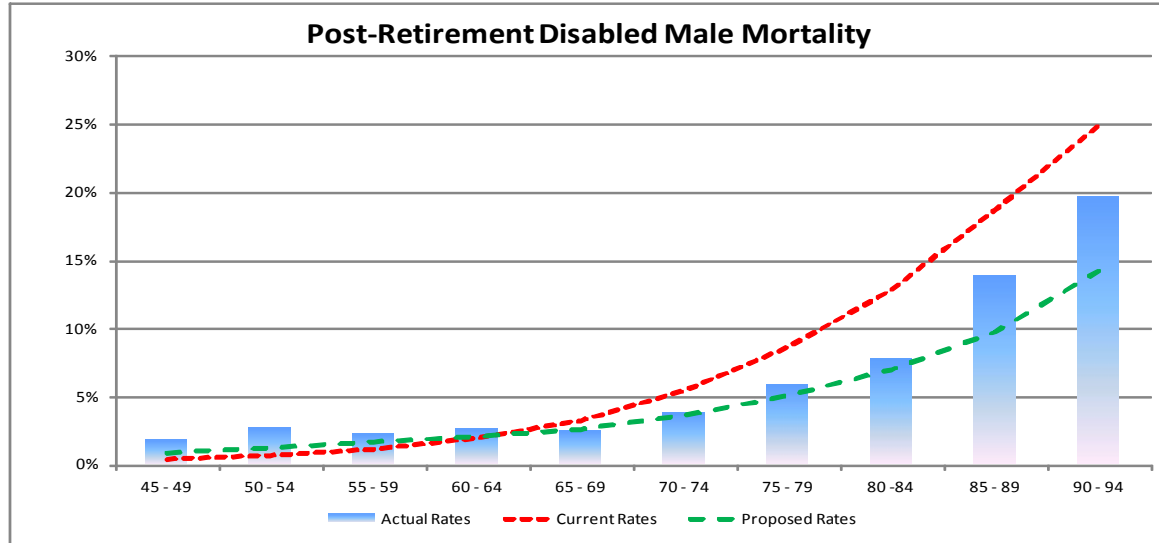
- Compared Actual versus Expected in Aggregate
- Actual retiree deaths exceeded expected over the five year period.
- Note that the experience is measured against the 1983 GAM table which is applied to retired members and beneficiaries as of June 30, 2006. The mortality table for all other members is the 1994 GAM.
- Recommend change in healthy mortality to the RP-2000 Combined Mortality Table projected to 2013 using the BB projection scale, set back one year for females.
- Recommend change in disabled mortality to the RP-2000 Combined Disability Mortality Table projected to 2013 using the BB projection scale, set back four years for males.



Demographic Assumptions



Demographic Assumptions





Demographic Assumptions

➤ Salary Scale

- For all groups, the actual salary increases were less than expected for the investigation period.
- However, the experience was influenced by unusual economic conditions.
- As a result, no changes to the merit component of the salary scales are recommended at this time.
- The decrease in real wage growth assumption (covered later) was reflected in the final salary scales.



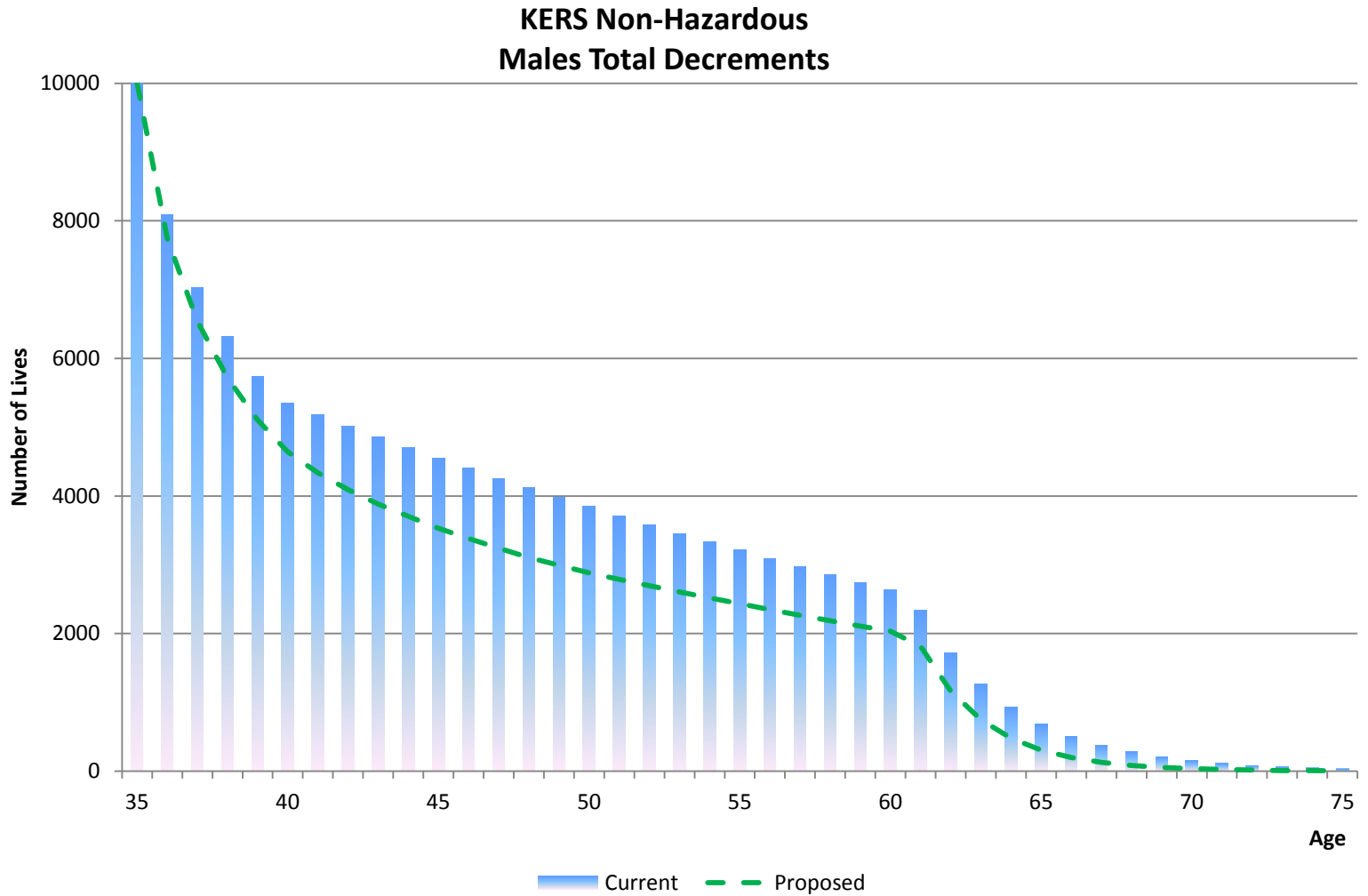
Demographic Assumptions



Years of Service	Salaries at End of Year (\$1,000)		
	KERS Non-Hazardous Members		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	220,811	217,487	1.015
1	507,093	520,958	0.973
2	484,743	498,032	0.973
3	482,475	498,747	0.967
4	444,984	459,748	0.968
5	423,318	440,350	0.961
6	391,379	403,277	0.970
7	388,915	402,451	0.966
8	377,814	391,740	0.964
9	387,872	400,573	0.968
10 +	3,734,383	3,866,063	0.966
TOTAL	7,843,787	8,099,426	0.970

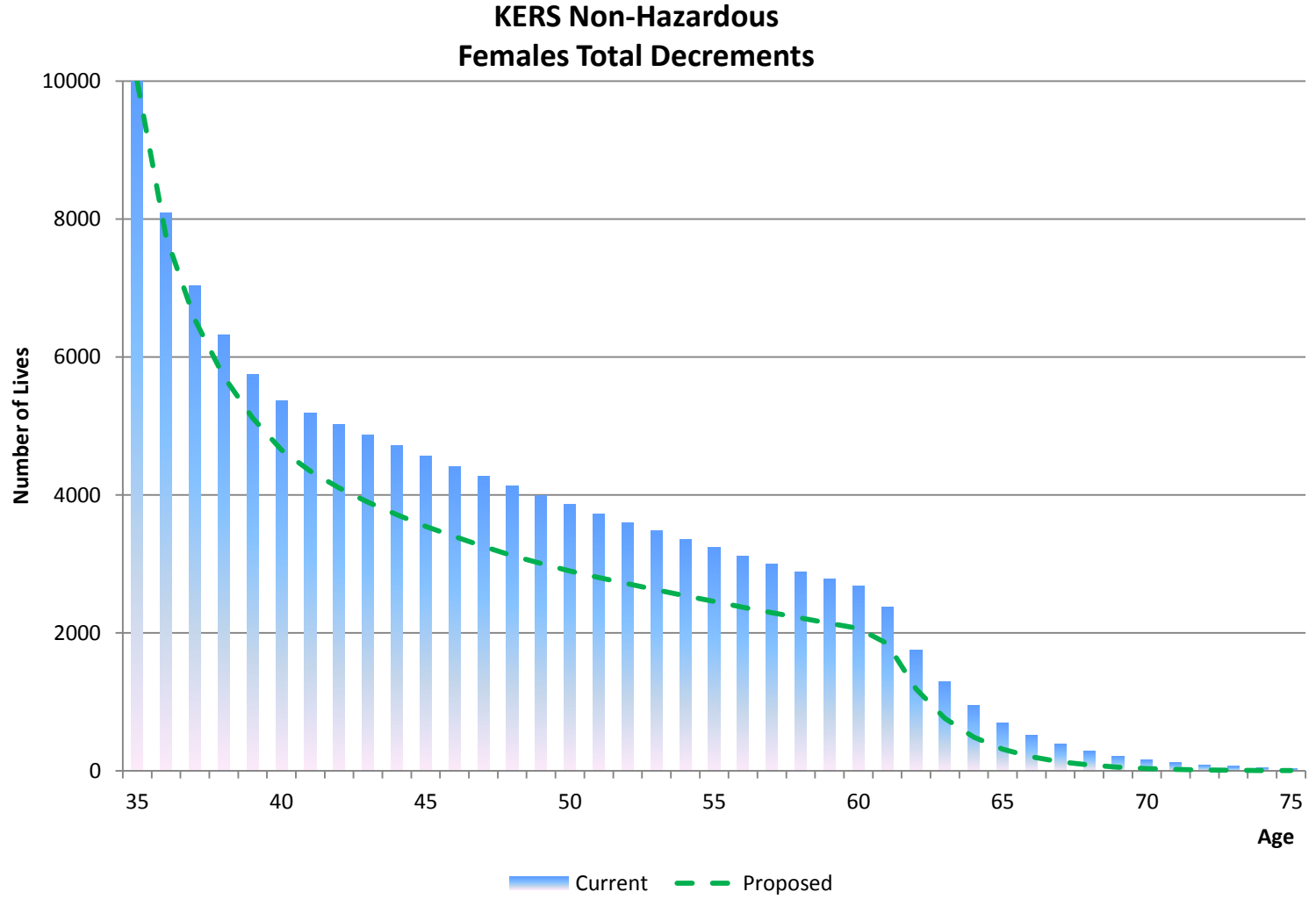


Demographic Assumptions



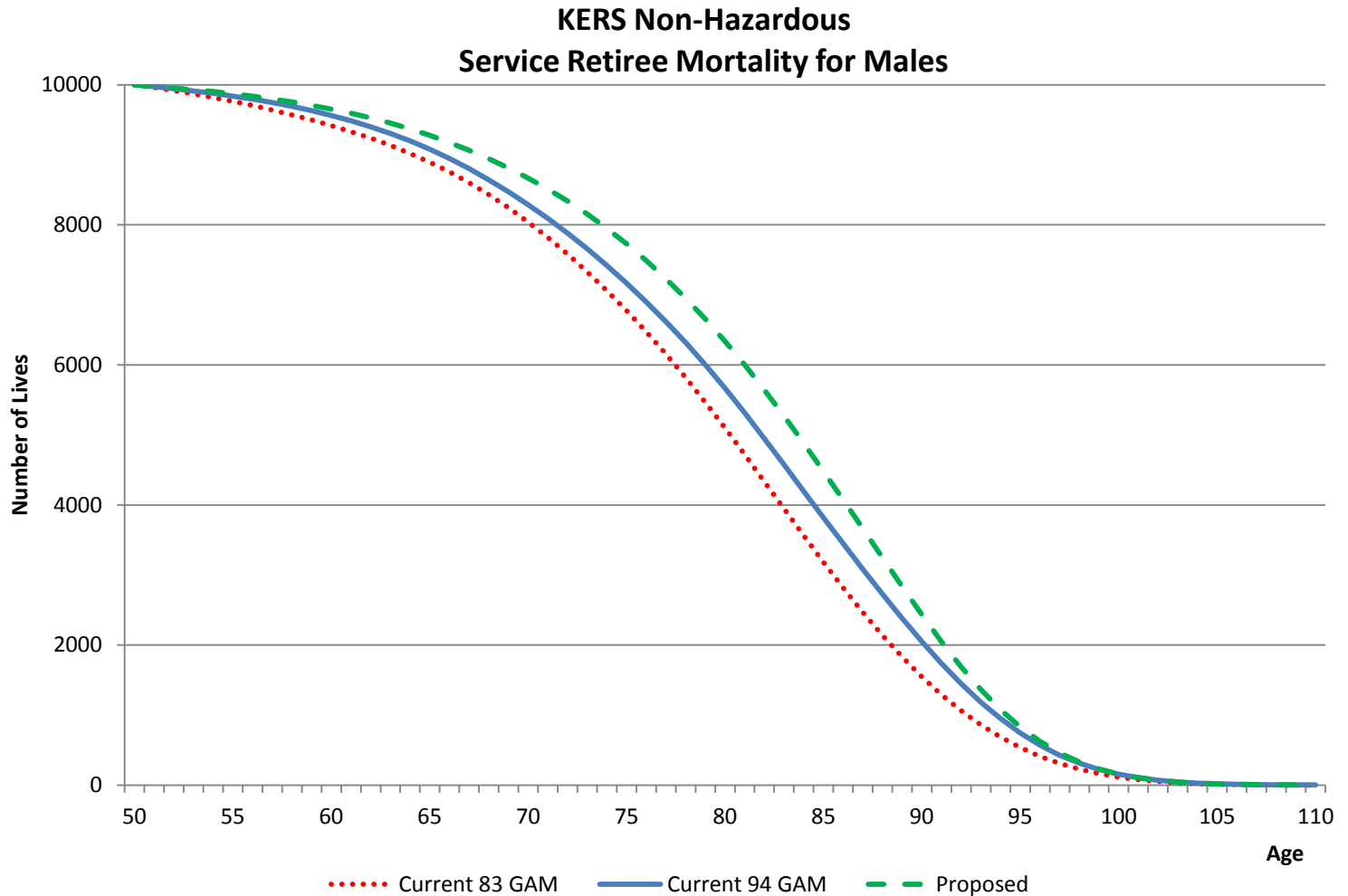


Demographic Assumptions





Demographic Assumptions





Demographic Assumptions





Retiree Healthcare Specific Assumptions



- The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, *“Measuring Retiree Group Benefit Obligations”*, which provides guidance to actuaries in selecting assumptions for measuring obligations of postretirement plans other than pensions.
- Types of assumptions:
 - Economic
 - Morbidity
 - Coverage
 - Choice of Coverage
 - Plan Participation
 - Spouse/Dependent Participation
 - Spouse/Dependent Age Differences



Retiree Healthcare Specific Assumptions



- Economic assumptions include those utilized for the pension funds plus health care trend rates.
 - Currently review and set the trend rate annually.
 - Recommend no change to this procedure.
-
- All other healthcare related assumptions were reviewed. The recommended changes are outlined in the following slides.



Retiree Healthcare Specific Assumptions



Tier 1: Service Retirement Members Participating Before July 1, 2003

KERS Non-Hazardous							
Percentage of Members Participating Before 7/1/2003 Electing Coverage							
Service at Retirement	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Under 10	35%	30%	52%	45%	30%	90%	50%
10 – 14	67%	63%	53%	58%	62%	90%	75%
15 – 19	81%	78%	81%	79%	85%	90%	90%
20+	95%	92%	96%	94%	96%	90%	100%

KERS Hazardous							
Percentage of Members Participating Before 7/1/2003 Electing Coverage							
Service at Retirement	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Under 10	24%	0%	47%	30%	13%	100%	50%
10 – 14	58%	69%	73%	46%	58%	100%	75%
15 – 19	71%	76%	68%	77%	73%	100%	90%
20+	97%	98%	97%	95%	97%	100%	100%



Retiree Healthcare Specific Assumptions



Tier 1: Service Retirement Members Participating Before July 1, 2003

CERS Non-Hazardous							
Percentage of Members Participating Before 7/1/2003 Electing Coverage							
Service at Retirement	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Under 10	28%	27%	52%	26%	22%	85%	50%
10 – 14	51%	54%	54%	57%	54%	85%	75%
15 – 19	79%	83%	76%	79%	81%	85%	90%
20+	92%	94%	95%	94%	94%	85%	100%

CERS Hazardous							
Percentage of Members Participating Before 7/1/2003 Electing Coverage							
Service at Retirement	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Under 10	20%	14%	67%	50%	0%	100%	50%
10 – 14	54%	50%	44%	65%	46%	100%	75%
15 – 19	73%	65%	77%	89%	82%	100%	90%
20+	94%	96%	97%	95%	97%	100%	100%

No changes recommended for SPRS from the current 100% participation rate



Retiree Healthcare Specific Assumptions



- No changes in participation rates for other service retirement tiers, disability or death-in-service recipients.
- Current assumption is 100% for all those groups. As experience emerges changes may be appropriate.



Retiree Healthcare Specific Assumption



Deferred Vested Member Health Care Participation Rates
Tier 1: Members Hired Before 7/1/2003

KERS Non-Hazardous							
Deferred Vested Benefit Recipients Electing Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	31%	27%	28%	45%	41%	90%	50%

KERS Hazardous							
Deferred Vested Benefit Recipients Electing Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	50%	43%	36%	42%	25%	100%	50%



Retiree Healthcare Specific Assumption



Deferred Vested Member Health Care Participation Rates
Tier 1: Members Hired Before 7/1/2003

CERS Non-Hazardous							
Deferred Vested Benefit Recipients Electing Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	22%	27%	31%	38%	25%	85%	50%

CERS Hazardous							
Deferred Vested Benefit Recipients Electing Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	15%	14%	33%	33%	35%	100%	50%

Again no changes recommended for SPRS or other tiers from the current 100% participation rate



Retiree Healthcare Specific Assumption



KRS Hazardous Divisions Spouse and Dependent Health Care Participation Rates

KERS Hazardous							
Percentage of Covered Retirees Electing Spouse Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	42%	42%	44%	44%	44%	100%	50%

CERS Hazardous							
Percentage of Covered Retirees Electing Spouse Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	66%	67%	67%	68%	67%	100%	75%

SPRS							
Percentage of Covered Retirees Electing Spouse Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	65%	71%	72%	73%	72%	100%	75%



Economic Assumptions

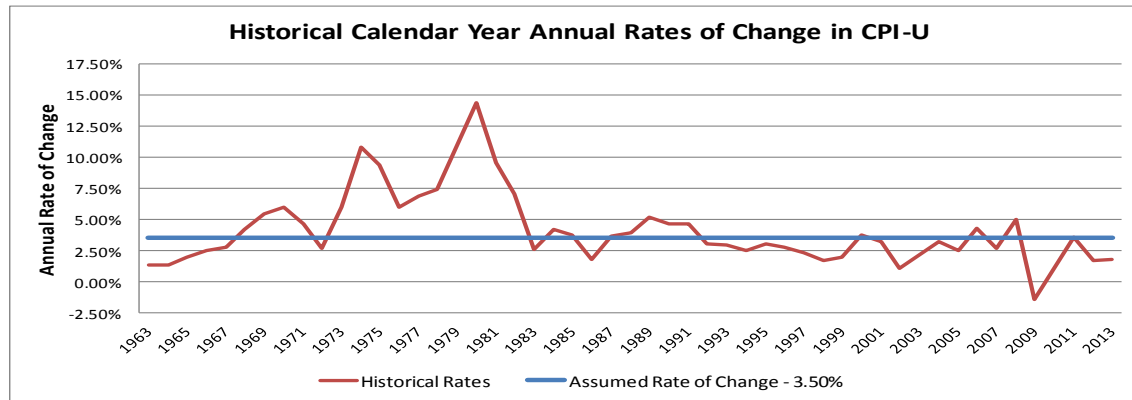
- Assumptions reviewed
 - Price inflation
 - Investment return
 - Wage inflation
- Actuarial Standard of Practice (ASOP) No. 27, *“Selection of Economic Assumptions for Measuring Pension Obligations”* provides guidance to actuaries in selecting economic assumptions for measuring obligations under defined benefit plans.
- Recommendations

Item	Current	Proposed
Price Inflation	3.50%	3.25%
Real Rate of Return	<u>4.25%</u>	<u>4.25%</u>
Investment Return	7.75%	7.50%
Price Inflation	3.50%	3.25%
Real Wage Growth	<u>1.00%</u>	<u>0.75%</u>
Wage Inflation	4.50%	4.00%

Economic Assumptions

Price Inflation

- Current assumption: 3.50%
- Historical data: Annual CPI (U) Increases



- Recommendation:

Price Inflation Assumption	
Current	3.50%
Reasonable Range	2.00% - 4.00%
Recommended	3.25%



Economic Assumptions Investment Return



➤ Current Assumption

- Price inflation 3.50%
- Real rate of return 4.25%
- Total return (net of investment and administrative expenses) 7.75%

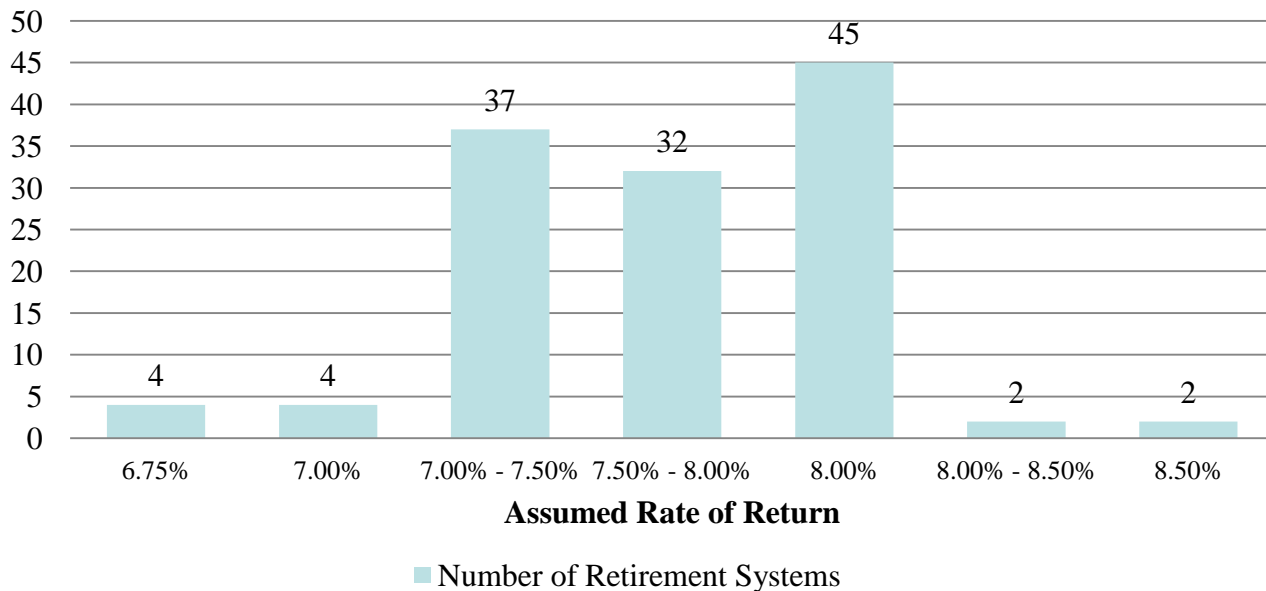
Nominal Total Rate of Return – Pension Funds		
Year Ending 6/30	Actuarial Value	Market Value
2009	1.74%	(17.72)%
2010	1.37%	16.37%
2011	3.60%	19.13%
2012	1.11%	0.01%
2013	4.29%	11.10%
Average	2.41%	4.85%



Economic Assumptions Investment Return



NASRA Issue Brief: Public Pension Plan Investment Return Assumption



The average assumed rate of return among Public Retirement Systems is 7.72% according to the April 2014 NASRA Issue Brief: “Public Pension Plan Investment Return Assumptions”



Economic Assumptions Investment Return



- Stochastic projection expected range of real rates of return (CERS)

Time Span In Years	Real Returns by Percentile				
	5 th	25 th	50 th	75 th	95 th
1	-14.43%	-4.11%	3.79%	12.34%	25.88%
5	-4.79%	0.18%	3.79%	7.53%	13.15%
10	-2.36%	1.22%	3.79%	6.42%	10.32%
20	-0.59%	1.97%	3.79%	5.64%	8.37%
30	0.20%	2.30%	3.79%	5.30%	7.51%
50	0.99%	2.63%	3.79%	4.96%	6.66%

- Based on KRS' current capital market assumptions and policy target asset allocation.



Economic Assumptions Investment Return



- Recommendation
 - ASOP No. 27 approach
 - Projection results – 50 years - CERS

Item	25 th Percentile	50 th Percentile	75 th Percentile
Real Rate of Return	2.63%	3.79%	4.96%
Inflation	3.25%	3.25%	3.25%
Expenses	<u>(0.00)%</u>	<u>(0.00)%</u>	<u>(0.00)%</u>
Net Investment Return	5.88%	7.04%	8.21%



Economic Assumptions Investment Return



- Normally would recommend 50th percentile results.
- However, there are mitigating issues:
 - Longer time horizon (10 years vs. System's lifetime)
 - Historical returns have been higher
 - Capital market assumptions do not include added return due to active management and other asset deployment strategies
 - Capital market assumptions are reflective of recent good experience. That, combined with the time horizon, causes them to be conservative compared to potential returns for longer periods.



Economic Assumptions Investment Return



- Therefore recommendation is greater than the 50th percentile
 - KERS Non-Hazardous – 64th percentile
 - KERS Hazardous, CERS Non-Hazardous and KERS Hazardous – 61st percentile
 - SPRS – 61st percentile

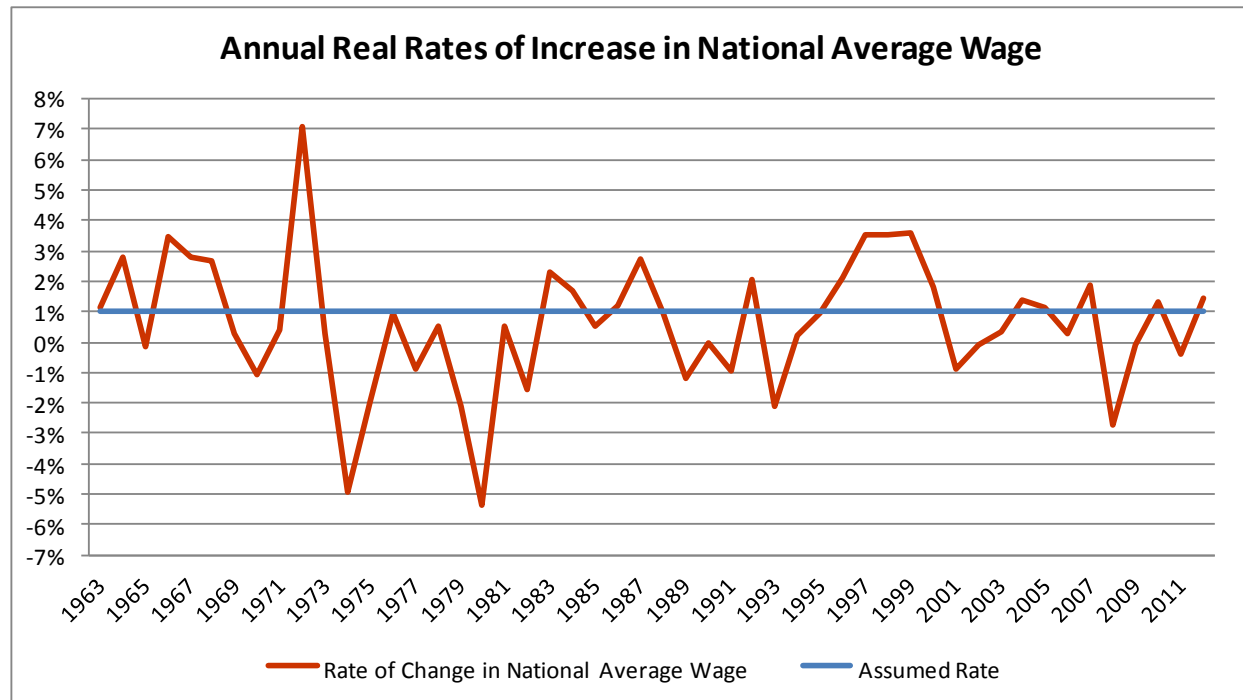
Investment Return Assumption	
Current	7.75%
Reasonable Range (CERS)	5.88% - 8.21%
Recommended	7.50%

- Further recommendation is to review the economic assumptions every biennium

Economic Assumptions

Wage Inflation

- Current assumption: 4.50%, which is 1.00% above price inflation
- Social Security Administration data





Economic Assumptions

Wage Inflation



➤ Historical Experience

Period	Wage Inflation	Price Inflation	Real Wage Growth
2002-2012	2.92%	2.46%	0.44%
1992-2012	3.35	2.49	0.83
1982-2012	3.79	2.91	0.85
1972-2012	4.67	4.36	0.30
1962-2012	4.78	4.14	0.62



Economic Assumptions

Wage Inflation



- Social Security 75 year projection of national wage growth assumption is 1.1% greater than price inflation.
- Recommendation is to be more consistent with historical results, particularly in periods of relatively high inflation.

Wage Inflation Assumption		
Current	4.50%	
	Reasonable Range	
Real Wage Growth	0.50%	1.50%
Inflation	<u>3.25%</u>	<u>3.25%</u>
Total	3.75%	4.75%
Recommended	4.00%	



Impact of Recommendations

Financial Impact on 06/30/2013 KERS Non-Hazardous Valuation

System	Before Change	After Change
KERS Non-Hazardous Pension:		
UAL	\$8,750,479,307	\$9,324,310,277
Funding Ratio	23.15%	22.04%
Employer Rate	30.84%	33.09%
KERS Non-Hazardous Insurance:		
UAL	\$1,631,169,807	\$1,801,450,791
Funding Ratio	23.37%	21.64%
Employer Rate	7.93%	8.27%
Total Employer Rate	38.77%	41.36%



Impact of Recommendations

Financial Impact on 06/30/2013 KERS Hazardous Valuation

System	Before Change	After Change
KERS Hazardous Pension:		
UAL	\$278,323,786	\$318,776,485
Funding Ratio	64.50%	61.33%
Employer Rate	16.37%	19.27%
KERS Hazardous Insurance:		
UAL	\$14,743,272	\$(6,845,174)
Funding Ratio	96.18%	101.88%
Employer Rate	9.97%	7.63%
Total Employer Rate	26.34%	26.90%



Impact of Recommendations

Financial Impact on 06/30/2013 CERS Non-Hazardous Valuation

System	Before Change	After Change
CERS Non-Hazardous Pension:		
UAL	\$3,741,781,631	\$4,163,362,131
Funding Ratio	60.10%	57.52%
Employer Rate	12.75%	13.69%
CERS Non-Hazardous Insurance:		
UAL	\$815,649,903	\$946,198,707
Funding Ratio	66.62%	63.25%
Employer Rate	5.35%	5.11%
Total Employer Rate	18.10%	18.80%



Impact of Recommendations

Financial Impact on 06/30/2013 CERS Hazardous Valuation

System	Before Change	After Change
CERS Hazardous Pension:		
UAL	\$1,322,514,183	\$1,432,756,145
Funding Ratio	57.67%	55.70%
Employer Rate	20.73%	19.63%
CERS Hazardous Insurance:		
UAL	\$544,558,426	\$519,882,134
Funding Ratio	62.11%	63.20%
Employer Rate	14.97%	12.40%
Total Employer Rate	35.70%	32.03%



Impact of Recommendations

Financial Impact on 06/30/2013 SPRS Valuation

System	Before Change	After Change
SPRS Pension:		
UAL	\$409,780,326	\$444,015,689
Funding Ratio	37.11%	35.26%
Employer Rate	53.90%	59.91%
SPRS Insurance:		
UAL	\$86,005,683	\$95,606,709
Funding Ratio	61.32%	58.78%
Employer Rate	21.86%	23.29%
Total Employer Rate		
	75.76%	83.20%



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Kentucky Retirement Systems

Experience Study

For the Five-Year Period

Ending June 30, 2013





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April 30, 2014

Board of Trustees
Kentucky Retirement Systems
1260 Louisville Road
Frankfurt, KY 40601

Dear Members of the Board:

We are pleased to submit the results of a study of the economic and demographic experience for the Kentucky Employees Retirement System, the County Employees Retirement System and the State Police Retirement System. The purpose of this investigation is to assess the reasonability of the actuarial assumptions for each system. This investigation covers the five-year period from July 1, 2008 to June 30, 2013. As a result of the investigation, it is recommended that revised assumptions be adopted by the Board for future use.

The experience studies for each system include all active members, retired members and beneficiaries of deceased members. The mortality experience was studied separately for males and females. Incidences of withdrawal, disability, retirement and compensation increases were investigated without regard to gender.

This report shows comparisons between the actual and expected cases of separation from active service, actual and expected number of deaths, and actual and expected salary increases. Tables and graphs are used to show the actual decrement rates, the expected decrement rates and, where applicable, the proposed decrement rates.

The newly proposed rates of separation and mortality for all five systems are shown in Appendix D of this report. In the actuary's judgment, the recommended rates are suitable for use until further experience indicates that modifications are needed.

Actuarial Assumptions are used to measure and budget future costs. Changing assumptions will not change the actual cost of future benefits.



Board of Trustees
April 30, 2014
Page 2

The experience study was performed by, and under the supervision of, independent actuaries who are members of the American Academy of Actuaries with experience in performing valuations for public retirement systems. The undersigned meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'Thomas J. Cavanaugh'.

Thomas J. Cavanaugh FSA, FCA, MAAA, EA
Chief Executive Officer

A handwritten signature in blue ink, appearing to read 'Todd B. Green'.

Todd B. Green ASA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink, appearing to read 'Alisa Bennett'.

Alisa Bennett, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

TJC\tbg



SUMMARY OF RESULTS

The following summarizes the findings and recommendations with regard to the assumptions utilized by the Kentucky Employees Retirement System (KERS), the County Employees Retirement System (CERS) and the State Police Retirement System (SPRS). Explanations for the recommendations are found in the sections that follow.

Recommended Economic Assumption Changes

The table below lists the three economic assumptions used in the actuarial valuation and their current and proposed rates. We recommend lowering the assumed rate of price inflation, the assumed rate of return on assets and the assumed rate of wage inflation for all five Systems.

Assumption	Current	Proposed
Price Inflation	3.50%	3.25%
Wage Inflation	4.50%	4.00%
Investment Return		
KERS Non-Hazardous	7.75%	7.50%
KERS Hazardous	7.75%	7.50%
CERS Non-Hazardous	7.75%	7.50%
CERS Hazardous	7.75%	7.50%
SPRS	7.75%	7.50%



Recommended Demographic Assumption Changes

The table below lists the demographic assumptions that we recommend be changed based on the experience during the last five years.

Assumption Changes
KERS Non-Hazardous Increase rates of withdrawal Update rates of pre-retirement mortality Decrease rates of disability retirements Adjust rates of retirement Update post-retirement mortality Update Other Post-Employment Benefit assumptions
KERS Hazardous Increase rates of withdrawal Update rates of pre-retirement mortality Decrease rates of disability retirements Adjust rates of retirement Update post-retirement mortality Update Other Post-Employment Benefit assumptions
CERS Non-Hazardous Increase rates of withdrawal Update rates of pre-retirement mortality Decrease rates of disability retirements Adjust rates of retirement Update post-retirement mortality Update Other Post-Employment Benefit assumptions
CERS Hazardous Increase rates of withdrawal Update rates of pre-retirement mortality Adjust rates of retirement Update post-retirement mortality Update Other Post-Employment Benefit assumptions
SPRS Increase rates of withdrawal Update rates of pre-retirement mortality Adjust rates of retirement Update post-retirement mortality Update Other Post-Employment Benefit assumptions



Section I: Summary of Results

Recommended Method Changes

In keeping with the real wage growth change, we recommend that the payroll growth assumption for amortization as a level percent of pay be reduced from 4.50% to 4.00%.

Financial Impact

The following tables highlight the impact of the recommended changes on the unfunded accrued liabilities (UAL), funded statuses and employer contribution rates for the five systems for both the pension and the insurance funds.

System	Pension		Insurance	
	Before Change	After Change	Before Change	After Change
KERS Non-Hazardous				
UAL	\$8,750,479,307	\$9,152,135,582	\$1,631,169,807	\$1,801,450,791
Funded Status	23.15%	22.36%	23.37%	21.64%
Employer Rate	30.84%	32.54%	7.93%	8.27%
KERS Hazardous				
UAL	\$278,323,786	\$318,776,485	\$14,743,272	\$(6,845,174)
Funded Status	64.50%	61.33%	96.18%	101.88%
Employer Rate	16.37%	19.27%	9.97%	7.63%
CERS Non-Hazardous				
UAL	\$3,741,781,631	\$4,459,335,404	\$815,649,903	\$946,198,707
Funded Status	60.10%	55.83%	66.62%	63.25%
Employer Rate	12.75%	15.34%	5.35%	5.11%
CERS Hazardous				
UAL	\$1,322,514,183	\$1,432,756,145	\$544,558,426	\$519,882,134
Funded Status	57.67%	55.70%	62.11%	63.20%
Employer Rate	20.73%	19.63%	14.97%	12.40%
SPRS				
UAL	\$409,780,326	\$444,015,689	\$86,005,683	\$95,606,709
Funded Status	37.11%	35.26%	61.32%	58.78%
Employer Rate	53.90%	59.91%	21.86%	23.29%



ECONOMIC ASSUMPTIONS

There are three economic assumptions used in performing the actuarial valuation for the KERS, CERS and SPRS. The assumptions are:

- Price Inflation
- Investment Return
- Wage Inflation

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 27, “*Selection of Economic Assumptions for Measuring Pension Obligations*”, which provides guidance to actuaries in selecting economic assumptions for measuring obligations under defined benefit plans. As noted in ASOP No. 27, because no one knows what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes based on a mixture of past experience and future expectations. These estimates therefore are best stated as a range utilizing the actuary’s professional judgment. In setting the range and the single point within that range to use, the actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. However, the standard explicitly advises the actuary not to give undue weight to recent experience.

Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period.

In our opinion, the economic assumptions recommended in this report have been developed in accordance with ASOP No. 27. The following table shows our recommendations followed by explanations of each assumption.

Item	Current	Proposed
Price Inflation	3.50%	3.25%
Real Rate of Return	<u>4.25</u>	<u>4.25%</u>
Investment Return	7.75%	7.50%
Price Inflation	3.50%	3.25%
Real Wage Growth	<u>1.00</u>	<u>0.75</u>
Wage Inflation	4.50%	4.00%



PRICE INFLATION

Background: As seen in the table on the previous page, assumed price inflation is used as a component for both the investment return assumption and the wage inflation assumption. The latter two assumptions will be discussed in detail in the following sections.

It is important that the price inflation assumption be consistently applied throughout the economic assumptions utilized in an actuarial valuation. This is called for in ASOP No. 27 and is also required to meet the parameters for determining pension liabilities and expense under Governmental Accounting Standards Board (GASB).

The current price inflation assumption is 3.50% per year.

Past Experience: The Consumer Price Index, US City Average, All Urban Consumers, CPI (U), has been used as the basis for reviewing historical levels of price inflation. The level of that index in June of each of the last 50 years is provided in Appendix A.

In analyzing this data, average rates of inflation have been determined by measuring the compound growth rate of the CPI (U) over various time periods. The results are as follows:

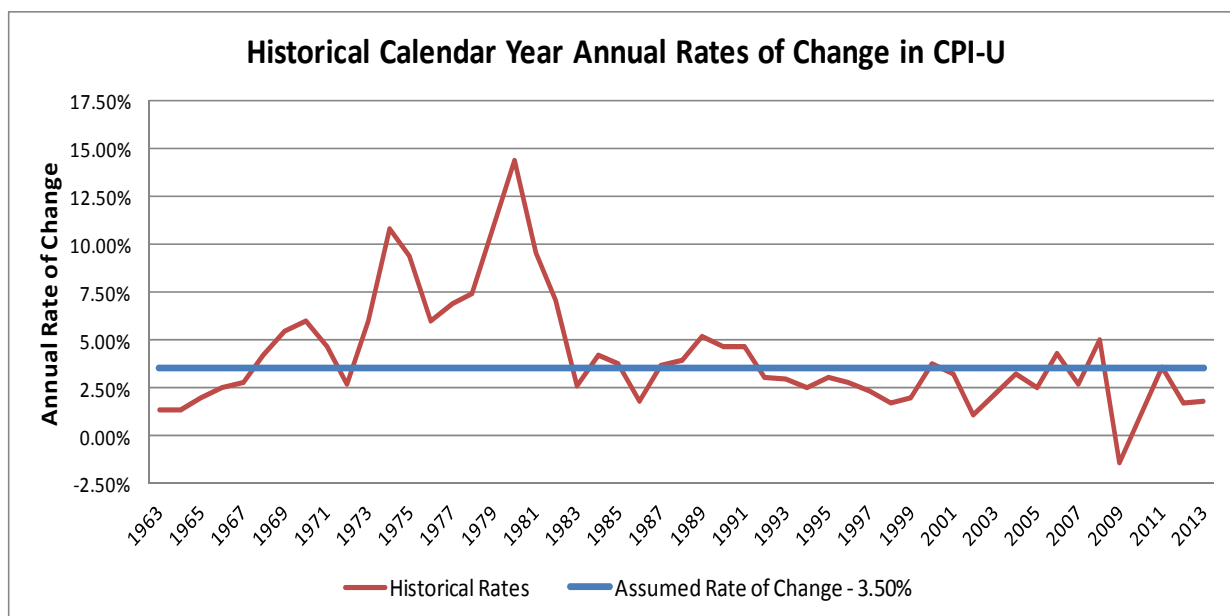
Period	Average Annual Rate of Inflation
2003 – 2013	2.43%
1993 – 2013	2.43%
1983 – 2013	2.88%
1973 – 2013	4.25%
1963 – 2013	4.15%
1953 – 2013	3.67%
1926 - 2013	2.99%

Over shorter historic periods, the average annual rate of increase in the CPI-U has been below 3.00%. The years of high inflation occurring from 1973 to 1982 has a significant impact on the averages over periods which include these rates. We should add that since 1926, the average annual rate of inflation was 2.99%.



Section II: Economic Assumptions

The graph below shows the annual increases in the CPI (U) over a 50-year period.



Additional information to consider when determining the reasonable range is obtained from measuring the spread on inflation protected treasury bills (TIPS) and from the prevailing economic forecasts. The spread between the nominal yield on treasury securities and the inflation indexed nominal yield on TIPS of the same maturity is referred to as the “breakeven rate of inflation” and represents the bond market’s expectation of inflation over the period to maturity. The table below provides the calculation of the breakeven rate of inflation as of December 31, 2013 over various periods.

Years to Maturity	Bond Nominal Yield	TIPS Nominal Yield	Breakeven Rate of Inflation
10	3.04%	0.80%	2.24%
20	3.72%	1.36%	2.36%
30	3.96%	1.64%	2.32%

The bond market’s expectation for the rate of inflation is lower than historical average annual rates. Additionally, based upon information provided from the “Survey of Professional Forecasters” published by the Philadelphia Federal Reserve Bank, the median annual rate of inflation for the ten years beginning January 1, 2013 is 2.30%.



Section II: Economic Assumptions

Recommendation: It is difficult to accurately predict inflation. Current economic forecasts and the bond market suggest lower inflation over the next ten to twenty years when compared to the historical averages, which is a shorter time period than appropriate for our purposes. In the 2013 OASDI Trustees Report, the Chief Actuary for Social Security bases the 75-year cost projections on an intermediate inflation assumption of 2.8% with a range of 1.8% - 3.8%. We concur in general with a range of 2.0% - 4.0%, and recommend reducing the assumed rate of inflation from 3.50% to 3.25% per year rate still recognizing the likely inflation pressures built into the economy at the current time.

Price Inflation Assumption	
Current	3.50%
Reasonable Range	2.00 - 4.00%
Recommended	3.25%



INVESTMENT RETURN

Background: The assumed investment return is one of the most significant assumptions in the annual actuarial valuation process as it is used to discount the expected benefit payments for all active, inactive and retired members of the System. Minor changes in this assumption can have a major impact on valuation results. The investment return assumption should reflect the asset allocation target for the funds set by the Board.

The current assumption is 7.75%, consisting of a price inflation assumption of 3.50% and a real rate of return assumption of 4.25%. The return is net of all investment expenses.

Past Experience: The actuarial value of assets of the System are developed using a widely accepted asset-smoothing methodology that fully recognizes investment gains and losses over a five-year period. The recent experience for the retirement funds over the last eight years is shown in the table below.

Year Ending 6/30	Insurance Funds		Pension Funds	
	Actuarial Value Rate of Return	Market Value Rate of Return	Actuarial Value Rate of Return	Market Value Rate of Return
2006	7.83%	11.91%	4.97%	9.70%
2007	10.33	17.79	9.01	15.29
2008	7.95	(7.82)	8.02	(4.09)
2009	0.36	(22.95)	1.74	(17.72)
2010	0.28	15.12	1.37	16.37
2011	3.46	22.64	3.60	19.13
2012	1.01	(3.40)	1.11	0.01
2013	4.50	10.04	4.29	11.10
Average	4.40%	4.34%	4.23%	5.52%

Because of the significant variability in past year-to-year results and the inter-play of inflation on those results in the short term, we prefer to base our investment return assumption on the capital market assumptions utilized by the Board in setting investment policy and the asset allocation established by the Board as a result of that policy. This approach is referred to as the building block method in ASOP No. 27.



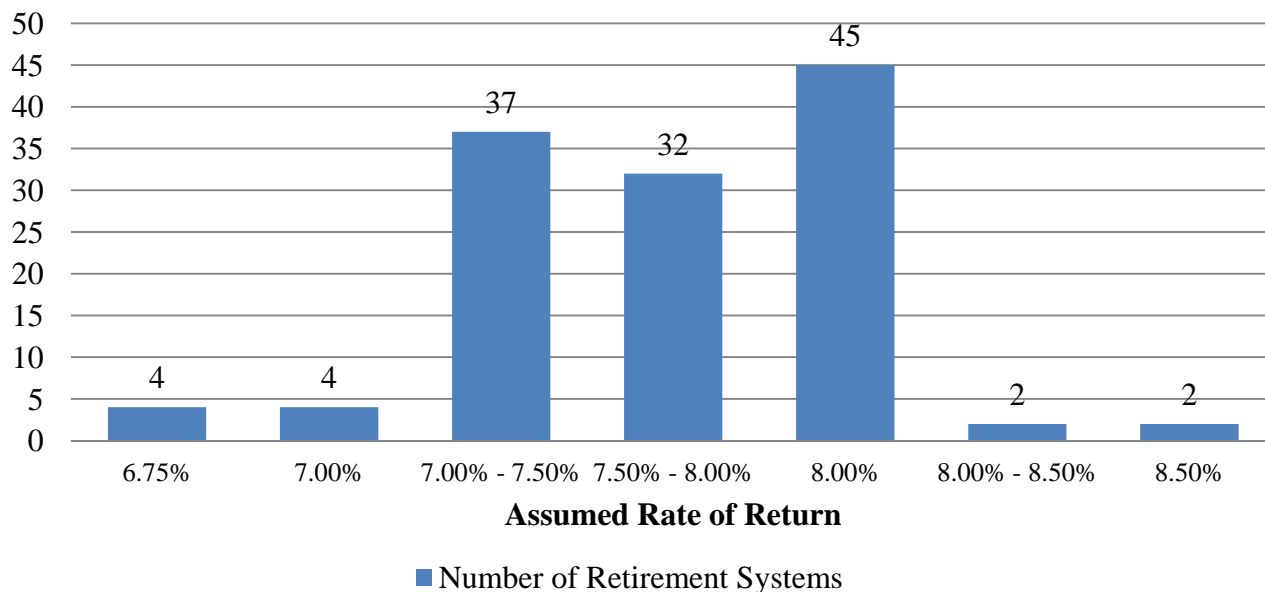
Section II: Economic Assumptions

Historical Analysis: The historical 50-year real rate of return of the S&P 500 has averaged 5.60%, and the 50-year real rate of return of intermediate-term government bonds as provided by *Ibbotson SBBI 2014 Classic Yearbook* has averaged 2.81%. By weighting these rates by common allocation of large retirement funds (30%/70% to 70%/30%) we construct the reasonable range for real rates of return to be from 3.98% to 5.11%. The following table shows various annualized rates of return based on different time periods and different allocations between equities and bonds.

Time Span In Years	Real Returns by Portfolio Allocation Equities vs. Bonds			
	30%/70%	35%/65%	65%/35%	70%/30%
10	3.41%	3.61%	4.53%	4.64%
20	4.59	4.82	5.97	6.12
30	5.89	6.11	7.21	7.36
40	4.67	4.86	5.85	5.98
50	3.98	4.14	4.99	5.11

Peer Analysis: Review of the *NASRA Issue Brief: Public Pension Plan Investment Return Assumptions* update as of December 2013, 8.00% is the predominant assumption for public sector pension systems while the median is 7.72%.

NASRA Issue Brief: Public Pension Plan Investment Return Assumption





Section II: Economic Assumptions

Analysis: The current capital market assumptions and asset allocations are shown in Appendix B. Using statistical distribution properties based upon capital market assumptions utilized by the Board, provided by RVKuhns in setting the System's asset allocation targets, provides an expected range of real rates of return over various time horizons.

It is important to note that capital market assumptions can be quite volatile from year to year as they tend to forecast shorter time horizons than typically required by the public plan actuarial community when looking at the long-term time horizon of a public pension system. For example the expected real arithmetic return for KERS Non-Hazardous Pension Fund utilizing the 2010 asset allocation decreases from 5.43% to 4.93% and further to 4.57% based on the 2010, 2012, and 2014 capital market assumptions, respectively, provided by the Board's investment consultant. The following tables provide a summary of results of our analysis of the current capital market assumptions provided by RVKuhns.

KERS Non-Hazardous

Time Span In Years	Real Returns by Percentile				
	5 th	25 th	50 th	75 th	95 th
1	-13.97%	-3.98%	3.65%	11.88%	24.88%
5	-4.64%	0.17%	3.65%	7.25%	12.66%
10	-2.28%	1.17%	3.65%	6.18%	9.94%
20	-0.58%	1.89%	3.65%	5.43%	8.06%
30	0.18%	2.21%	3.65%	5.10%	7.23%
50	0.95%	2.53%	3.65%	4.77%	6.42%



KERS Hazardous, CERS Non Hazardous and CERS Hazardous

Time Span In Years	Real Returns by Percentile				
	5 th	25 th	50 th	75 th	95 th
1	-14.43%	-4.11%	3.79%	12.34%	25.88%
5	-4.79%	0.18%	3.79%	7.53%	13.15%
10	-2.36%	1.22%	3.79%	6.42%	10.32%
20	-0.59%	1.97%	3.79%	5.64%	8.37%
30	0.20%	2.30%	3.79%	5.30%	7.51%
50	0.99%	2.63%	3.79%	4.96%	6.66%

SPRS

Time Span In Years	Real Returns by Percentile				
	5 th	25 th	50 th	75 th	95 th
1	-14.44%	-4.12%	3.77%	12.32%	25.86%
5	-4.81%	0.16%	3.77%	7.51%	13.13%
10	-2.37%	1.21%	3.77%	6.40%	10.30%
20	-0.61%	1.95%	3.77%	5.62%	8.35%
30	0.18%	2.28%	3.77%	5.28%	6.99%
50	0.98%	2.62%	3.77%	4.94%	6.64%

The charts above and on the previous page show the percentile rankings for expected returns for the various funds. For example, in the KERS Non-Hazardous fund 20-year time span, 5% of the resulting real rates of return are expected to be below -0.58% and 95% expected to be above that. As the time span increases, the results begin to merge. Over a 50-year time span, the result indicate there is a 25% chance that real return will be below 2.53% and a 25% chance they will be above 4.77%. In other words there is a 50% chance the real returns will be between 2.53% and 4.77%. The results vary from fund to fund due to slightly different asset allocation targets.



Section II: Economic Assumptions

Administrative and Investment Expenses (\$ millions): Administrative expenses are directly reflected as a separate component in the calculation of the contribution rate. However, the investment return is assumed to be net of all investment-related expenses. The following table shows the ratio of expenses to Plan assets over the last eight years. The expense ratio is calculated as the total expense divided by the ending asset balance at fair market value.

	Market Value Assets	Investment Expense	Expense Ratio
2009	\$11,938	\$11.9	0.10%
2010	\$12,969	\$30.1	0.23%
2011	\$14,776	\$41.8	0.28%
2012	\$13,878	\$26.7	0.19%
2013	\$14,675	\$31.5	0.21%

Over the five-year period the expense ratio averaged approximately 0.20%. This assumption does not have a direct impact on the actuarial valuation results, but it does provide a measure of gross return on investments that will be needed to meet the actuarial assumption used for the valuation. For example, if the KERS non-hazardous pension fund investment return assumption is set at 7.00%, then the Fund would need to earn a gross return of 7.20% in order to meet the 7.00% for funding purposes. The capital market assumptions provided by RVKuhns are net of investment expenses; therefore a separate investment expense assumption is not necessary.

Recommendation: Using the building block approach of ASOP No. 27 and the projection results outlined above, we recommend a range for the investment return assumption of the 25th to 75th percentile real returns over the 50-year time span plus the recommended inflation assumption less the recommended expense ratio assumption. The tables on the following pages detail the ranges for the funds.



KERS Non-Hazardous

Item	25 th Percentile	50 th Percentile	75 th Percentile
Real Rate of Return	2.53%	3.65%	4.77%
Inflation	3.25	3.25	3.25
Expenses*	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
Net Investment Return	5.78%	6.90%	8.02%

* *The capital market assumptions used to develop the reasonable range for the real rate of return are net of investment expenses. Therefore a separate assumption for investment expenses is not necessary.*

The current assumed rate of return of 7.75% is in line with its peer group of other public retirement systems, however, the 50th percentile net return based on the analysis utilizing the capital market assumptions provided by RVKuhns is 6.90% for the above referenced fund.

Historically, a portfolio of assets that consisted of 65% S&P 500 and 35% intermediate-term government bonds yielded a compound average real rate of return on of 4.99% over the last 50 years. When combined with the inflation assumption of 3.25% that would yield an assumed rate of return of 8.24% on a historical basis.

The capital market assumptions provided by RVKuhns are based on a shorter time horizon relative to the time horizon required by actuaries. The capital market assumptions reflect the current economic environment that has outperformed current expectations. Due to the cyclical nature of the economy it is expected that the financial markets cannot continue at the current pace, therefore expectations are muted in the short run which has heavily biased the capital market assumptions. The actuary does not put undo weight on recent experience when setting the long-term assumed rate of return. In addition, the capital market assumptions do not reflect excess return that is derived through active management and other asset deployment strategies.

Our recommendation taking into account historical analysis, peer group analysis and the capital market assumption analysis is 7.50%. For the KERS Non-Hazardous System this represents the 64th percentile which is well within the reasonable range developed above.



KERS Hazardous, CERS Non-Hazardous and CERS Hazardous

Item	25 th Percentile	50 th Percentile	75 th Percentile
Real Rate of Return	2.63%	3.79%	4.96%
Inflation	3.25	3.25	3.25
Expenses*	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
Net Investment Return	5.88%	7.04%	8.21%

* *The capital market assumptions used to develop the reasonable range for the real rate of return are net of investment expenses. Therefore a separate assumption for investment expenses is not necessary.*

The current assumed rate of return of 7.75% is in line with its peer group of other public retirement systems, however, the 50th percentile net return based on the analysis utilizing the capital market assumptions provided by RVKuhns is 7.04% for the above referenced fund.

Historically, a portfolio of assets that consisted of 65% S&P 500 and 35% intermediate-term government bonds yielded a compound average real rate of return on of 4.99% over the last 50 years. When combined with the inflation assumption of 3.25% that would yield an assumed rate of return of 8.24% on a historical basis.

The capital market assumptions provided by RVKuhns are based on a shorter time horizon relative to the time horizon required by actuaries. The capital market assumptions reflect the current economic environment that has outperformed current expectations. Due to the cyclical nature of the economy it is expected that the financial markets cannot continue at the current pace, therefore expectations are muted in the short run which has heavily biased the capital market assumptions. The actuary does not put undo weight on recent experience when setting the long-term assumed rate of return. In addition, the capital market assumptions do not reflect excess return that is derived through active management and other asset deployment strategies.

Our recommendation taking into account historical analysis, peer group analysis and the capital market assumption analysis is 7.50%. For the KERS Hazardous System and both CERS systems this represents the 61st percentile which is well within the reasonable range developed above.



SPRS Pension

Item	25 th Percentile	50 th Percentile	75 th Percentile
Real Rate of Return	2.62%	3.77%	4.94%
Inflation	3.25	3.25	3.25
Expenses*	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
Net Investment Return	5.87%	7.02%	8.19%

* *The capital market assumptions used to develop the reasonable range for the real rate of return are net of investment expenses. Therefore a separate assumption for investment expenses is not necessary.*

The current assumed rate of return of 7.75% is in line with its peer group of other public retirement systems, however, the 50th percentile net return based on the analysis utilizing the capital market assumptions provided by RVKuhns is 7.02% for the above referenced fund.

Historically, a portfolio of assets that consisted of 65% S&P 500 and 35% intermediate-term government bonds yielded a compound average real rate of return on of 4.99% over the last 50 years. When combined with the inflation assumption of 3.25% that would yield an assumed rate of return of 8.24% on a historical basis.

The capital market assumptions provided by RVKuhns are based on a shorter time horizon relative to the time horizon required by actuaries. The capital market assumptions reflect the current economic environment that has outperformed current expectations. Due to the cyclical nature of the economy it is expected that the financial markets cannot continue at the current pace, therefore expectations are muted in the short run which has heavily biased the capital market assumptions. The actuary does not put undo weight on recent experience when setting the long-term assumed rate of return. In addition, the capital market assumptions do not reflect excess return that is derived through active management and other asset deployment strategies.

Our recommendation taking into account historical analysis, peer group analysis and the capital market assumption analysis is 7.50%. For the SPRS System this represents the 61st percentile which is well within the reasonable range developed above.



WAGE INFLATION

Background: The assumed future increases in salaries consist of an inflation component and a component for promotion and longevity, often called merit increases. Merit increases are generally age and/or service related, and will be studied in the demographic assumption section of the report. Wage inflation normally is above price inflation, which reflects the overall return on labor in the economy. The current wage inflation assumption is 4.50%, or 1.00% above price inflation.

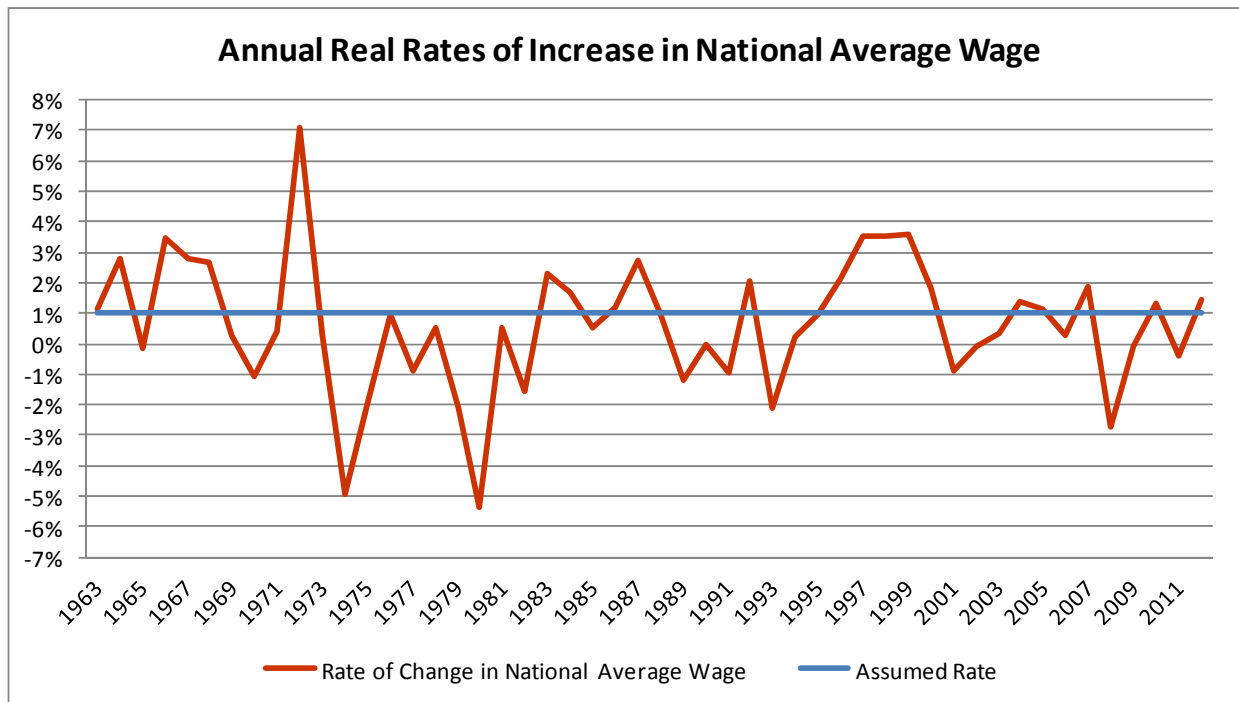
Past Experience: The Social Security Administration publishes data on wage growth in the United States. Appendix C shows the last 50 calendar years' data. As we did in our analysis of inflation, in the table below, we show the wage inflation and a comparison with the price inflation over various time periods. Since wage data is only available through 2012 we use that year as the end point.

Period	Wage Inflation	Price Inflation	Real Wage Growth
2002-2012	2.92%	2.46%	0.44%
1992-2012	3.35	2.49	0.83
1982-2012	3.79	2.91	0.85
1972-2012	4.67	4.36	0.30
1962-2012	4.78	4.14	0.62

Thus, over the last 50 years, annual real wage growth has averaged 0.62%. The graph on the following page shows the annual increases in real wage growth over the entire 50-year period.



Section II: Economic Assumptions



Recommendation: As we did with price inflation, we again look at the 2013 OASDI Trustees Report. The Chief Actuary for Social Security bases the 75-year cost projections on a national wage growth assumption 1.1% greater than the price inflation assumption of 2.8%. We concur in general with a range of .5% - 1.5%. To be more consistent with historical results, particularly in periods of relatively higher inflation, we recommend a change to 0.75% for the real wage growth assumption.

Wage Inflation Assumption		
Current	4.50%	
	Reasonable Range	
Real Wage Growth	0.50%	1.50%
Inflation	<u>3.25</u>	<u>3.25</u>
Total	3.75%	4.75%
Recommended	4.00%	



DEMOGRAPHIC ASSUMPTIONS

There are several demographic assumptions used in the actuarial valuations performed for the Kentucky Retirement Systems. They are:

- Rates of Mortality
- Rates of Service Retirement
- Rates of Disability Retirement
- Rates of Withdrawal
- Rates of Salary Increase for Merit and Promotions
- Other Post-Employment Benefit Assumptions

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 35, “*Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*”, which provides guidance to actuaries in selecting demographic assumptions for measuring obligations under defined benefit plans. In our opinion, the demographic assumptions recommended in this report have been developed in accordance with ASOP No. 35.

The purpose of a study of demographic experience is to compare what actually happened to the membership during the study period (July 1, 2008 through June 30, 2013) with what was expected to happen based on the assumptions used in the most recent actuarial valuations.

Detailed tabulations by age, service and/or gender are performed over the entire study period. These tabulations look at all active and retired members during the period as well as separately identifying those who experience a demographic event, also referred to as a decrement. In addition, the tabulation of all members together with the current assumptions permits the calculation of the number of expected decrements during the study period.

If the actual experience differs significantly from the overall expected results, or if the pattern of actual decrements, or rates of decrement, by age, gender, or service does not follow the expected pattern, new assumptions are recommended. Recommended changes usually do not follow the exact actual experience during the observation period. Judgment is required to extrapolate future experience from past trends and current member behavior. In addition non-recurring events, such as early retirement windows, need to be taken into account in determining the weight to give to recent experience.

The remainder of this section presents the results of the demographic study. We have prepared graphs and tables that show a comparison of the actual and expected decrements and the overall ratio of actual to expected results under the current assumptions. If a change is being proposed, the revised actual to expected ratios are shown as well.



RATES OF MORTALITY

Mortality tables are a fundamental assumption in actuarial valuations. Because benefits are typically paid over a retiree's lifetime, it is important to appropriately reflect what a typical lifetime looks like. In addition, deaths before retirement may also result in the payout of benefits to a spouse or survivor. For valuation purposes, we must consider mortality tables for retirees, beneficiaries of retirees, disabled retirees, and active members.

Retiree and Beneficiary Mortality

The post-retirement mortality rates used in the actuarial valuation project the percentage of retirees who are expected to die in a given future year. This assumption is a very important demographic assumption since it typically has the most significant impact on liability projections.

Based upon the long term trend of mortality improvement, actuaries seek to account for future improvements in longevity, either by directly projecting future improvements or by maintaining a sufficient margin in expected rates of mortality to allow for future improvement. We propose that the selected table reflect some degree of future improvement now, thereby providing a margin for improvement. The current table is the 1983 Group Annuity Mortality Table for all retired members and beneficiaries as of June 30, 2006 and the 1994 Group Annuity Mortality Table for all other members.



Section III: Demographic Assumptions

Retiree and Beneficiary Mortality Experience Under Current Assumptions

The analysis of the actual post-retirement mortality experience over the five-year study period yields actual/expected ratios of 103% and 106% respectively for males and females.

Age Group	Post-Retirement Mortality Experience					
	Males			Females		
	Actual	Expected	Ratio	Actual	Expected	Ratio
			Actual/Expected			Actual/Expected
Under 40	47	0.57	82.46	49	0.40	122.50
40 - 44	21	12.84	1.64	33	0.90	36.67
45 - 49	43	16.40	2.62	45	5.85	7.69
50 - 54	127	63.03	2.01	82	28.06	2.92
55 - 59	306	182.24	1.68	216	91.88	2.35
60 - 64	626	383.34	1.63	426	241.74	1.76
65 - 69	643	595.48	1.08	558	426.65	1.31
70 - 74	740	794.32	0.93	646	590.57	1.09
75 - 79	771	904.10	0.85	733	804.72	0.91
80 - 84	769	920.85	0.84	867	992.19	0.87
85 - 89	637	682.85	0.93	942	959.35	0.98
90 - 94	282	290.50	0.97	646	643.34	1.00
95 - 99	71	75.30	0.94	218	270.20	0.81
100 & Over	41	63.23	0.65	55	143.19	0.38
TOTAL	5,124	4,985.05	1.03	5,516	5,199.04	1.06

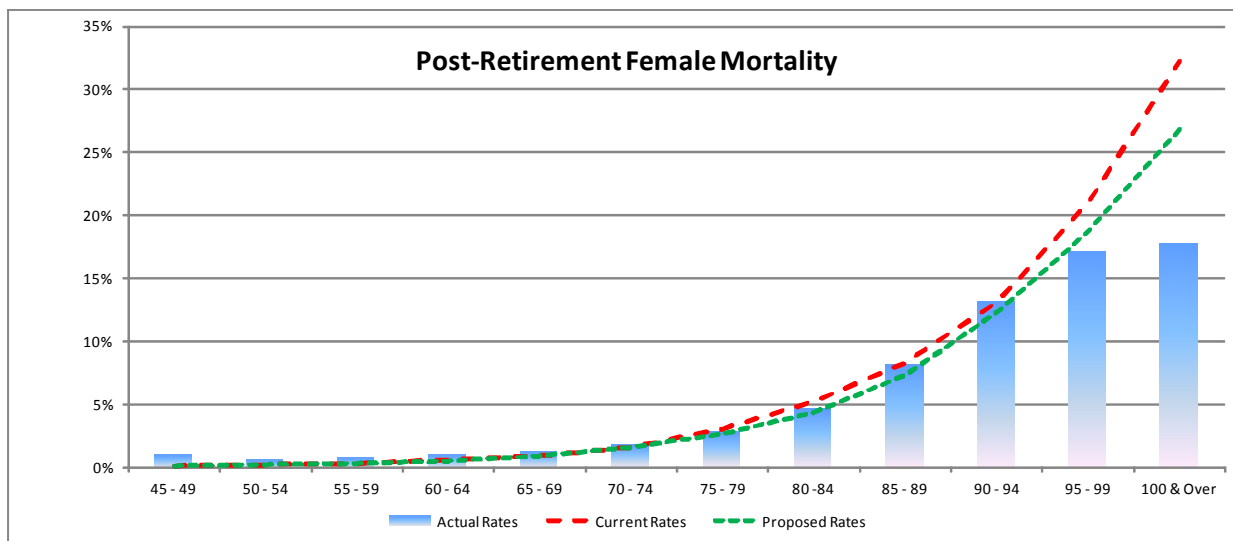
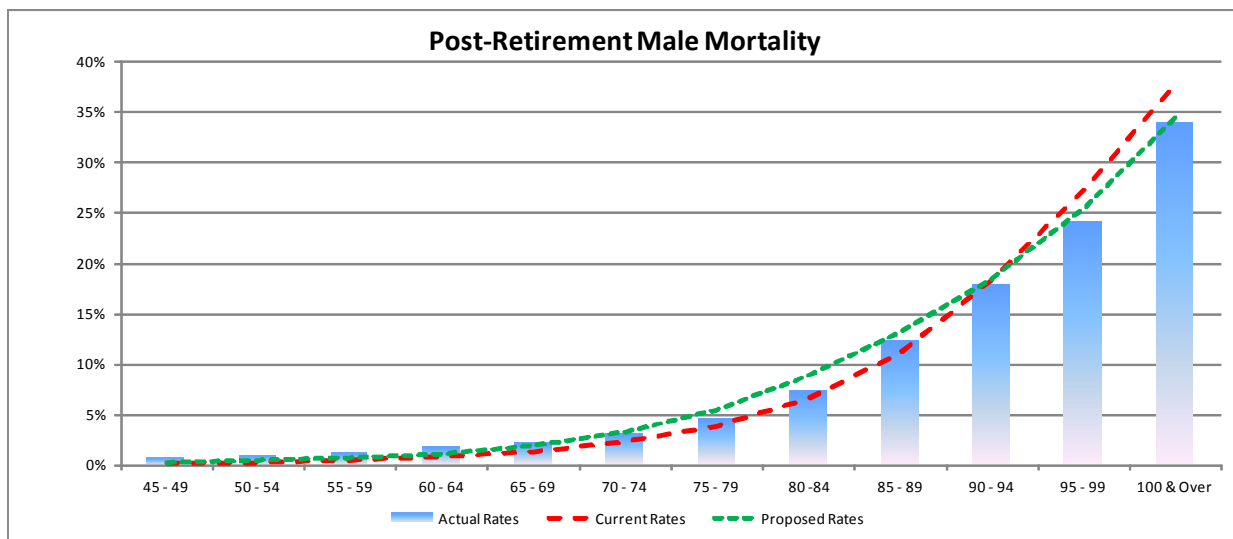
Retiree and Beneficiary Mortality Findings and Recommendations

Experience indicates that overall more members have died than expected during the study period at younger ages while fewer members have died than anticipated during the study period at older ages. We recommend updating the post-retirement mortality assumption to the RP-2000 projected to 2013 with the BB projection scale set back 1 year for females. The complete tables of recommended mortality rates are shown in Appendix D.



Section III: Demographic Assumptions

The charts below show (i) the actual rates of mortality for retirees and beneficiaries by age during the past five years, (ii) the current assume rates of mortality and (iii) the recommended assumed rates of mortality.





Section III: Demographic Assumptions

Retiree and Beneficiary Mortality Experience Under Proposed Assumptions

The actual/expected ratios based on the recommended assumption is 1.37% compared to 1.03% for males and 1.19% compared to 1.06% for females under the current assumption. The higher ratios under the recommend assumption anticipate a margin for mortality improvement in the future.

Age Group	Post-Retirement Mortality					
	Males			Females		
	Actual	Proposed	Ratio	Actual	Proposed	Ratio
			Actual/Expected			Actual/Expected
Under 40	47	0.47	100.00	49	0	148.48
40 - 44	21	1.82	11.54	33	1	38.37
45 - 49	43	12.09	3.56	45	6	7.60
50 - 54	127	39.94	3.18	82	27	3.05
55 - 59	306	123.17	2.48	216	85	2.54
60 - 64	626	274.61	2.28	426	224	1.90
65 - 69	643	412.62	1.56	558	427	1.31
70 - 74	740	546.29	1.35	646	576	1.12
75 - 79	771	643.79	1.20	733	700	1.05
80 - 84	769	686.74	1.12	867	825	1.05
85 - 89	637	577.04	1.10	942	845	1.11
90 - 94	282	289.60	0.97	646	604	1.07
95 - 99	71	80.23	0.88	218	239	0.91
100 & Over	41	45.59	0.90	55	83	0.66
TOTAL	5,124	3734.00	1.37	5,516	4,642.38	1.19



Section III: Demographic Assumptions

Disabled Retiree Mortality

Members who retire under the disability retirement provisions are generally expected to be less healthy than the overall population. Currently, the assumption for this group is the Group Annuity Mortality Table set forward 5 years. The study period yielded actual/expected ratios of 138% and 174% respectively for males and females. These ratios indicate more disabled individuals are dying at a rate that is greater rate than as currently assumed.

Disabled Retiree Mortality Experience Under Current Assumptions

Age Group	Post-Retirement Disabled Mortality					
	Males			Females		
	Actual	Expected	Ratio	Actual	Expected	Ratio
			Actual/Expected			Actual/Expected
Under 40	6	0	21.43	4	0	57.14
40 - 44	6	1	5.77	8	0	27.59
45 - 49	18	4	4.48	12	1	9.23
50 - 54	42	10	4.17	37	4	8.47
55 - 59	68	26	2.64	52	13	4.01
60 - 64	91	53	1.72	83	29	2.87
65 - 69	100	71	1.41	70	48	1.47
70 - 74	95	86	1.10	85	68	1.25
75 - 79	66	81	0.81	57	50	1.14
80 - 84	45	43	1.04	21	22	0.96
85 - 89	12	22	0.55	14	13	1.04
90 - 94	9	7	1.24	9	10	0.90
95 - 99	2	1	1.37	2	3	0.68
100 & Over	1	0	2.13	0	0	0.00
TOTAL	561	407.01	1.38	454	261.34	1.74

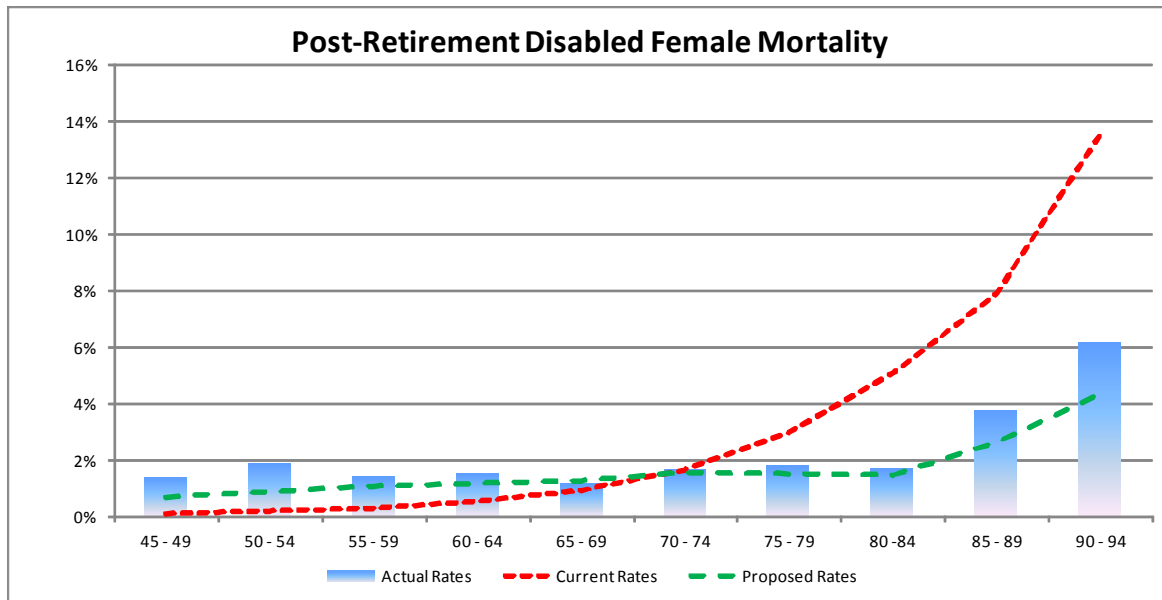
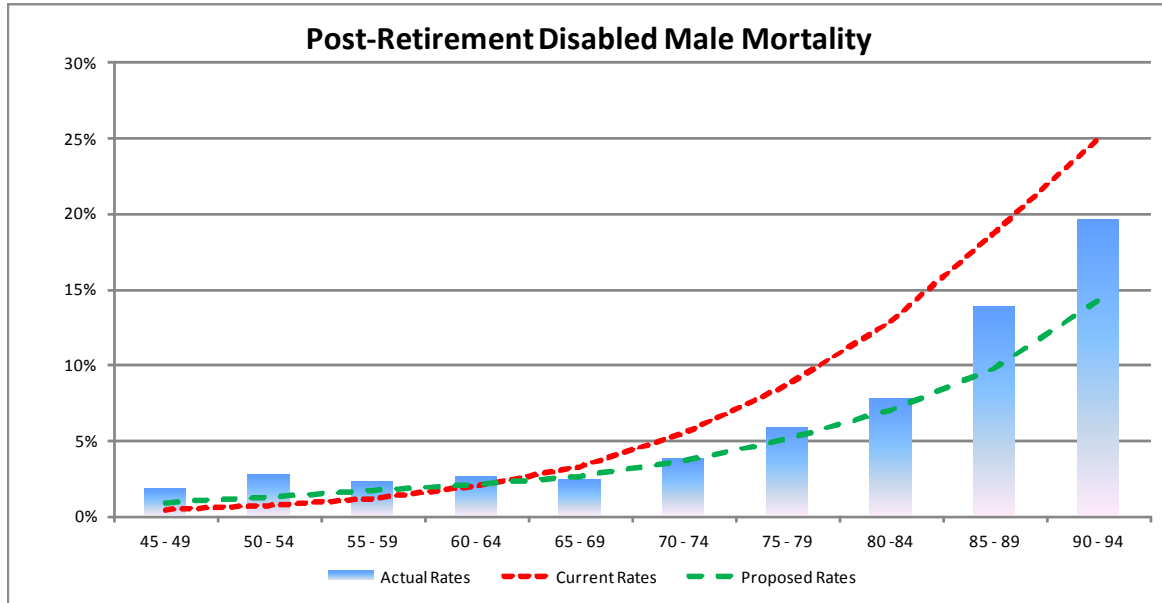
Disabled Retiree Mortality Findings and Recommendations

Experience indicates that overall more members have died than expected during the study period. We recommend updating the post-retirement mortality assumption to the RP-2000 Combined Disabled Mortality projected to 2013 with the BB projection scale and the males set back 4 years to be consistent with the recommendation for healthy post retirement mortality assumption. The complete tables of recommended mortality rates are shown in Appendix D.



Section III: Demographic Assumptions

The charts below show (i) the actual rates of mortality for disabled retirees by age during the past five years, (ii) the current assume rates of disabled mortality and (iii) the recommended assumed rates of disabled mortality.





Section III: Demographic Assumptions

Disabled Retiree Mortality Experience Under Proposed Assumptions

The actual expected ratio based on the recommended assumption are 1.14% compared to 1.38% for males and 1.21% compared to 1.74% for females.

Age Group	TOTAL			TOTAL		
	Males			Females		
	Actual	Proposed	Ratio	Actual	Proposed	Ratio
			Actual/Expected			Actual/Expected
Under 40	6	4.28	1.40	4	1	7.02
40 - 44	6	8.68	0.69	8	2	4.85
45 - 49	18	19.67	0.92	12	6	2.02
50 - 54	42	36.97	1.14	37	18	2.06
55 - 59	68	71.33	0.95	52	40	1.29
60 - 64	91	93.59	0.97	83	66	1.26
65 - 69	100	83.27	1.20	70	78	0.90
70 - 74	95	73.88	1.29	85	81	1.04
75 - 79	66	56.42	1.17	57	49	1.17
80 - 84	45	26.71	1.68	21	19	1.13
85 - 89	12	12.50	0.96	14	10	1.44
90 - 94	9	4.18	2.15	9	6	1.41
95 - 99	2	0.89	2.25	2	2	1.16
100 & Over	1	0.31	3.26	0	0	0.00
TOTAL	561	492.68	1.14	454	376.26	1.21



Section III: Demographic Assumptions

Active Member Mortality

For active members, the mortality assumption is less significant since it is only a small reason that employment ends and benefits begin. Further, there is no need for a margin for future improvements as there is for retirees. For active mortality the study period yielded actual expected ratios of 74% and 79% respectively for males and females respectively.

Active Member Mortality Experience Under Current Assumptions

Age Group	Pre-Retirement Mortality					
	Males			Females		
	Actual	Expected	Ratio	Actual	Expected	Ratio
			Actual/Expected			Actual/Expected
<20	0	0.46	0.00	0	0.21	0.00
20-24	6	4.78	1.26	0	2.32	0.00
25-29	8	9.56	0.84	1	4.78	0.21
30-34	10	12.90	0.78	3	6.97	0.43
35-39	19	20.59	0.92	6	11.58	0.52
40-44	19	24.66	0.77	16	15.58	1.03
45-49	41	37.61	1.09	31	24.10	1.29
50-54	41	58.04	0.71	44	37.99	1.16
55-59	74	88.60	0.84	51	56.35	0.91
60-64	52	102.47	0.51	42	65.10	0.65
65+	79	110.01	0.72	37	65.93	0.56
TOTAL	349	469.68	0.74	231	290.92	0.79

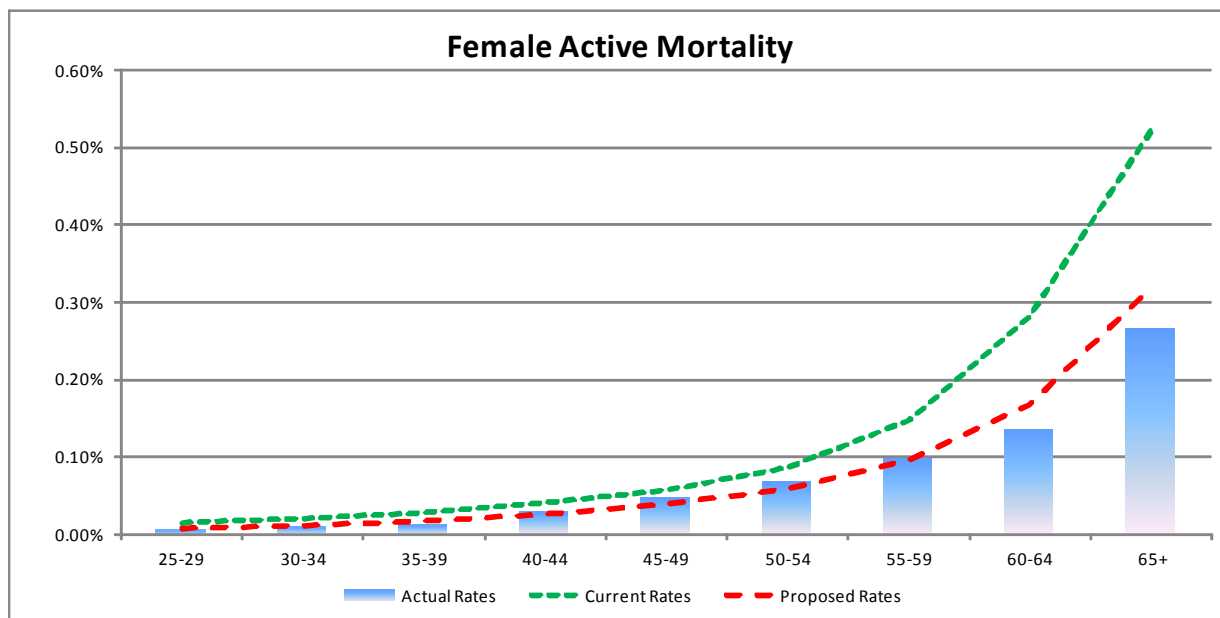
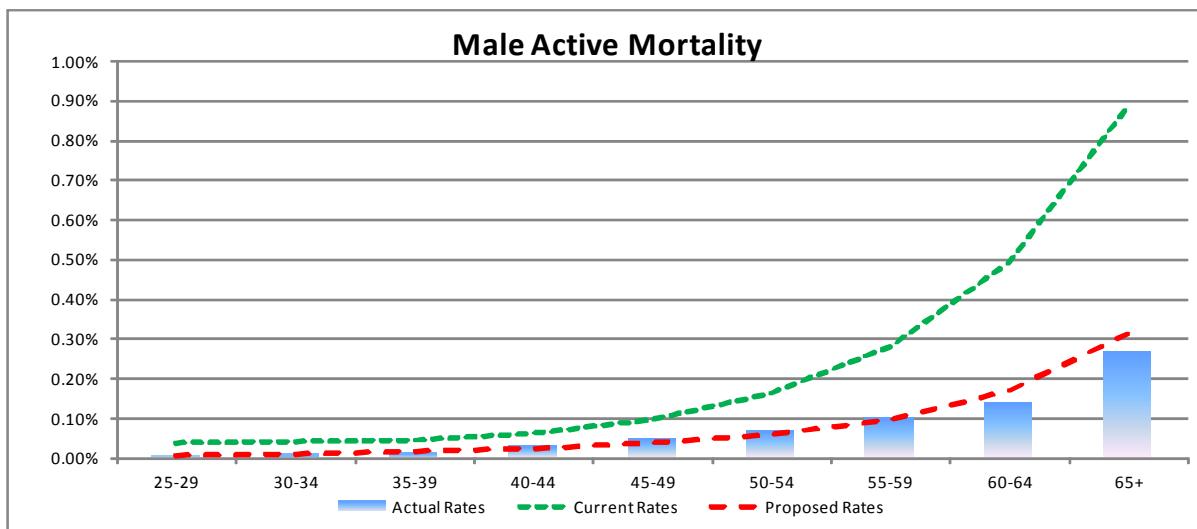
Active Member Mortality Findings and Recommendations

Experience indicates that overall fewer members have died than expected during the study period. We recommend updating the pre-retirement mortality assumption to 50% of the RP-2000 Combined Mortality Table projected to 2013 with the BB projection scale for males and 30% of the RP-2000 Combined Mortality Table projected to 2013 with the BB projection scale for females. The complete tables of recommended mortality rates are shown in Appendix D.



Section III: Demographic Assumptions

The charts below show (i) the actual rates of mortality for active members by age during the past five years, (ii) the current assume rates of active member mortality and (iii) the recommended assumed rates of active mortality.





Section III: Demographic Assumptions

Active Member Mortality Experience Under Proposed Assumptions

The actual expected ratio based on the recommended assumption are 94% compared to 74% for males and 97% compared to 79% for females respectively.

Age Group	Pre-Retirement Mortality					
	Males			Females		
	Actual	Proposed	Ratio Actual/Expected	Actual	Proposed	Ratio Actual/Expected
<20	0	0.28	0.00	0	0.01	0.00
20-24	6	2.95	2.03	0	0.47	0.00
25-29	8	4.83	1.66	1	1.68	0.60
30-34	10	8.39	1.19	3	3.65	0.82
35-39	19	19.84	0.96	6	7.65	0.78
40-44	19	22.92	0.83	16	14.24	1.12
45-49	41	32.60	1.26	31	25.21	1.23
50-54	41	46.03	0.89	44	38.07	1.16
55-59	74	70.31	1.05	51	49.98	1.02
60-64	52	81.87	0.64	42	51.86	0.81
65+	79	82.24	0.96	37	44.42	0.83
TOTAL	349	372.26	0.94	231	237.24	0.97



RATES OF SERVICE RETIREMENT

The service retirement rates used in the actuarial valuations project the percentage of employees who are expected to retire during a given year. This assumption does not include the retirement patterns of the individuals who terminated from active membership prior to their retirement. Retirements that occurred during the 2012/2013 plan year were not included in this analysis due to significant plan changes which were implemented under SB2 which may have caused members to retire when they otherwise would not have.

KERS Non-Hazardous Members

For members who began participation prior to September 1, 2008 KERS provides an unreduced retirement benefit upon obtaining age 65 and at least one month of service. KERS also provides a reduced benefit to members who retire upon obtaining age 55 and at least 60 months service or any age with 25 years of service. The normal retirement benefit is reduced by 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member is younger than age 65 or has less than 27 years of service, whichever is smaller.

For members who began participation on or after September 1, 2008 KERS provides an unreduced retirement benefit upon obtaining age 65 and at least 60 month of service or age 57 and “Rule of 87”. KERS also provides a reduced benefit to members who retire upon obtaining age 60 and at least 10 years service or any age with 25 years of service. The normal retirement benefit is reduced by 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member is younger than age 65 or does not meet the “Rule of 87” and is younger than age 57, whichever is smaller.

Due to lack of experience, the assumed rates of retirement are consistently applied for both the pre and post September 1, 2008 members. We recommend continuing to follow this approach until enough experience is developed for post September 1, 2008 members.

The analysis of the actual retirement experience over the five-year period yields an actual/expected ratio of 92%. An actual/expected ratio that is less than 100% indicates that less than the assumed amount of members have retired during the experience period.



Section III: Demographic Assumptions

KERS Non-Hazardous Service Retirement Experience Under Current Assumptions

The table below shows the retirement experience for KERS Non-Hazardous Members who retired during the experience period with less than 27 years of service. The fixed retirement age is 75. Therefore 100% of members are assumed to retire upon obtaining age 75.

Age	Retirement Experience KERS Non-Hazardous Members		
	Males and Females		
	Actual	Expected	Ratio Actual/Expected
55	336	308.88	1.09
56	268	290.16	0.92
57	303	278.40	1.09
58	287	260.64	1.10
59	306	246.80	1.24
60	340	286.10	1.19
61	390	522.00	0.75
62	434	490.95	0.88
63	312	380.48	0.82
64	277	297.23	0.93
65	332	257.85	1.29
66	187	177.75	1.05
67	137	127.12	1.08
68	98	98.55	0.99
69	71	75.60	0.94
70	61	62.10	0.98
71	56	46.35	1.21
72	35	38.25	0.92
73	33	32.62	1.01
74	26	26.77	0.97
75	81	422.00	0.19
TOTAL	4,370	4,726.60	0.92

KERS Non-Hazardous Service Retirement Findings and Recommendations

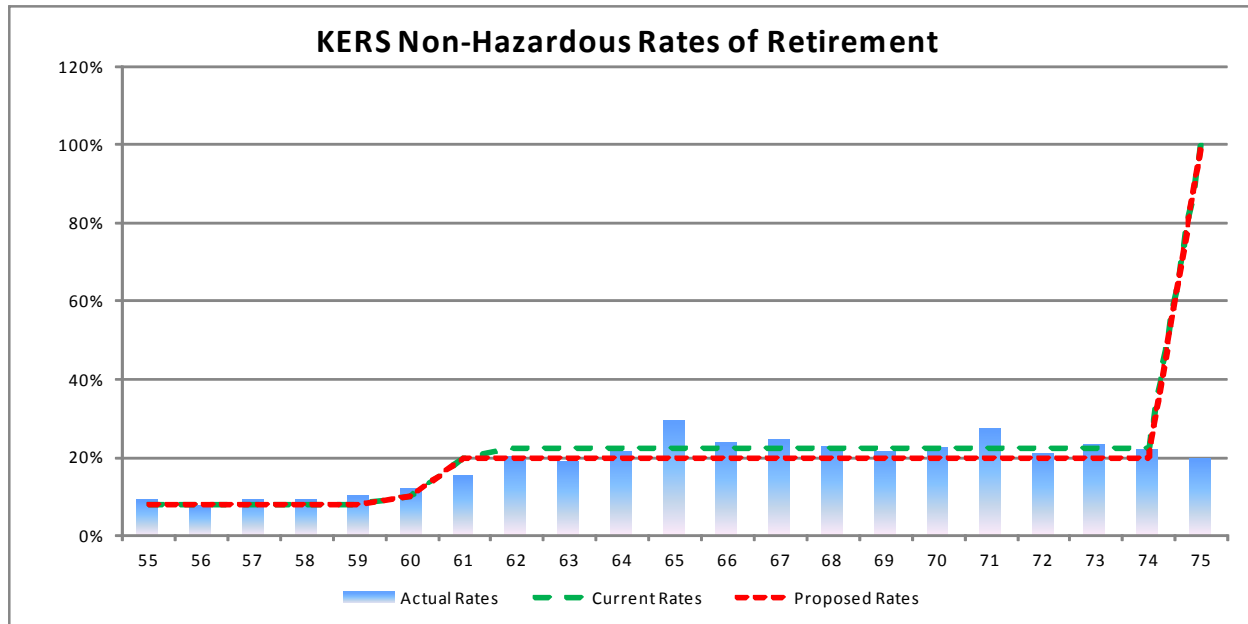
We recommend an adjustment in the retirement rates based on recent experience. The complete tables of recommended rates are shown in Appendix D.

In addition, the assumed retirement rate is 25% for members who have 27 or more years of service. The actual number of members who retired with at least 27 years during the experience period was 1,815. The expected number of retirees was 1,241.75. We recommend increasing the assumed rate of retirement with 27 or more years of service to 35% to more closely match actual experience.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of retirement for employees by age during the experience period, (ii) the current assume rates of retirement and (iii) the recommended assumed rates of retirement.





Section III: Demographic Assumptions

KERS Non-Hazardous Service Retirement Experience Under Proposed Assumptions

The actual/expected ratio under the proposed assumption is 97% compared to 92% under the current assumption.

Age	Retirement Experience KERS Non-Hazardous Members		
	Males and Females		
	Actual	Proposed	Ratio
Actual/Proposed			
55	336	308.88	1.09
56	268	290.16	0.92
57	303	278.40	1.09
58	287	260.64	1.10
59	306	246.80	1.24
60	340	286.10	1.19
61	390	522.00	0.75
62	434	436.40	0.99
63	312	338.20	0.92
64	277	264.20	1.05
65	332	229.20	1.45
66	187	158.00	1.18
67	137	113.00	1.21
68	98	87.60	1.12
69	71	67.20	1.06
70	61	55.20	1.11
71	56	41.20	1.36
72	35	34.00	1.03
73	33	29.00	1.14
74	26	23.80	1.09
75	81	422.00	0.19
TOTAL	4,370	4,491.98	0.97



KERS Hazardous Members

For members who began participation prior to September 1, 2008 KERS provides an unreduced retirement benefit upon obtaining age 55 and at least one month of service. KERS also provides a reduced benefit to members who retire upon obtaining age 50 and at least 15 years of service or any age with 20 years of service. The normal retirement benefit is reduced by 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member is younger than age 55 or has less than 20 years of service, whichever is smaller.

It is currently assumed these members will begin retiring upon the earlier of obtaining 20 years of service regardless of age or age 65.

For members who began participation on or after September 1, 2008 KERS provides an unreduced retirement benefit upon obtaining age 60 and at least 60 month of service. KERS also provides a reduced benefit to members who retire upon obtaining age 50 and at least 15 years service or any age with 25 years of service. The normal retirement benefit is reduced by 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member is younger than age 60 or has less than 25 years of service, whichever is smaller.

It is currently assumed that these members will begin retiring upon the earlier of obtaining age 60 and five years of service or 25 years of service regardless of age.

Due to lack of experience, the assumed rates of retirement are consistently applied for both the pre and post September 1, 2008 members. We recommend continuing to follow this approach until enough experience is developed for post September 1, 2008 members.



KERS Hazardous Service Retirement Experience Under Current Assumptions

The table below shows the retirement experience for KERS Hazardous Members who retired during the experience that were less than age 65 and obtained at least 20 years of service. The fixed retirement age is 65 therefore 100% of members are assumed to retire upon obtaining age 65.

Service	Retirement Experience KERS Hazardous Members		
	Males and Females		
	Actual	Expected	Ratio Actual/Expected
20	102	61.60	1.66
21	82	42.46	1.93
22	41	30.14	1.36
23	45	25.52	1.76
24	32	18.70	1.71
25	29	24.50	1.18
26	26	19.98	1.30
27	16	11.84	1.35
28	11	9.75	1.13
29	6	6.08	0.99
30	8	4.94	1.62
31	5	3.04	1.64
32	3	2.50	1.20
33	0	1.50	0.00
34	1	1.50	0.67
35 & Over	6	6.60	0.91
TOTAL	413	270.65	1.53

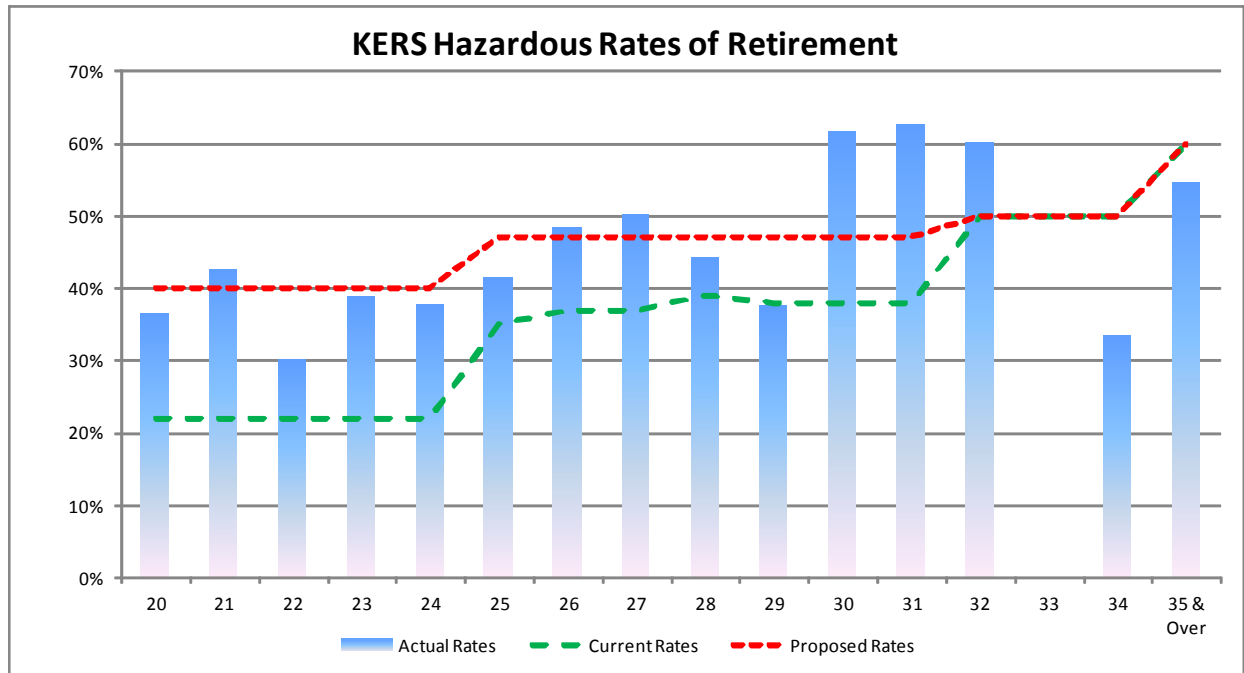
KERS Hazardous Service Retirement Findings and Recommendations

The analysis of the actual retirement experience yields an actual/expected ratio of 153%. An actual/expected ratio greater than 100% indicates that more than the assumed amounts of members have retired during the experience period. We recommend increasing the assumed rates of retirement to more accurately reflect actual experience. The complete tables of recommended rates are show in Appendix D.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of retirement for employees by service during the experience period, (ii) the current assume rates of retirement and (iii) the recommended assumed rates of retirement.





Section III: Demographic Assumptions

KERS Hazardous Service Retirement Experience Under Proposed Assumptions

The actual/expected ratio under the proposed assumption is 94% compared to 153% under the current assumption.

Service	Retirement Experience KERS Hazardous Members		
	Males and Females		
	Actual	Proposed	Ratio Actual/Proposed
20	102	112.00	0.91
21	82	77.20	1.06
22	41	54.80	0.75
23	45	46.40	0.97
24	32	34.00	0.94
25	29	32.90	0.88
26	26	25.38	1.02
27	16	15.04	1.06
28	11	11.75	0.94
29	6	7.52	0.80
30	8	6.11	1.31
31	5	3.76	1.33
32	3	2.50	1.20
33	0	1.50	0.00
34	1	1.50	0.67
35 & Over	6	6.60	0.91
TOTAL	413	438.96	0.94



CERS Non-Hazardous Members

For members who began participation prior to September 1, 2008 CERS provides an unreduced retirement benefit upon obtaining age 65 and at least one month of service. CERS also provides and reduced benefit to members who retire upon obtaining age 55 and at least 60 months service or any age with 25 years of service. The normal retirement benefit is reduced by 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member is younger than age 65 or has less than 27 years of service, whichever is smaller.

For members who began participation on or after September 1, 2008 CERS provides an unreduced retirement benefit upon obtaining age 65 and at least 60 month of service or age 57 and “Rule of 87”. CERS also provides and reduced benefit to members who retire upon obtaining age 60 and at least 10 years service or any age with 25 years of service. The normal retirement benefit is reduced by 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member is younger than age 65 or does not meet the “Rule of 87” and is younger than age 57, whichever is smaller.

Due to lack of experience, the assumed rates of retirement are consistently applied for both the pre and post September 1, 2008 members. We recommend continuing to follow this approach until enough experience is developed for post September 1, 2008 members.



CERS Non-Hazardous Service Retirement Experience Under Current Assumptions

The table below shows the retirement experience for CERS Non-Hazardous Members who retired during the experience period with less than 27 years of service. The fixed retirement age is 75. Therefore 100% of members are assumed to retire upon obtaining age 75.

Age	Retirement Experience CERS Non-Hazardous Members		
	Males and Females		
	Actual	Expected	Ratio Actual/Expected
55	541	755.92	0.72
56	530	719.68	0.74
57	529	679.68	0.78
58	522	637.76	0.82
59	563	603.68	0.93
60	657	700.90	0.94
61	821	1,275.60	0.64
62	920	1,195.04	0.77
63	606	957.44	0.63
64	636	792.88	0.80
65	827	789.80	1.05
66	593	614.02	0.97
67	416	503.36	0.83
68	369	431.86	0.85
69	313	352.88	0.89
70	285	297.00	0.96
71	243	237.16	1.02
72	199	190.52	1.04
73	148	155.32	0.95
74	119	128.26	0.93
75	464	1,852.00	0.25
TOTAL	9,371	11,544.66	0.81

CERS Non-Hazardous Service Retirement Findings and Recommendations

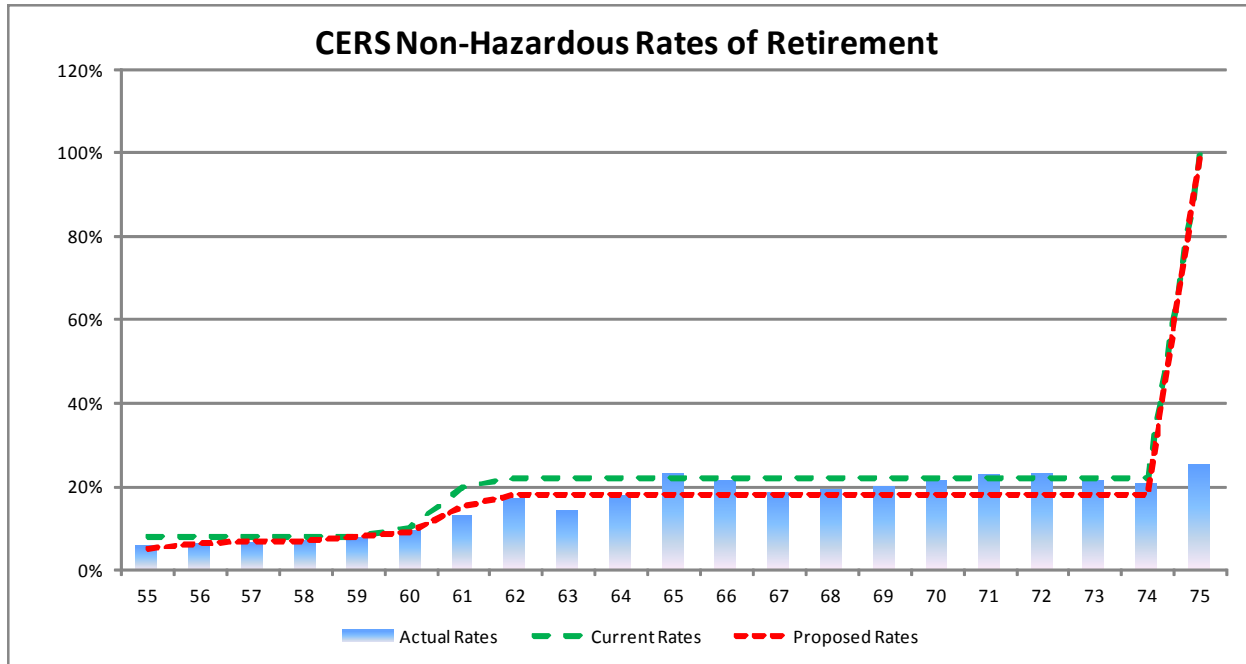
The analysis of the actual retirement experience yields an actual/expected ratio of 81%. An actual/expected ratio less than 100% indicates that fewer than the assumed amounts of members have retired during the experience period. As a result, we recommend adjusting the retirement rates to more accurately reflect experience.

In addition, we assume 30% for members who have 27 or more years of service will retire. The actual number of members who retired with at least 27 years during the experience period was 1,286. The expected number of retirees was 1,725. The current assumption for a retirement with 27 or more years of service is still sufficient; therefore we recommend no change to the assumed rate of retirement with 27 or more years of service at this time. The complete tables of recommended rates are show in Appendix D.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of retirement for employees by age during the experience period, (ii) the current assume rates of retirement and (iii) the recommended assumed rates of retirement.





Section III: Demographic Assumptions

CERS Non-Hazardous Service Retirement Experience Under Proposed Assumptions

The actual/expected ratio under the proposed assumption is 100% compared to 81% under the current assumption.

Age	Retirement Experience CERS Non-Hazardous Members		
	Males and Females		
	Actual	Proposed	Ratio Actual/Proposed
55	541	472.45	1.15
56	530	539.76	0.98
57	529	594.72	0.89
58	522	558.04	0.94
59	563	603.68	0.93
60	657	630.81	1.04
61	821	956.70	0.86
62	920	977.76	0.94
63	606	783.36	0.77
64	636	648.72	0.98
65	827	646.20	1.28
66	593	502.38	1.18
67	416	411.84	1.01
68	369	353.34	1.04
69	313	288.72	1.08
70	285	243.00	1.17
71	243	194.04	1.25
72	199	155.88	1.28
73	148	127.08	1.16
74	119	104.94	1.13
75	464	1,856.00	0.25
TOTAL	9,371	9,405.52	1.00



CERS Hazardous Members

For members who began participation prior to September 1, 2008 KERS provides an unreduced retirement benefit upon obtaining age 55 and at least one month of service. KERS also provides a reduced benefit to members who retire upon obtaining age 50 and at least 15 years of service or any age with 20 years of service. The normal retirement benefit is reduced by 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member is younger than age 55 or has less than 20 years of service, whichever is smaller.

It is currently assumed these members will begin retiring upon the earlier of obtaining 20 years of service regardless of age or age 62.

For members who began participation on or after September 1, 2008 KERS provides an unreduced retirement benefit upon obtaining age 60 and at least 60 month of service. KERS also provides a reduced benefit to members who retire upon obtaining age 50 and at least 15 years service or any age with 25 years of service. The normal retirement benefit is reduced by 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member is younger than age 60 or has less than 25 years of service, whichever is smaller.

It is currently assumed that these members will begin retiring upon the earlier of obtaining age 60 and five years of service or 25 years of service regardless of age.

Due to lack of experience, the assumed rates of retirement are consistently applied for both the pre and post September 1, 2008 members. We recommend continuing to follow this approach until enough experience is developed for post September 1, 2008 members.



CERS Hazardous Service Retirement Experience Under Current Assumptions

The table below shows the retirement experience for CERS Hazardous Members who retired during the experience period that were less than age 62 and obtained at least 20 years of service. The fixed retirement age is 62 therefore 100% of members are assumed to retire upon obtaining age 62.

Service	Retirement Experience CERS Hazardous Members Males and Females		
	Actual	Expected	Ratio
			Actual/Expected
20	179	160.40	1.12
21	143	136.00	1.05
22	113	116.00	0.97
23	111	100.60	1.10
24	120	130.20	0.92
25	96	99.99	0.96
26	68	67.98	1.00
27	41	45.21	0.91
28	32	37.05	0.86
29	28	19.47	1.44
30	11	12.54	0.88
31	8	10.23	0.78
32	10	13.50	0.74
33	7	7.60	0.92
34	3	5.60	0.54
35 & Over	3	6.00	0.50
TOTAL	973	968.37	1.00

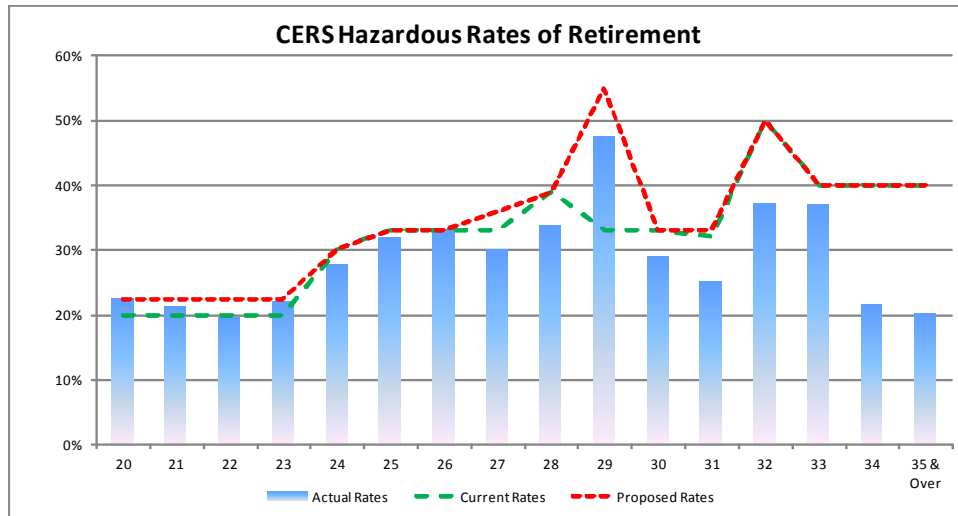
CERS Hazardous Service Retirement Findings and Recommendations

The analysis yields an actual/expected ratio of 100% for the experience period. An actual/expected ratio of 100% indicates that overall, the assumption has matched experience. We recommend a slight adjustment to the assumed retirement rates. The complete tables of recommended rates are show in Appendix D.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of retirement for employees by service during the experience period, (ii) the current assume rates of retirement and (iii) the recommended assumed rates of retirement.



CERS Hazardous Service Retirement Experience Under Proposed Assumptions

The actual/expected ratio under the proposed assumption is 93% compared to 100% under the current assumption.

Service	Retirement Experience CERS Hazardous Members Males and Females		
	Actual	Proposed	Ratio
			Actual/Proposed
20	179	180.45	0.99
21	143	153.00	0.93
22	113	130.50	0.87
23	111	113.18	0.98
24	120	130.20	0.92
25	96	99.99	0.96
26	68	67.98	1.00
27	41	49.32	0.83
28	32	37.05	0.86
29	28	32.45	0.86
30	11	12.54	0.88
31	8	10.56	0.76
32	10	13.50	0.74
33	7	7.60	0.92
34	3	5.60	0.54
35 & Over	3	6.00	0.50
TOTAL	973	1,049.92	0.93



SPRS Members

For members who began participation prior to September 1, 2008 SPRS provides an unreduced retirement benefit upon obtaining age 55 and at least one month of service. SPRS also provides a reduced benefit to members who retire upon obtaining age 50 and at least 15 years of service or any age with 20 years of service. The normal retirement benefit is reduced by 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member is younger than age 55 or has less than 20 years of service, whichever is smaller.

It is currently assumed these members will begin retiring upon the earlier of obtaining 20 years of service regardless of age or age 55.

For members who began participation on or after September 1, 2008 SPRS provides an unreduced retirement benefit upon obtaining age 60 and at least 60 month of service. SPRS also provides a reduced benefit to members who retire upon obtaining age 50 and at least 15 years service or any age with 25 years of service. The normal retirement benefit is reduced by 6.5% per year for the first five years and 4.5% per year for the next five years for each year the member is younger than age 60 or has less than 25 years of service, whichever is smaller.

It is currently assumed that these members will begin retiring upon the earlier of obtaining age 60 and five years of service or 25 years of service regardless of age.

Due to lack of experience, the assumed rates of retirement are consistently applied for both the pre and post September 1, 2008 members. We recommend continuing to follow this approach until enough experience is developed for post September 1, 2008 members.



SPRS Service Retirement Experience Under Current Assumptions

The table below shows the retirement experience for SPRS Members who retired during the experience period that were less than age 55 and obtained at least 20 years of service. The fixed retirement age is 55 therefore 100% of members are assumed to retire upon obtaining age 55.

The analysis of actual retirement experience over the experience period yields an actual/expected ratio 158%. An actual/expected ratio greater than 100% indicates that more than the assumed number of retirees has retired during the experience period.

Service	Retirement Experience SPRS Members Males and Females		
	Actual	Expected	Ratio
			Actual/Expected
20	22	9.54	2.31
21	22	9.00	2.44
22	16	8.80	1.82
23	20	16.50	1.21
24	13	12.76	1.02
25	18	11.66	1.54
26	11	8.80	1.25
27	9	7.00	1.29
28	11	7.00	1.57
29	9	5.25	1.71
30	7	3.25	2.15
31	7	3.33	2.10
32	1	1.00	1.00
33 & Over	5	4.33	1.15
TOTAL	171	108.22	1.58

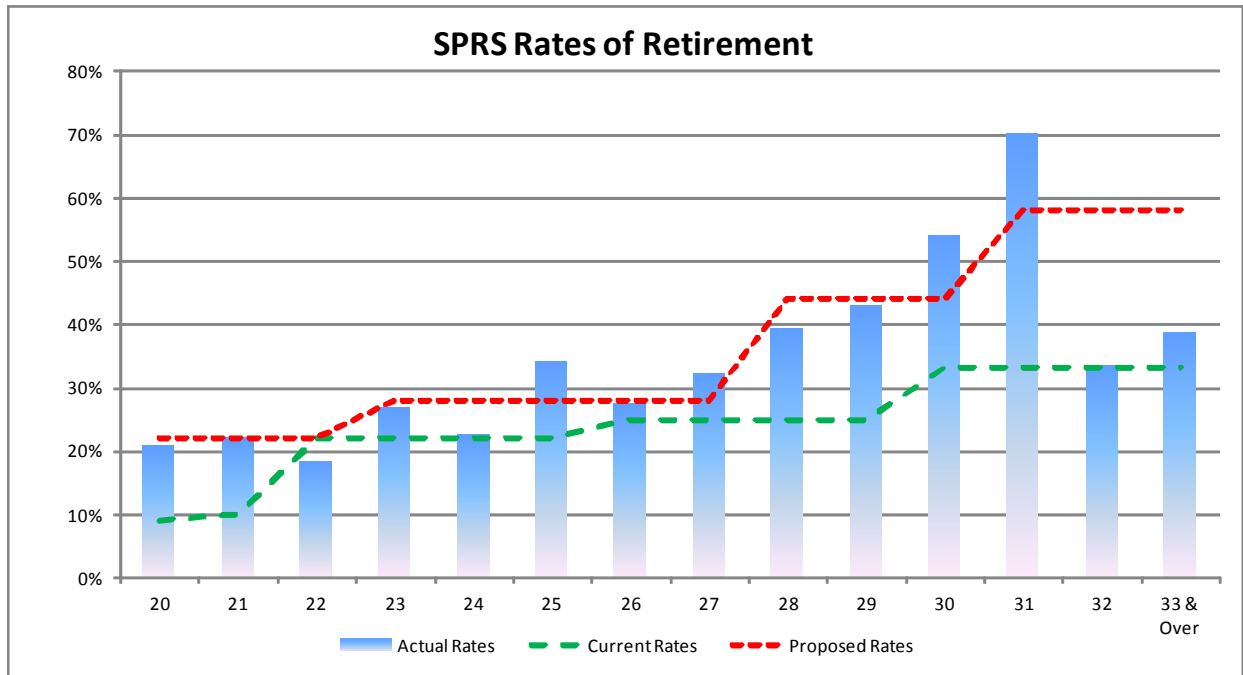
SPRS Service Retirement Findings and Recommendations

Overall, the assumption is underestimating retirements. As a result we recommend increasing retirement rates to more accurately match experience. The complete tables of recommended rates are show in Appendix D.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of retirement for employees by service during the past five years, (ii) the current assume rates of retirement and (iii) the recommended assumed rates of retirement.



SPRS Service Retirement Experience Under Proposed Assumptions

The actual/expected ratio based on the recommended assumption is 96% compared to 158% based on the current assumption.

Service	Retirement Experience SPRS Members Males and Females		
	Actual	Proposed	Ratio
			Actual/Proposed
20	22	23.32	0.94
21	22	22.00	1.00
22	16	19.36	0.83
23	20	21.00	0.95
24	13	16.24	0.80
25	18	14.84	1.21
26	11	11.20	0.98
27	9	7.84	1.15
28	11	12.32	0.89
29	9	9.24	0.97
30	7	5.72	1.22
31	7	5.80	1.21
32	1	1.74	0.57
33 & Over	5	7.54	0.66
TOTAL	171	178.16	0.96



RATES OF DISABILITY RETIREMENT

The rates of disability retirement used in the actuarial valuation project the percentage of employees who are expected to become disabled each year and begin to receive a disability retirement benefit. A non-hazardous and hazardous member must have at least 60 months of service to qualify for a disability retirement benefit.

KERS Non-Hazardous Members

KERS Non-Hazardous Disability Retirement Experience Under Current Assumptions

Age Group	Disability Experience KERS Non-Hazardous Members		
	Actual	Expected	Ratio
			Actual/Expected
Under 20	0	0.00	0.00
20 - 24	0	1.68	0.00
25 - 29	0	9.84	0.00
30 - 34	0	16.29	0.00
35 - 39	2	27.14	0.07
40 - 44	17	41.82	0.41
45 - 49	26	71.93	0.36
50 - 54	48	110.80	0.43
55 - 59	48	148.44	0.32
60 & Over	52	139.10	0.37
TOTAL	193	567.04	0.34

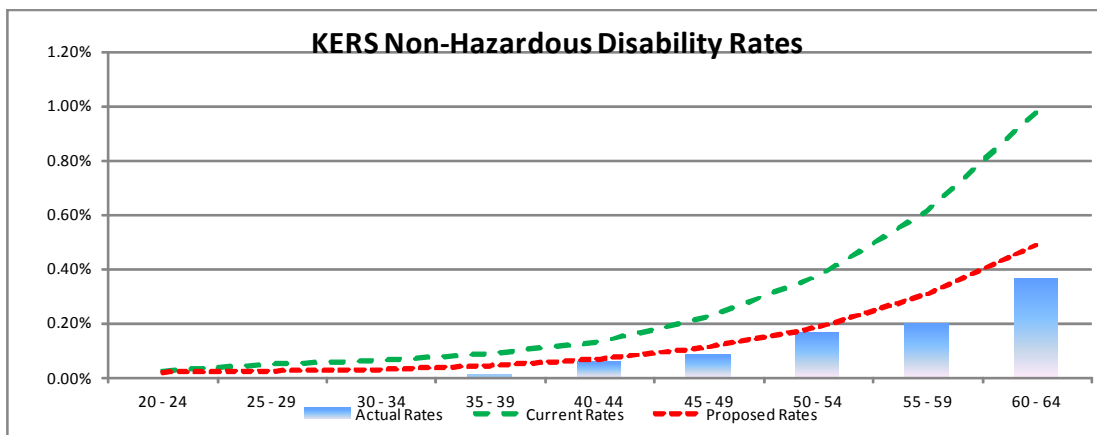
KERS Non-Hazardous Disability Retirement Findings and Recommendations

The analysis yields an actual/expected ratio of 34% over the experience period. A ratio of 34% indicates that the current assumption is overestimating the number of disability retirements. This finding is consistent with the last experience study in which we recommended reducing assumed rates of disability. As a result, we recommend reducing the incidences of disability retirements.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of disability for employees by age during the past five years, (ii) the current assume rates of disability and (iii) the recommended assumed rates of disability.



KERS Non-Hazardous Disability Retirement Experience Under Proposed Assumptions

The actual/expected ratio based on the recommended assumption is 68% compared to 34% based on the current assumption.

Age Group	Disability Experience KERS Non-Hazardous Members		
	Total		Ratio Actual/Expected
	Actual	Proposed	
Under 20	0	0.00	0.00
20 - 24	0	1.33	0.00
25 - 29	0	4.92	0.00
30 - 34	0	8.14	0.00
35 - 39	2	13.56	0.15
40 - 44	17	20.91	0.81
45 - 49	26	35.96	0.72
50 - 54	48	55.41	0.87
55 - 59	48	74.22	0.65
60 & Over	52	69.55	0.75
TOTAL	193	283.98	0.68



KERS Hazardous Members

KERS Hazardous Disability Retirement Experience Under Current Assumptions

Age Group	Disability Experience KERS Hazardous Members		
	Males		
	Actual	Expected	Ratio Actual/Expected
Under 20	0	0.00	0.00
20 - 24	0	0.47	0.00
25 - 29	0	1.74	0.00
30 - 34	1	2.39	0.42
35 - 39	3	4.05	0.74
40 - 44	2	5.61	0.36
45 - 49	1	7.68	0.13
50 - 54	2	11.99	0.17
55 - 59	2	16.13	0.12
60 & Over	0	15.21	0.00
TOTAL	11	65	0.17

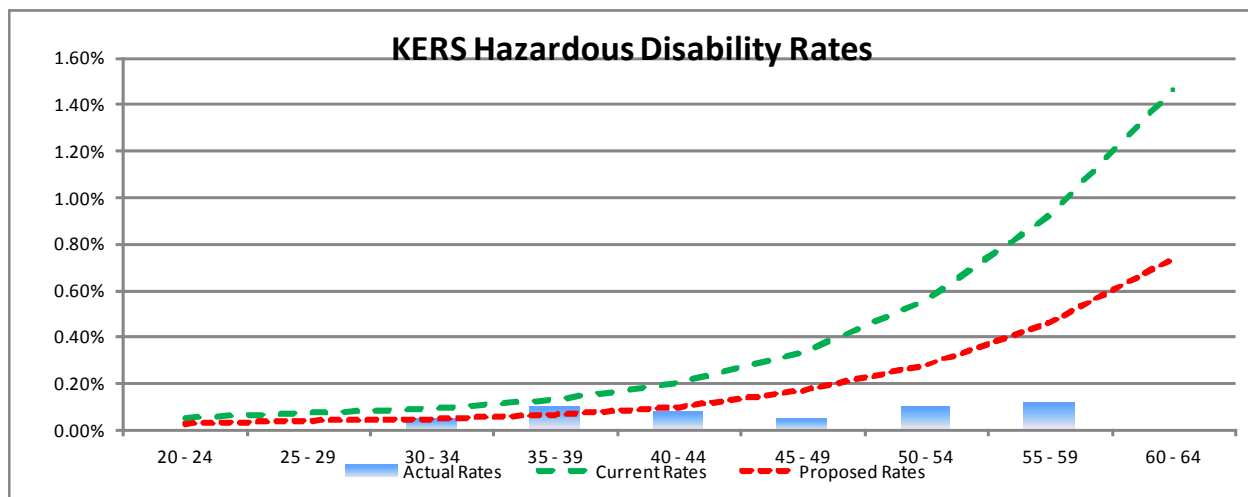
KERS Hazardous Disability Retirement Findings and Recommendations

The analysis yields an actual/expected ratio of 17% over the experience period. A ratio of 17% indicates that the current assumption is overestimating the number of disability retirements. This finding is consistent with the last experience study in which we recommended reducing assumed rates of disability. As a result, we recommend reducing the incidences of disability retirements.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of disability for employees by age during the past five years, (ii) the current assume rates of disability and (iii) the recommended assumed rates of disability.



KERS Hazardous Disability Retirement Experience Under Proposed Assumptions

The actual/expected ratio based on the recommended assumption is 31% compared to 17% based on the current assumption.

Age Group	Disability Experience KERS Hazardous Members		
	Total		
	Actual	Proposed	Ratio Actual/Expected
Under 20	0	0.00	0.00
20 - 24	0	0.23	0.00
25 - 29	0	0.87	0.00
30 - 34	0	1.20	0.00
35 - 39	1	2.03	0.49
40 - 44	3	2.81	1.07
45 - 49	2	3.84	0.52
50 - 54	4	5.99	0.67
55 - 59	0	8.07	0.00
60 & Over	0	7.60	0.00
TOTAL	10	32.64	0.31



CERS Non-Hazardous Members

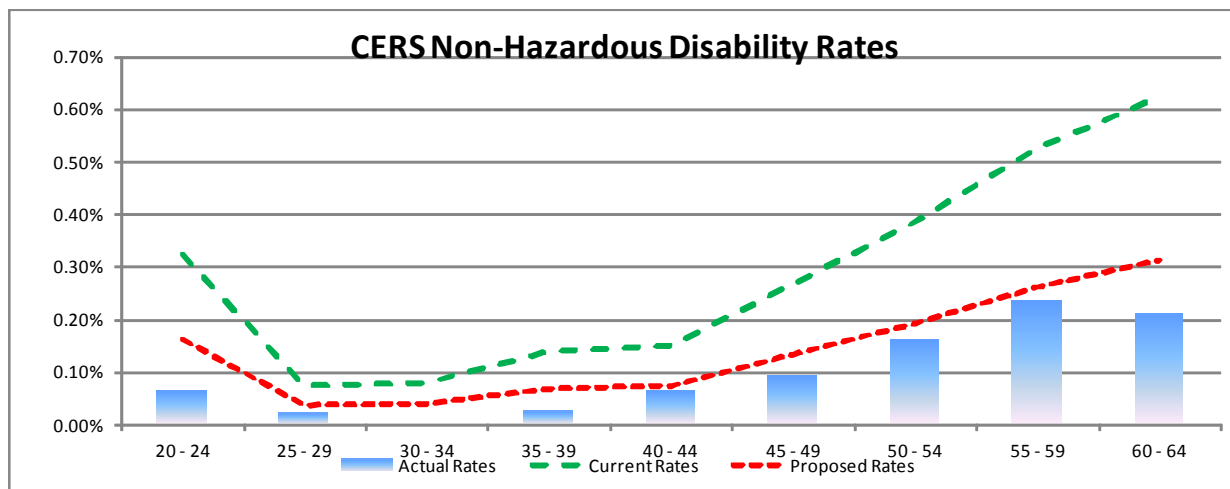
CERS Non-Hazardous Disability Retirement Experience Under Current Assumptions

Age Group	Disability Experience CERS Non-Hazardous Members		
	Total		Ratio Actual/Expected
	Actual	Expected	
Under 20	0	0.00	0.00
20 - 24	1	5.20	0.19
25 - 29	3	10.71	0.28
30 - 34	0	17.93	0.00
35 - 39	7	40.31	0.17
40 - 44	30	70.49	0.43
45 - 49	49	141.66	0.35
50 - 54	103	246.65	0.42
55 - 59	155	347.45	0.45
60 & Over	118	353.19	0.33
TOTAL	466	1,233.59	0.38

CERS Non-Hazardous Disability Retirement Findings and Recommendations

The analysis yields an actual/expected ratio of 38% over the experience period. A ratio of 38% indicates that the current assumption is overestimating the number of disability retirements. This finding is consistent with the last experience study in which we recommended reducing assumed rates of disability. As a result, we recommend reducing the incidences of disability retirements.

The chart below show (i) the actual rates of disability for employees by age during the past five years, (ii) the current assume rates of disability and (iii) the recommended assumed rates of disability.





Section III: Demographic Assumptions

CERS Non-Hazardous Disability Retirement Experience Under Proposed Assumptions

The actual/expected ratio based on the recommended assumption is 76% compared to 38% based on the current assumption.

Age Group	Disability Experience CERS Non-Hazardous Members		
	Total		
	Actual	Proposed	Ratio Actual/Expected
Under 20	0	0.00	0.00
20 - 24	1	2.60	0.39
25 - 29	3	5.35	0.56
30 - 34	0	8.97	0.00
35 - 39	7	20.15	0.35
40 - 44	30	35.24	0.85
45 - 49	49	70.82	0.69
50 - 54	103	123.33	0.84
55 - 59	155	173.71	0.89
60 & Over	118	176.59	0.67
TOTAL	466	616.76	0.76



Section III: Demographic Assumptions

CERS Hazardous Members

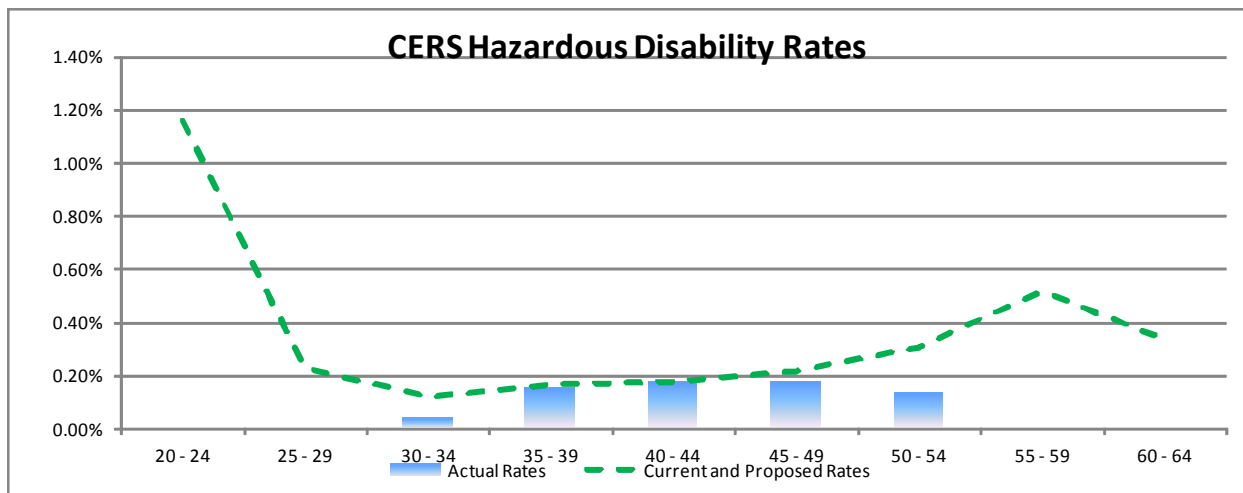
CERS Hazardous Disability Retirement Experience Under Current Assumptions

Age Group	Disability Experience CERS Hazardous Members		
	Total		
	Actual	Expected	Ratio Actual/Expected
Under 20	0	0.00	0.00
20 - 24	0	0.94	0.00
25 - 29	0	4.02	0.00
30 - 34	2	6.74	0.30
35 - 39	11	11.88	0.93
40 - 44	16	16.12	0.99
45 - 49	14	17.34	0.81
50 - 54	7	16.04	0.44
55 - 59	0	14.86	0.00
60 & Over	0	5.39	0.00
TOTAL	50	93.33	0.54

CERS Hazardous Disability Retirement Findings and Recommendations

The analysis yields an actual/expected ratio of 54% over the experience period. A ratio of 54% indicates that the overall current assumption is overestimating the number of disability retirements. However, the current assumed rates of disability were a good indication of actual disabilities for ages 35-50, but a poor indication elsewhere. This may be attributed to lack of significant exposures and we recommend no change to the assumption at this time. We will continue to monitor in the future.

The chart below show (i) the actual rates of disability for employees by age during the past five years, (ii) the current assume rates of disability.





Section III: Demographic Assumptions

SPRS Members

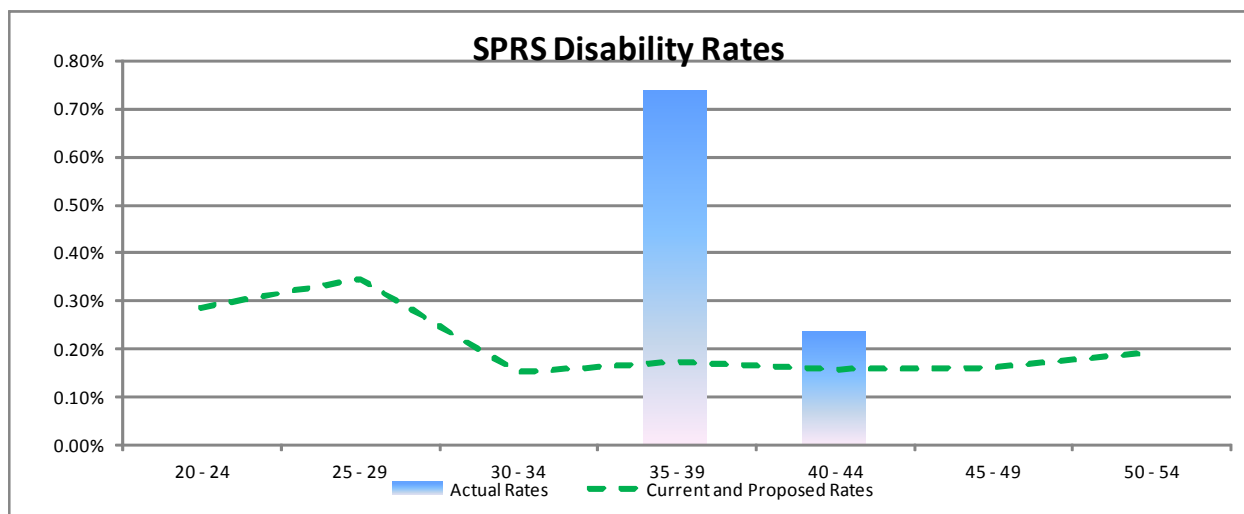
SPRS Disability Retirement Experience Under Current Assumptions

Age Group	Disability Experience SPRS Members		
	Total		
	Actual	Expected	Ratio Actual/Expected
Under 20	0	0.00	0.00
20 - 24	0	0.06	0.00
25 - 29	0	0.42	0.00
30 - 34	0	0.88	0.00
35 - 39	7	1.64	4.27
40 - 44	3	2.01	1.49
45 - 49	0	1.62	0.00
50 & Over	0	0.93	0.00
TOTAL	10	7.56	1.32

SPRS Disability Retirement Findings and Recommendations

The analysis yields an actual/expected ratio of 132% over the experience period. A ratio of 132% indicates that the current assumption is underestimating the number of disability retirements. Due to the relative small sample size of the data we are recommending no change in this assumption at this time.

The chart below show (i) the actual rates of disability for employees by age during the past five years, (ii) the current assume rates of disability.





Section III: Demographic Assumptions

RATES OF WITHDRAWAL

The rates of withdrawal are used to determine the expected number of separations from active service that will occur prior to attaining the eligibility requirement for a retirement benefit as a result of resignation or dismissal.

The current assumption utilizes a service based a approach for the first five years of service and then an age based approach for years of service beyond five years. Overall, termination is more correlated with service rather than age; therefore we are recommending changing from a select and ultimate age based approach to strictly a service based approach.

KERS Non-Hazardous Members

KERS Non-Hazardous Withdrawal Experience Under Current Assumptions

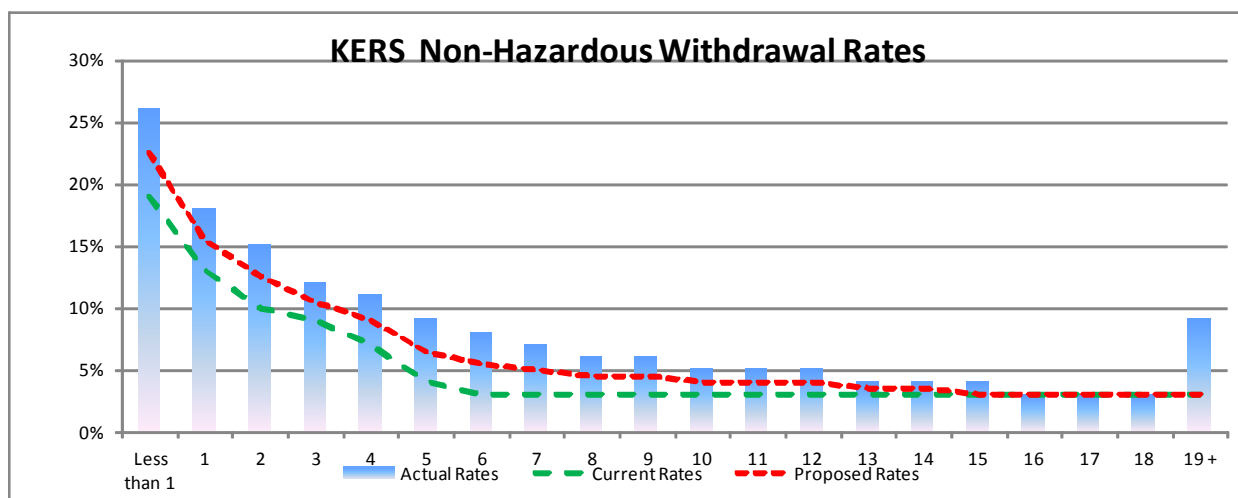
Year of Service	Withdrawal KERS Non-Hazardous Members		
	Males and Females Withdrawal Experience		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	4,708	3,505.31	1.34
1	3,165	2,295.54	1.38
2	2,296	1,572.90	1.46
3	1,702	1,304.64	1.30
4	1,403	836.03	1.68
5	903	356.33	2.53
6	757	313.27	2.42
7	576	293.89	1.96
8	462	275.56	1.68
9	454	263.02	1.73
10	393	241.12	1.63
11	352	214.01	1.64
12	288	182.05	1.58
13	192	159.42	1.20
14	176	143.24	1.23
15	152	122.79	1.24
16	111	103.74	1.07
17	99	103.07	0.96
18	101	92.50	1.09
19 +	1,580	552.38	2.86
TOTAL	19,870	12,930.81	1.54



KERS Non-Hazardous Withdrawal Findings and Recommendations

The analysis of the actual withdrawals from active service yielded an actual/expected ratio of 154%. A ratio greater than 100% indicates that there were more withdrawals than anticipated by the current assumption. The table above shows that the expected number of terminations was 12,930.81 compared to 19,870 actual terminations. The data reflects a general increase in the rates of withdrawal. As a result, we recommend adjusting the withdrawal rates to more closely reflect actual experience. The complete tables of recommended withdrawal rates are shown in Appendix D.

The chart below show (i) the actual rates of withdrawal for employees by service during the past five years, (ii) the current assume rates of withdrawal and (iii) the recommended assumed rates of withdrawal.





Section III: Demographic Assumptions

KERS Non-Hazardous Withdrawal Experience Under Proposed Assumptions

The actual/expected ratio based on the recommended assumption is 128% compared to 154% based on the current assumption.

Year of Service	Withdrawal KERS Non-Hazardous Members		
	Males and Females Withdrawal Experience		
	Actual	Proposed	Ratio Actual/Expected
Less Than 1	4,708	4,151.03	1.13
1	3,165	2,736.99	1.16
2	2,296	1,966.13	1.17
3	1,702	1,522.08	1.12
4	1,403	1,157.58	1.21
5	903	652.02	1.38
6	757	498.14	1.52
7	576	435.75	1.32
8	462	375.35	1.23
9	454	365.58	1.24
10	393	303.04	1.30
11	352	272.88	1.29
12	288	234.88	1.23
13	192	181.76	1.06
14	176	164.61	1.07
15	152	121.59	1.25
16	111	103.08	1.08
17	99	102.66	0.96
18	101	92.25	1.09
19+	1,580	552.12	2.86
TOTAL	19,870	15,989.49	1.24



KERS Hazardous Members

KERS Hazardous Withdrawal Experience Under Current Assumptions

Years of Service	Withdrawal KERS Hazardous Members		
	Males and Females Withdrawal Experience		
	Actual	Expected	Ratio
Actual/Expected			
Less Than 1	762	557.44	1.37
1	340	199.99	1.70
2	246	128.37	1.92
3	243	114.75	2.12
4	168	92.12	1.82
5	156	36.53	4.27
6	120	31.73	3.78
7	107	28.25	3.79
8	107	24.87	4.30
9	81	22.78	3.56
10	87	21.85	3.98
11	61	19.72	3.09
12	53	16.47	3.22
13	56	15.49	3.62
14	47	14.21	3.31
15	46	11.83	3.89
16	44	10.73	4.10
17 +	259	34.32	7.55
TOTAL	2,983	1,381.45	2.16

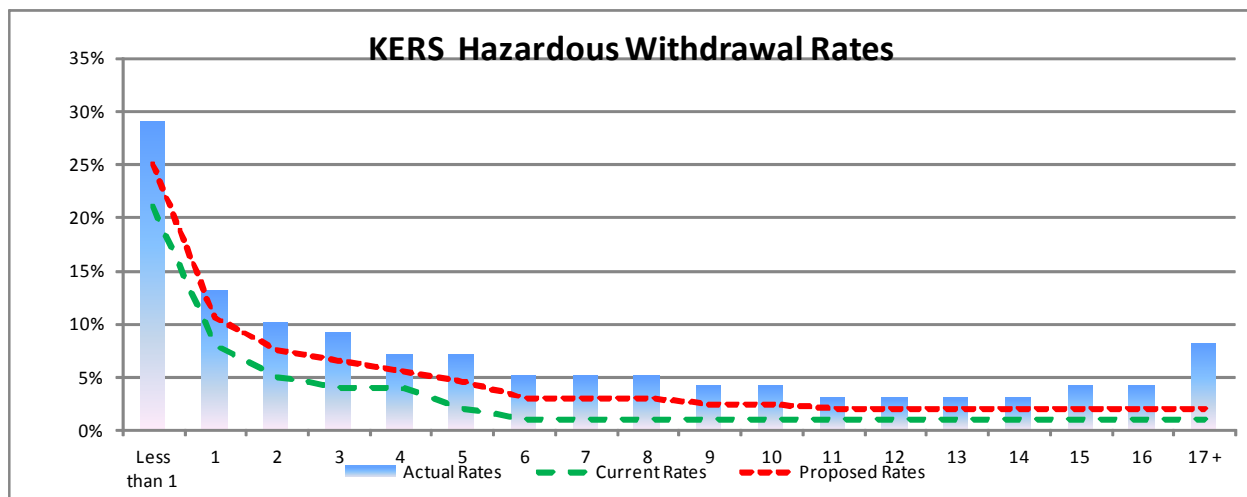
KERS Hazardous Withdrawal Findings and Recommendations

The analysis of the actual withdrawals from active service yielded an actual/expected ratio of 216%. A ratio greater than 100% indicates that there were more withdrawals than anticipated by the current assumption. The table above shows that the expected number of terminations was 1,281.45 compared to 2,983 actual terminations. The data reflects a general increase in the rates of withdrawal. As a result, we recommend adjusting the withdrawal rates to more closely reflect actual experience. The complete tables of recommended withdrawal rates are shown in Appendix D.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of withdrawal for employees by service during the past five years, (ii) the current assume rates of withdrawal and (iii) the recommended assumed rates of withdrawal.



KERS Hazardous Withdrawal Experience Under Proposed Assumptions

The actual/expected ratio based on the recommended assumption is 147% compared to 216% based on the current assumption.

Years of Service	Withdrawal KERS Hazardous Members		
	Males and Females Withdrawal Experience		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	762	655.75	1.16
1	340	270.27	1.26
2	246	186.30	1.32
3	243	168.35	1.44
4	168	139.43	1.20
5	156	106.16	1.47
6	120	66.39	1.81
7	107	64.02	1.67
8	107	62.28	1.72
9	81	52.68	1.54
10	87	51.10	1.70
11	61	39.08	1.56
12	53	36.06	1.47
13	56	32.60	1.72
14	47	29.72	1.58
15	46	25.92	1.77
16	44	23.52	1.87
17+	259	64.46	4.02
TOTAL	2,983	2,074.08	1.44



CERS Non-Hazardous Members

CERS Non-Hazardous Withdrawal Experience Under Current Assumptions

Year of Service	Withdrawal CERS Non-Hazardous Members		
	Males and Females Withdrawal Experience		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	11,586	9,431.50	1.23
1	6,126	4,663.82	1.31
2	3,803	2,804.70	1.36
3	2,849	2,038.88	1.40
4	2,172	1,503.64	1.44
5	1,313	664.36	1.98
6	1,004	592.56	1.69
7	888	548.92	1.62
8	730	526.91	1.39
9	655	498.67	1.31
10	584	457.04	1.28
11	500	407.72	1.23
12	382	355.50	1.07
13	327	299.75	1.09
14	216	256.83	0.84
15	182	214.88	0.85
16	162	181.49	0.89
17	121	152.38	0.79
18	112	128.38	0.87
19+	89	106.45	0.84
TOTAL	33,801	25,834.38	1.31

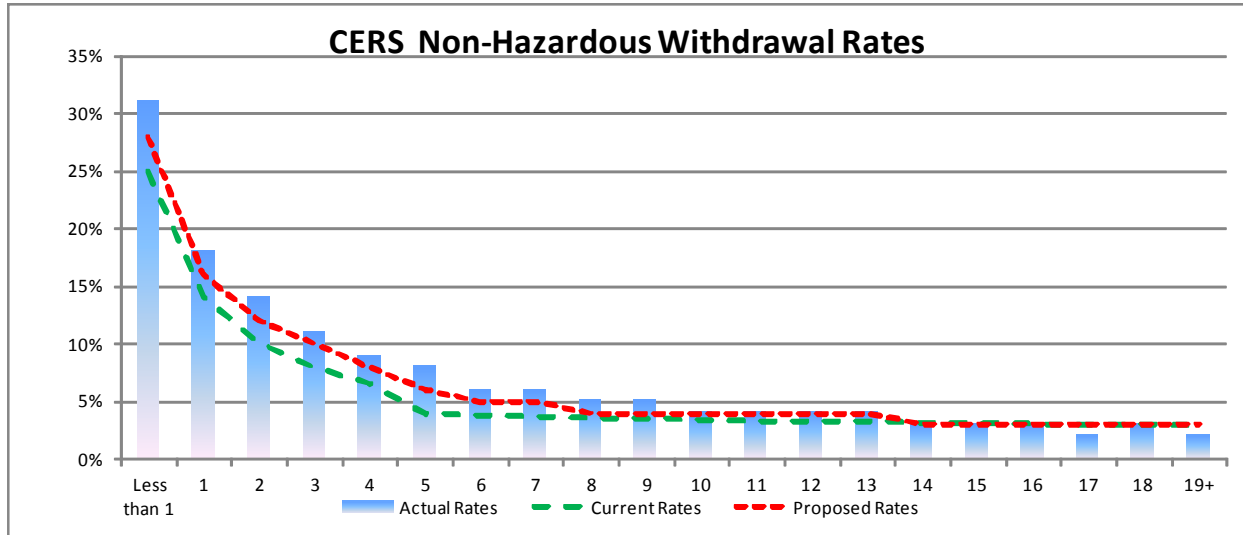
CERS Non-Hazardous Withdrawal Findings and Recommendations

The analysis of the actual withdrawals from active service yielded an actual/expected ratio of 131%. A ratio greater than 100% indicates that there were more withdrawals than anticipated by the current assumption. The table above shows that the expected number of terminations was 25,834.38 compared to 33,801 actual terminations. The data reflects a general increase in the rates of withdrawal. As a result, we recommend adjusting the withdrawal rates to more closely reflect actual experience. The complete tables of recommended withdrawal rates are shown in Appendix D.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of withdrawal for employees by service during the past five years, (ii) the current assume rates of withdrawal and (iii) the recommended assumed rates of withdrawal.



CERS Non-Hazardous Withdrawal Experience Under Proposed Assumptions

The actual/expected ratio based on the recommended assumption is 112% compared to 131% based on the current assumption.

Year of Service	Withdrawal CERS Non-Hazardous Members		
	Males and Females Withdrawal Experience		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	11,586	10,565.24	1.10
1	6,126	5,330.24	1.15
2	3,803	3,365.64	1.13
3	2,849	2,548.60	1.12
4	2,172	1,850.64	1.17
5	1,313	1,026.48	1.28
6	1,004	778.65	1.29
7	888	744.40	1.19
8	730	587.84	1.24
9	655	569.52	1.15
10	584	532.80	1.10
11	500	486.36	1.03
12	382	431.88	0.88
13	327	371.48	0.88
14	216	243.06	0.89
15	182	207.33	0.88
16	162	178.38	0.91
17	121	152.01	0.80
18	112	129.12	0.87
19 +	89	108.03	0.82
TOTAL	33,801	30,207.70	1.12



CERS Hazardous Members

CERS Hazardous Withdrawal Experience Under Current Assumptions

Years of Service	Withdrawal CERS Hazardous Members		
	Males and Females Withdrawal Experience		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	697	367.22	1.90
1	469	193.05	2.43
2	367	149.04	2.46
3	337	116.55	2.89
4	294	101.40	2.90
5	268	55.08	4.87
6	259	50.94	5.08
7	207	49.16	4.21
8	206	48.10	4.28
9	201	48.80	4.12
10	206	47.57	4.33
11	185	45.57	4.06
12	185	41.93	4.41
13	164	37.65	4.36
14	156	33.77	4.62
15	126	28.92	4.36
16	125	25.50	4.90
17	112	22.87	4.90
18 +	132	21.80	6.06
TOTAL	4,696	1,484.92	3.16

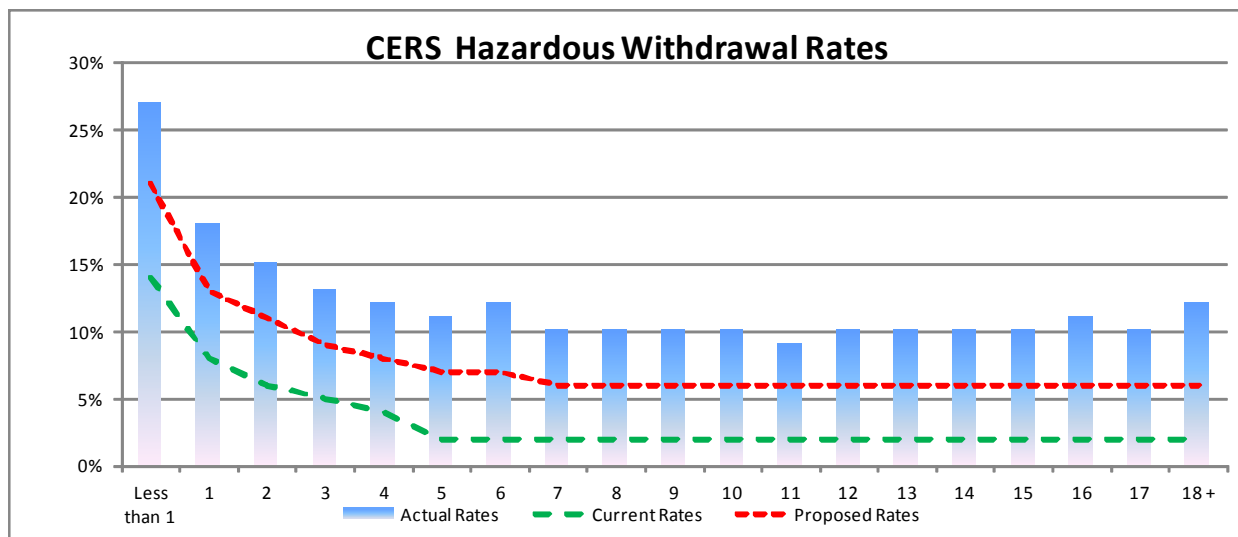
CERS Hazardous Withdrawal Findings and Recommendations

The analysis of the actual withdrawals from active service yielded an actual/expected ratio of 316%. A ratio greater than 100% indicates that there were more withdrawals than anticipated by the current assumption. The table above shows that the expected number of terminations was 1,484.92 compared to 4,696 actual terminations. The data reflects a general increase in the rates of withdrawal. As a result, we recommend adjusting the withdrawal rates to more closely reflect actual experience. The complete tables of recommended withdrawal rates are shown in Appendix D.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of withdrawal for employees by service during the past five years, (ii) the current assume rates of withdrawal and (iii) the recommended assumed rates of withdrawal.



CERS Hazardous Withdrawal Experience Under Proposed Assumptions

The actual/expected ratio based on the recommended assumption is 153% compared to 316% based on the current assumption.

Years of Service	Withdrawal CERS Hazardous Members		
	Males and Females Withdrawal Experience		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	697	550.83	1.27
1	469	334.62	1.40
2	367	273.24	1.34
3	337	233.10	1.45
4	294	202.80	1.45
5	268	165.13	1.62
6	259	154.91	1.67
7	207	128.04	1.62
8	206	124.56	1.65
9	201	126.42	1.59
10	206	122.64	1.68
11	185	117.24	1.58
12	185	108.18	1.71
13	164	97.80	1.68
14	156	89.16	1.75
15	126	77.76	1.62
16	125	70.56	1.77
17	112	65.58	1.71
18+	132	64.02	2.06
TOTAL	4,696	3,106.59	1.51



SPRS Members

SPRS Withdrawal Experience Under Current Assumptions

Year of Service	Withdrawal SPRS Members		
	Males and Females Withdrawal Experience		
	Actual	Expected	Ratio
Actual/Expected			
Less Than 1	85	47.80	1.78
1	14	12.67	1.10
2	10	3.99	2.51
3	4	4.89	0.82
4	9	5.76	1.56
5	5	4.97	1.01
6	10	5.57	1.80
7	3	6.15	0.49
8	7	5.75	1.22
9	4	5.87	0.68
10	5	5.87	0.85
11	6	5.45	1.10
12	2	5.52	0.36
13	3	5.95	0.50
14	3	6.15	0.49
15 +	2	5.32	0.38
TOTAL	172	137.68	1.25

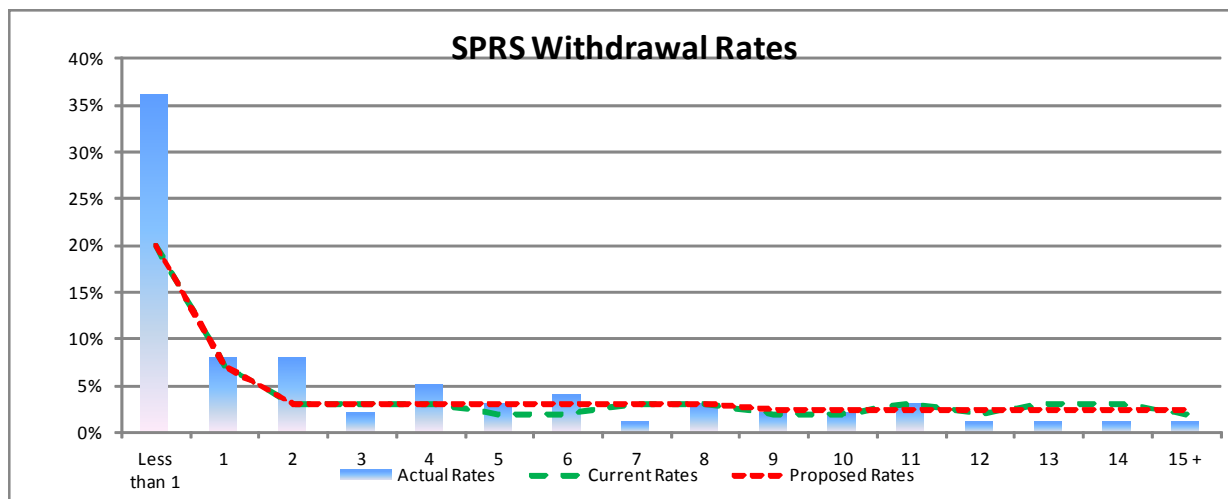
SPRS Withdrawal Findings and Recommendations

The analysis of the actual withdrawals from active service yielded an actual/expected ratio of 125%. A ratio greater than 100% indicates that there were more withdrawals than anticipated by the current assumption. The table above shows that the expected number of terminations was 137.68 compared to 172 actual terminations. The data reflects a general increase in the rates of withdrawal. The assumption is currently sufficient but, we recommend a slight adjustment to the withdrawal rates to smooth out the rate changes from one year of service to the next. The complete tables of recommended withdrawal rates are shown in Appendix D.



Section III: Demographic Assumptions

The chart below show (i) the actual rates of termination for employees by service during the past five years, (ii) the current assume rates of retirement and (iii) the recommended assumed rates of withdrawal.



SPRS Withdrawal Experience Under Proposed Assumptions

The actual/expected ratio based on the recommended assumption is 122% compared to 125% based on the current assumption.

Year of Service	Withdrawal SPRS Members		
	Males and Females Withdrawal Experience		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	85	47.80	1.78
1	14	11.83	1.18
2	10	3.99	2.51
3	4	4.89	0.82
4	9	5.76	1.56
5	5	5.97	0.84
6	10	6.69	1.49
7	3	7.38	0.41
8	7	6.90	1.01
9	4	5.88	0.68
10	5	5.88	0.85
11	6	5.45	1.10
12	2	5.53	0.36
13	3	5.95	0.50
14	3	6.15	0.49
15	2	5.33	0.38
TOTAL	172	141.36	1.22



RATES OF SALARY INCREASE

Under the “building block” approach recommended in ASOP 27, this assumption is composed of three components; inflation, productivity (real wage increases), and merit/promotion. The inflation and productivity components are combined to produce the assumed rates of wage inflation. The rate represents the “across the board” average annual increase in salaries shown in the experience data. The merit component includes the additional increases in salary due to performance, seniority, promotions, etc.

The past five years salary experience has been influenced by a number of factors. With pressures on state and local budgets, employers responded with strategies such as pay freezes or cuts and furloughs. In general, salary increases were less than anticipated for all five systems of KRS. However, in light of the broader issues affecting pay during this period, we are not comfortable making any adjustments to the merit component of the salary scales at this time.

KERS Non-Hazardous Members

The analysis salary increases yielded an actual/expected ratio of 97%. A ratio less than 100% indicates that salary increases in general were less than anticipated by the current assumption. Due to the low inflation environment coupled with budgetary issues that faced state and local government during the experience period, we recommend no change to the salary scale other than the reduction due to the lowering of the wage base component of the total salary increase assumption from 4.50% to 4.00%.

KERS Non-Hazardous Salary Experience Under Current Assumptions

Years of Service	Salaries at End of Year (\$1,000)		
	KERS Non-Hazardous Members		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	220,811	217,487	1.015
1	507,093	520,958	0.973
2	484,743	498,032	0.973
3	482,475	498,747	0.967
4	444,984	459,748	0.968
5	423,318	440,350	0.961
6	391,379	403,277	0.970
7	388,915	402,451	0.966
8	377,814	391,740	0.964
9	387,872	400,573	0.968
10+	3,734,383	3,866,063	0.966
TOTAL	7,843,787	8,099,426	0.970



Section III: Demographic Assumptions

KERS Hazardous Members

The analysis salary increases yielded an actual/expected ratio of 97%. A ratio less than 100% indicates that salary increases in general were less than anticipated by the current assumption. Due to the low inflation environment coupled with budgetary issues that faced state and local government during the experience period, we recommend no change to the salary scale other than the reduction due to the lowering of the wage base component of the total salary increase assumption from 4.50% to 4.00%.

KERS Hazardous Salary Experience Under Current Assumptions

Years of Service	Salaries at End of Year (\$1,000)		
	KERS Hazardous Members		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	24,327,498	23,916,079	1.017
1	49,144,588	50,736,156	0.969
2	43,931,350	46,267,435	0.950
3	43,740,913	46,013,576	0.951
4	39,924,315	41,644,587	0.959
5	36,047,495	37,314,158	0.966
6	32,383,428	33,346,916	0.971
7	28,975,931	30,009,393	0.966
8	25,075,203	25,901,758	0.968
9	24,122,963	24,857,151	0.970
10 +	189,129,979	195,618,216	0.967
TOTAL	536,803,663	555,625,425	0.970



Section III: Demographic Assumptions

CERS Non-Hazardous Members

The analysis salary increases yielded an actual/expected ratio of 98%. A ratio less than 100% indicates that salary increases in general were less than anticipated by the current assumption. Due to the low inflation environment coupled with budgetary issues that faced state and local government during the experience period, we recommend no change to the salary scale other than the reduction due to the lowering of the wage base component of the total salary increase assumption from 4.50% to 4.00%.

CERS Non-Hazardous Salary Experience Under Current Assumptions

Years of Service	Salaries at End of Year (\$1,000)		
	CERS Non-Hazardous Members		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	280,969	278,431	1.009
1	677,525	686,657	0.987
2	608,448	616,362	0.987
3	585,439	597,261	0.980
4	567,095	578,297	0.981
5	546,942	558,511	0.979
6	508,605	519,133	0.980
7	501,666	513,892	0.976
8	500,822	510,180	0.982
9	512,554	523,913	0.978
10 +	4,888,685	5,005,575	0.977
TOTAL	10,178,750	10,388,212	0.980



Section III: Demographic Assumptions

CERS Hazardous Members

The analysis salary increases yielded an actual/expected ratio of 99%. A ratio less than 100% indicates that salary increases in general were less than anticipated by the current assumption. Due to the low inflation environment coupled with budgetary issues that faced state and local government during the experience period, we recommend no change to the salary scale other than the reduction due to the lowering of the wage base component of the total salary increase assumption from 4.50% to 4.00%.

CERS Hazardous Salary Experience Under Current Assumptions

Years of Service	Salaries at End of Year (\$1,000)		
	CERS Hazardous Members		
	Actual	Expected	Ratio Actual/Expected
Less Than 1	49,744	46,339	1.073
1	90,936	90,275	1.007
2	93,672	94,765	0.988
3	101,256	103,644	0.977
4	103,730	105,662	0.982
5	102,859	104,322	0.986
6	103,226	104,688	0.986
7	102,483	103,979	0.986
8	100,254	101,982	0.983
9	104,048	105,508	0.986
10 +	921,541	940,292	0.980
TOTAL	1,873,749	1,901,456	0.990



Section III: Demographic Assumptions

SPRS Members

The analysis salary increases yielded an actual/expected ratio of 97%. A ratio less than 100% indicates that salary increases in general were less than anticipated by the current assumption. Due to the low inflation environment coupled with budgetary issues that faced state and local government during the experience period, we recommend no change to the salary scale other than the reduction due to the lowering of the wage base component of the total salary increase assumption from 4.50% to 4.00%.

SPRS Salary Experience Under Current Assumptions

Years of Service	Salaries at End of Year (\$1,000)		
	SPRS Members		Ratio
	Actual	Expected	Actual/Expected
Less Than 1	17,063,770	16,133,131	1.058
1	6,594,847	7,100,888	0.929
2	7,551,599	8,148,488	0.927
3	9,676,895	10,087,965	0.959
4	11,865,184	12,808,210	0.926
5	12,325,077	12,910,193	0.955
6	14,560,436	15,121,338	0.963
7	13,799,952	14,377,172	0.960
8	12,187,167	12,704,431	0.959
9	12,726,883	13,059,869	0.975
10 +	113,923,894	117,210,234	0.972
TOTAL	232,275,704	239,661,919	0.970



MISCELLANEOUS ASSUMPTIONS

Percent Married: Currently 100% of members are assumed to be married with the husband three years older than the wife. This is a common and reasonable assumption and we recommend maintaining this assumption.



OTHER POST-EMPLOYMENT BENEFIT ASSUMPTIONS

I. Economic Assumptions

In addition to the three economic assumptions used in all of the actuarial valuations performed for KRS, the Health Care Cost Trend Rates reflect the change in per capita health claims rates over time due to the following factors:

- medical inflation
- utilization
- plan design
- technology improvements

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, “*Measuring Retiree Group Benefit Obligations*”, which provides guidance to actuaries in selecting economic assumptions for measuring obligations of postretirement plans other than pensions. The actuary should not consider aging of the covered population when selecting the trend assumption for projecting future costs, but should consider the following key components in setting the health care cost trend rate as noted in ASOP No. 6:

- inflation
- medical inflation
- definition of covered charges
- frequency of services
- leveraging caused by plan design features not explicitly modeled
- plan participation

When setting assumptions for projecting medical and prescription drug costs, Cavanaugh Macdonald Consulting, LLC (CMC) assumes the health benefit plan cost trend rates will decrease from an initial rate to an ultimate level. CMC’s methodology for setting the initial trend rate includes the use of published annual health care inflation surveys in conjunction with actual plan experience, where credible. The initial trend rate assumption is subject to continued update and review with each valuation performed given the volatile nature of medical and prescription drug costs. There are various approaches used to determine the timing and level of decreases to the ultimate trend rate (e.g., multi-year grading period, SOA-Getzen Model). The assumed decrease in medical and prescription drug trend rates reflects the belief that health care inflation cannot indefinitely outstrip the growth rate of employer budgets and the overall economy. As a standard of practice, CMC typically assumes a grading period of five to ten years, depending on the level of change (i.e., larger differences between the initial trend rate and the ultimate trend rate are assumed to require a longer reduction period). For the ultimate trend rate assumption, Medicare expenditures increasing at the rate of long-term per capita GDP



Section III: Demographic Assumptions

growth + 1.0% was felt to be reasonable by a 2004 Medicare Trustees Technical Review Panel, and is widely used. As a standard of practice, CMC believes the use of a “GDP+1%” to “GDP+2%” assumption is reasonable and CMC typically assumes an ultimate trend rate of 5.0%. As with any standard of practice, the specifics of each plan are reviewed to ensure there is nothing unusual that would necessitate a long-term trend rate that is either higher or lower than what is typical. It appears to be reasonable to use an ultimate rate of 5.0%, as there appears to be nothing unusual about KRS’ medical plans that would necessitate a long-term trend that is either higher or lower than what is typically used for this type of calculation.

Background: In our opinion, the economic assumptions recommended in this report have been developed in accordance with ASOP No. 6. Currently, the short term healthcare trend rates are set on an annual basis based on the information and data as previously described, with an ultimate trend rate of 5.0% that is reached after an appropriate grading period.

System Wide Recommendation: Continue to update the healthcare trends annually and base the healthcare trends on KRS’ experience and demographics while taking into account the projected trend from external sources.

II. Morbidity Assumptions

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, “Measuring Retiree Group Benefit Obligations”, which provides guidance to actuaries when developing benefit cost projection assumptions for measuring obligations of postretirement plans other than pensions. As noted in ASOP No. 6, the actuary should consider the variation in rates by age for the benefits being modeled and use appropriate age bands if the rates vary significantly. The age bands should not be overly broad, based on the expected rate variations within the bands. It is inappropriate to assume a single per capita rate that does not vary by age, if the rates vary significantly by age. The relationship between the rates at various ages is an actuarial assumption that may be based on normative databases.

CMC assumes, in the absence of credible KRS plan experience, the projected, non-community-rated medical and prescription drug costs of the Plan vary significantly by age from the average cost at the central age of the applicable group based upon the paper “Aging Curves for Health Care Costs in Retirements”, The North American Actuarial Journal, July 2005, Jeffrey P. Petertil. The publication’s “Representative Curve for General Use” is used for ages 65 and older. CMC continuously monitors all available data, publications, and research projects undertaken by actuarial organizations regarding age-related morbidity (e.g., “Health Care Costs—From Birth to Death”, Health Care Cost Institute’s Independent Report Series – Report



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2013-1, June 2013, Dale H. Yamamoto) and see no indication of the factors no longer being appropriate.

Background: Currently, the morbidity assumptions are used to adjust Medicare claims costs based on the benefit recipient’s age. For pre-Medicare retiree claims costs, the current premium charged by the Kentucky Employees’ Health Plan (KEHP) is used as the base cost and is projected forward using the healthcare trend assumption. No implicit rate subsidy is calculated or recognized as the subsidy is the responsibility of KEHP. The Medicare claims cost age adjustment assumptions are as follows.

Participant Age	Annual Increase
65-69	3.0%
70-74	2.5%
75-79	2.0%
80-84	1.0%
85-89	0.5%
90 and over	0.0%

System Wide Recommendation: Continue with the current assumption while continuing to follow up on research regarding morbidity from external sources.

III. Coverage Assumptions

The Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 6, “Measuring Retiree Group Benefit Obligations”, which provides guidance to actuaries in selecting coverage assumptions for measuring obligations of postretirement plans other than pensions. The “Coverage Assumptions” section includes the key components the actuary should consider in setting the coverage assumptions per ASOP No. 6:

- Choice of Coverage
- Plan Participation
- Spouse/Dependent Coverage Eligibility
- Spouse/Dependent Age Differences

A. KRS Plan Elections for Future Post-65 Retirees

Background: Beyond participation in the plan, KRS offers members a choice in coverage. As the costs vary by coverage option, the level of participation in each coverage option is considered by CMC based upon historic participation rates, how plan eligibility rules, plan choices, and



Section III: Demographic Assumptions

retiree contribution rates have changed over time or are assumed to change in the future. The coverage choice assumptions are subject to continued update and review with each valuation performed.

Non-Hazardous Plans					
Plan Elections of Covered Members Age 65 and Older					
Year Ending June 30	2009	2010	2011	2012	2013
Medical Only	14%	13%	13%	12%	10%
Essential (Plus) Plan	8%	8%	6%	7%	7%
Premium Plan	78%	79%	81%	81%	83%

Non-Hazardous Plans Recommendation: Based upon recent experience, plan election rates have remained relatively steady over time and plan benefits and rules regarding coverage are not anticipated to change. As a result, we propose to continue to assume that the distribution of plan elections observed on the valuation date will remain steady.

Hazardous Plans					
Plan Elections of Covered Members Age 65 and Older					
Year Ending June 30	2009	2010	2011	2012	2013
Medical Only	7%	7%	5%	5%	5%
Essential (Plus) Plan	5%	5%	4%	4%	4%
Premium Plan	88%	88%	91%	91%	91%

Hazardous Plans Recommendation: Based upon recent experience, plan election rates have remained relatively steady over time and plan benefits and rules regarding coverage are not anticipated to change. As a result, we propose to continue to assume that the distribution of plan elections observed on the valuation date will remain steady.

B. Retirement Health Care Participation Rates

Background: KRS requires individuals to contribute toward the cost of health care to maintain coverage based on service at retirement, Medicare eligibility and the coverage tier elected. Some eligible individuals may not elect to be covered, especially if they have coverage available through a spouse or previous employer. The rates of participation are based on experiential data, where available and credible. These rates are considered when selecting the participation assumption for future retirees, as well as the plan eligibility rules, plan choices and the change in retiree contribution rates over time.



Section III: Demographic Assumptions

Since plan participation may vary in the future due to anticipated retiree contribution levels and plan choices, the appropriateness of participation rates for both current and future retirees need to be considered. The availability to opt in and out of the plan at the time of open enrollment also needs to be considered.

Participation rates vary based on the level of benefit the member may receive, thus the participation rates vary based on the three membership tiers:

Tier 1: Members that began Participating Before September 1, 2008. This includes two sub-tiers; members that began participating prior to July 1, 2003, and members with a participation date between July 1, 2003 and August 31, 2008.

Tier 2: Members with a participation date on or after September 1, 2008, but before January 1, 2014.

Tier 3: Members with a participation date on or after January 1, 2014.

Tier 1: Members Participating Before July 1, 2003

KERS Non-Hazardous							
Percentage of Members Participating Before 7/1/2003 Electing Coverage							
Service at Retirement	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Under 10	35%	30%	52%	45%	30%	90%	50%
10 – 14	67%	63%	53%	58%	62%	90%	75%
15 – 19	81%	78%	81%	79%	85%	90%	90%
20+	95%	92%	96%	94%	96%	90%	100%

KERS Non-Hazardous Recommendation: Historic participation levels suggest an increasing rate of participation as service at retirement increases. This is most likely because the level of subsidy increases as the service at retirement increases. As a result, the use of service based participation rates is proposed.



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KERS Hazardous							
Percentage of Members Participating Before 7/1/2003 Electing Coverage							
Service at Retirement	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Under 10	24%	0%	47%	30%	13%	100%	50%
10 – 14	58%	69%	73%	46%	58%	100%	75%
15 – 19	71%	76%	68%	77%	73%	100%	90%
20+	97%	98%	97%	95%	97%	100%	100%

KERS Hazardous Recommendation: Historic participation levels suggest an increasing rate of participation as service at retirement increases. This is most likely because the level of subsidy increases as the service at retirement increases. As a result, the use of service based participation rates is proposed.

CERS Non-Hazardous							
Percentage of Members Participating Before 7/1/2003 Electing Coverage							
Service at Retirement	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Under 10	28%	27%	52%	26%	22%	85%	50%
10 – 14	51%	54%	54%	57%	54%	85%	75%
15 – 19	79%	83%	76%	79%	81%	85%	90%
20+	92%	94%	95%	94%	94%	85%	100%

CERS Non-Hazardous Recommendation: Historic participation levels suggest an increasing rate of participation as service at retirement increases. This is most likely because the level of subsidy increases as the service at retirement increases. As a result, the use of service based participation rates is proposed.



Section III: Demographic Assumptions

CERS Hazardous							
Percentage of Members Participating Before 7/1/2003 Electing Coverage							
Service at Retirement	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Under 10	20%	14%	67%	50%	0%	100%	50%
10 – 14	54%	50%	44%	65%	46%	100%	75%
15 – 19	73%	65%	77%	89%	82%	100%	90%
20+	94%	96%	97%	95%	97%	100%	100%

CERS Hazardous Recommendation: Historic participation levels suggest an increasing rate of participation as service at retirement increases. This is most likely because the level of subsidy increases as the service at retirement increases. As a result, the use of service based participation rates is proposed.

SPRS							
Percentage of Members Participating Before 7/1/2003 Electing Coverage							
Service at Retirement	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Under 10	100%	N/A	N/A	N/A	0%	100%	100%
10 – 14	N/A	N/A	100%	N/A	100%	100%	100%
15 – 19	0%	100%	100%	100%	100%	100%	100%
20+	58%	100%	97%	92%	100%	100%	100%

SPRS Recommendation: Historic participation levels support maintaining the current assumption of 100%.



Tier 1 Members Participating Between 7/1/2003 and 9/1/2008

Percentage of Members Participating Between 7/1/2003 and 9/1/2008 Electing Coverage		
System	Current	Proposed
KERS Non-Hazardous	100%	100%
KERS Hazardous	100%	100%
CERS Non-Hazardous	100%	100%
CERS Hazardous	100%	100%
SPRS	100%	100%

System Wide Recommendation: Participation rates for members that began participating between 7/1/2003 and 9/1/2008 will be studied with the next experience study since the very first time those members would be eligible to participate in health care would be 7/1/2013. The use of the current assumption is proposed until such experience can be studied.

Tiers 2 & 3 Members Hired On or After 9/1/2008

Percentage of Members Participating On or After 9/1/2008 Electing Coverage		
System	Current	Proposed
KERS Non-Hazardous	100%	100%
KERS Hazardous	100%	100%
CERS Non-Hazardous	100%	100%
CERS Hazardous	100%	100%
SPRS	100%	100%

System Wide Recommendation: Participation rates for members that began participating on and after 9/1/2008 will be studied in a future experience study once credible experience for these members has been studied. The use of the current assumption is proposed until such experience can be studied.



C. Duty-Disability Retirement Health Care Participation Rates for Tier 1 Members Hired Before 7/1/2003

Percentage of Members Participating Before 7/1/2003 Electing Coverage		
System	Current	Proposed
KERS Non-Hazardous	100%	100%
KERS Hazardous	100%	100%
CERS Non-Hazardous	100%	100%
CERS Hazardous	100%	100%
SPRS	100%	100%

System Wide Recommendation: Participation rates for members becoming disabled in the line of duty as a result of a duty related injury, regardless of actual service receive 100% of the health care benefit paid by KRS. The use of the current assumption is proposed due to the benefit level.

D. Duty Death-In-Service Health Care Participation Rates for Tier 1 Members Hired Before 7/1/2003

Percentage of Members Participating Before 7/1/2003 Electing Coverage		
System	Current	Proposed
KERS Non-Hazardous	100%	100%
KERS Hazardous	100%	100%
CERS Non-Hazardous	100%	100%
CERS Hazardous	100%	100%
SPRS	100%	100%

System Wide Recommendation: Participation rates for spouses and dependents of members that die in the line of duty, regardless of actual service receive 100% of the health care benefit paid by KRS. The use of the current assumption is proposed due to the benefit level.



E. Deferred Vested Member Health Care Participation Rates

Tier 1: Members Hired Before 7/1/2003

Background: For plans that require some form of contribution to maintain coverage, some eligible individuals that terminated with a vested benefit may not elect to be covered, particularly if they have other coverage available from their most recent employer. Empirical data on plan participation, where available and credible, should be considered when selecting the participation assumption for future covered retirees that retire from deferred vested status. When developing the participation rates, how plan eligibility rules, plan choices, or retiree contribution rates have changed over time should be considered.

Furthermore, plan participation may be different in the future due to participants’ response to changes in retiree contribution levels and plan choices. For plans that anticipate changes in retiree contributions, the appropriateness of participation rates that vary over the projection period for both current and future retirees should be considered. Also, plan eligibility rules governing dropping coverage and subsequent re-enrollment when selecting participation rates should be considered.

KERS Non-Hazardous							
Deferred Vested Benefit Recipients Electing Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	31%	27%	28%	45%	41%	90%	50%

KERS Non-Hazardous Recommendation: The percentage of deferred vested benefit recipients electing coverage has been lower than assumed over the last five years. As a result, we propose lowering the assumed rate of participation by current deferred vested who retire in the future to 50%.



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KERS Hazardous							
Deferred Vested Benefit Recipients Electing Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	50%	43%	36%	42%	25%	100%	50%

KERS Hazardous Recommendation: The percentage of deferred vested benefit recipients electing coverage has been lower than assumed over the last five years. As a result, we propose lowering the assumed rate of participation by current deferred vested who retire in the future to 50%.

CERS Non-Hazardous							
Deferred Vested Benefit Recipients Electing Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	22%	27%	31%	38%	25%	85%	50%

CERS Non-Hazardous Recommendation: The percentage of deferred vested benefit recipients electing coverage has been lower than assumed over the last five years. As a result, we propose lowering the assumed rate of participation by current deferred vested who retire in the future to 50%.

CERS Hazardous							
Deferred Vested Benefit Recipients Electing Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	15%	14%	33%	33%	35%	100%	50%

CERS Hazardous Recommendation: The percentage of deferred vested benefit recipients electing coverage has been lower than assumed over the last five years. As a result, we propose lowering the assumed rate of participation by current deferred vested who retire in the future to 50%.



Section III: Demographic Assumptions

SPRS							
Deferred Vested Benefit Recipients Electing Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	0%	67%	100%	N/A	33%	100%	100%

SPRS Recommendation: The percentage of deferred vested benefit recipients electing coverage has been volatile over the last five years and the number of data points has been small. As a result, we propose retaining the current assumed rate of 100%.

Tier 1 Members Participating Between 7/1/2003 and 9/1/2008

Deferred Vested Benefit Recipients Electing Coverage		
System	Current	Proposed
KERS Non-Hazardous	100%	100%
KERS Hazardous	100%	100%
CERS Non-Hazardous	100%	100%
CERS Hazardous	100%	100%
SPRS	100%	100%

System Wide Recommendation: Participation rates for members that began participating between 7/1/2003 and 9/1/2008 will be studied with the next experience study since the very first time those members would be eligible to participate in health care would be 7/1/2013. The use of the current assumption is proposed until such experience can be studied.



Tiers 2 & 3 Members Hired On or After 9/1/2008

Deferred Vested Benefit Recipients Electing Coverage		
System	Current	Proposed
KERS Non-Hazardous	100%	100%
KERS Hazardous	100%	100%
CERS Non-Hazardous	100%	100%
CERS Hazardous	100%	100%
SPRS	100%	100%

System Wide Recommendation: Participation rates for members that began participating on and after 9/1/2008 will be studied in a future experience study once credible experience for these members has been studied. The use of the current assumption is proposed until such experience can be studied.

F. KRS Hazardous Divisions Spouse and Dependent Health Care Participation Rates

Background: Members eligible for coverage under the plan should be considered and appropriate assumptions should be made regarding the coverage of spouses and dependents. Additionally, the impact of plan rules regarding changes in coverage after retirement, such as remarriage, if significant should be considered.

KERS Hazardous							
Percentage of Covered Retirees Electing Spouse Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	42%	42%	44%	44%	44%	100%	50%

KERS Hazardous Recommendation: The percentage of those electing coverage for their spouses has remained steady over time and plan benefits and rules regarding dependent coverage are not anticipated to change. As a result, the use of the historic spouse coverage election average with a small margin for conservatism is proposed.



Section III: Demographic Assumptions

CERS Hazardous							
Percentage of Covered Retirees Electing Spouse Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	66%	67%	67%	68%	67%	100%	75%

CERS Hazardous Recommendation: The percentage of those electing coverage for their spouses has remained steady over time and plan benefits and rules regarding dependent coverage are not anticipated to change. As a result, the use of the historic spouse coverage election average with a small margin for conservatism is proposed.

SPRS							
Percentage of Covered Retirees Electing Spouse Coverage							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Percentage	65%	71%	72%	73%	72%	100%	75%

SPRS Hazardous Recommendation: The percentage of those electing coverage for their spouses has remained steady over time and plan benefits and rules regarding dependent coverage are not anticipated to change. As a result, the use of the historic spouse coverage election average with a small margin for conservatism is proposed.



G. KRS Deferred Vested Benefit Recipients Initial Age of Benefit Receipt for Members

Tier 1: Members Participating Before 7/1/2003

Background: Although members may begin receiving their deferred vested benefits once meeting the age and service requirements for retirement eligibility, many members do not begin receiving benefits at the earliest eligibility date. For those members with deferred vested benefits, an average age in which health benefits are to begin must be assumed.

KERS Non-Hazardous			
Deferred Vested Benefit Recipients			
Initial Age of Benefit Receipt			
First Year of Benefit Receipt	Average Age	Current	Proposed
2009	58.4	55	55
2010	58.0		
2011	57.0		
2012	57.9		
2013	59.1		

KERS Non-Hazardous Recommendation: The average age of initial receipt has remained relatively steady over time and plan benefits and rules regarding coverage are not anticipated to change. As a result, we recommend continued use of the current assumption.

KERS Hazardous			
Deferred Vested Benefit Recipients			
Initial Age of Benefit Receipt			
First Year of Benefit Receipt	Average Age	Current	Proposed
2009	51.2	50	50
2010	53.1		
2011	52.1		
2012	51.2		
2013	52.8		

KERS Hazardous Recommendation: The average age of initial receipt has remained relatively steady over time and plan benefits and rules regarding coverage are not anticipated to change. As a result, we recommend continued use of the current assumption.



Section III: Demographic Assumptions

CERS Non-Hazardous			
Deferred Vested Benefit Recipients			
Initial Age of Benefit Receipt			
First Year of Benefit Receipt	Average Age	Current	Proposed
2009	57.2	55	55
2010	57.7		
2011	58.1		
2012	57.8		
2013	59.1		

CERS Non-Hazardous Recommendation: The average age of initial receipt has remained relatively steady over time and plan benefits and rules regarding coverage are not anticipated to change. As a result, we recommend continued use of the current assumption.

CERS Hazardous			
Deferred Vested Benefit Recipients			
Initial Age of Benefit Receipt			
First Year of Benefit Receipt	Average Age	Current	Proposed
2009	47.45	50	50
2010	49.75		
2011	53.55		
2012	42.58		
2013	50.49		

CERS Hazardous Recommendation: The average age of initial receipt has remained relatively steady over time and plan benefits and rules regarding coverage are not anticipated to change. As a result, we recommend continued use of the current assumption.



Section III: Demographic Assumptions

SPRS			
Deferred Vested Benefit Recipients			
Initial Age of Benefit Receipt			
First Year of Benefit Receipt	Average Age	Current	Proposed
2009	N/A	50	50
2010	46.97		
2011	51.08		
2012	N/A		
2013	45.66		

SPRS Recommendation: The average age of initial receipt has remained relatively steady over time and plan benefits and rules regarding coverage are not anticipated to change. As a result, we recommend continued use of the current assumption.

Tier 1 Members Participating Between 7/1/2003 and 9/1/2008

System	Current	Proposed
KERS Non-Hazardous	55	55
KERS Hazardous	50	50
CERS Non-Hazardous	55	55
CERS Hazardous	50	50
SPRS	50	50

System Wide Recommendation: The average age of initial receipt will be studied with the next experience study since the very first time those members would be eligible to participate in health care would be after 7/1/2013. The use of the current assumption is proposed until such experience can be studied.



Tier 3: Members Hired After 9/1/2008

System	Current	Proposed
KERS Non-Hazardous	60	60
KERS Hazardous	50	50
CERS Non-Hazardous	60	60
CERS Hazardous	50	50
SPRS	50	50

System Wide Recommendation: The average age of initial receipt will be studied in a future experience once credible experience for these members has been studied. The use of the current assumption is proposed until such experience can be studied.

H. KRS Hazardous Spouse and Dependent Age

Background: The actual data for the age of the covered spouse and dependents of retired participants is used. The spouse and dependents of an active employee today may not be the same spouse and dependents covered at retirement, therefore the actuary should generally select an assumed covered spouse age difference for purposes of projecting future spouse coverage and assumed dependents' ages for projecting dependent coverage.

KERS Hazardous							
Average Number of Years a Covered Male Spouse is Older than a Covered Female Spouse							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Average Years	3.60	3.42	3.55	3.46	3.39	3	3

KERS Hazardous Recommendation: The average age difference between covered male and female spouses has been slightly higher than assumed. We recommend maintaining the current assumption to remain consistent with the pension valuation.



Section III: Demographic Assumptions

CERS Hazardous							
Average Number of Years a Covered Male Spouse is Older than a Covered Female Spouse							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Average Years	3.74	3.78	3.71	3.76	3.79	3	3

CERS Hazardous Recommendation: The average age difference between covered male and female spouses has been slightly higher than assumed. We recommend maintaining the current assumption to remain consistent with the pension valuation.

SPRS							
Average Number of Years a Covered Male Spouse is Older than a Covered Female Spouse							
Valuation	6/30/2009	6/30/2010	6/30/2011	6/30/2012	6/30/2013	Current	Proposed
Average Years	4.04	4.31	4.25	4.35	4.40	3	3

SPRS Recommendation: The average age difference between covered male and female spouses has been slightly higher than assumed. We recommend maintaining the current assumption to remain consistent with the pension valuation.



KERS SUMMARY AND COST OF CHANGES

As a result of the experience investigation, we are recommending revised rates of withdrawal, disability, pre-retirement mortality, service retirement and salary increases for active members. When these proposed assumption changes are applied to the June 30, 2013 valuation, the results will change. The change in results represents the financial impact of adopting the proposed assumptions. The table below summarizes the financial impact.

Pension

	KERS Non-Hazardous		
	Valuation 6/30/2013	Demographic Assumption Changes	All Assumption Changes
Employer Contribution Rate:			
Normal Cost Rate	3.48%	3.11%	3.11%
Expenses	0.65	0.65	0.65
UAAL	<u>26.71</u>	<u>27.71</u>	<u>28.78</u>
Total Employer Rate	30.84%	31.47%	32.54%
Actuarial accrued liability	\$ 11,386,602,159	\$ 11,716,235,034	\$ 11,788,258,431
Actuarial value of assets	\$ 2,636,122,849	\$ 2,636,122,849	\$ 2,636,122,849
UAAL	\$ 8,750,479,310	\$ 9,080,112,185	\$ 9,152,135,582

	KERS Hazardous		
	Valuation 6/30/2013	Demographic Assumption Changes	All Assumption Changes
Employer Contribution Rate:			
Normal Cost Rate	5.24%	6.23%	6.23%
Expenses	0.55	0.55	0.55
UAAL	<u>10.58</u>	<u>11.44</u>	<u>12.49</u>
Total Employer Rate	16.37%	18.22%	19.27%
Actuarial accrued liability	\$ 783,980,594	\$ 806,705,619	\$ 824,433,293
Actuarial value of assets	\$ 505,656,808	\$ 505,656,808	\$ 505,656,808
UAAL	\$ 278,323,786	\$ 301,048,811	\$ 318,776,485



KERS SUMMARY AND COST OF CHANGES

Insurance

	KERS Non-Hazardous		
	Valuation 6/30/2013	Demographic Assumption Changes	All Assumption Changes
Employer Contribution Rate:			
Normal Cost Rate	2.69%	2.28%	2.34%
Expenses	0.26	0.26	0.26
UAAL	<u>4.98</u>	<u>5.26</u>	<u>5.67</u>
Total Employer Rate	7.93%	7.80%	8.27%
Actuarial accrued liability	\$ 2,128,754,134	\$ 2,220,005,137	\$ 2,299,035,118
Actuarial value of assets	\$ 497,584,327	\$ 497,584,327	\$ 497,584,327
UAAL	\$ 1,631,169,807	\$ 1,722,420,810	\$ 1,801,450,791

	KERS Hazardous		
	Valuation 6/30/2013	Demographic Assumption Changes	All Assumption Changes
Employer Contribution Rate:			
Normal Cost Rate	9.27%	7.47%	7.76%
Expenses	0.14	0.14	0.14
UAAL	<u>0.56</u>	<u>-0.75</u>	<u>-0.27</u>
Total Employer Rate	9.97%	6.86%	7.63%
Actuarial accrued liability	\$ 385,517,675	\$ 351,110,059	\$ 363,929,229
Actuarial value of assets	\$ 370,774,403	\$ 370,774,403	\$ 370,774,403
UAAL	\$ 14,743,272	-\$ 19,664,344	-\$ 6,845,174



CERS SUMMARY AND COST OF CHANGES

As a result of the experience investigation, we are recommending revised rates of withdrawal, disability, pre-retirement mortality, service retirement and salary increases for active members. When these proposed assumption changes are applied to the June 30, 2013 valuation, the results will change. The change in results represents the financial impact of adopting the proposed assumptions. The table below summarizes the financial impact.

Pension

	CERS Non-Hazardous		
	Valuation 6/30/2013	Demographic Assumption Changes	All Assumption Changes
Employer Contribution Rate:			
Normal Cost Rate	3.56%	3.28%	3.27%
Expenses	0.79	0.79	0.79
UAAL	<u>8.40</u>	<u>8.90</u>	<u>9.63</u>
Total Employer Rate	12.75%	12.97%	13.69%
Actuarial accrued liability	\$ 9,378,876,114	\$ 9,603,889,054	\$ 9,800,456,616
Actuarial value of assets	\$ 5,637,094,485	\$ 5,637,094,485	\$ 5,637,094,485
UAAL	\$ 3,741,781,629	\$ 3,966,794,569	\$ 4,163,362,131

	CERS Hazardous		
	Valuation 6/30/2013	Demographic Assumption Changes	All Assumption Changes
Employer Contribution Rate:			
Normal Cost Rate	6.09%	3.27%	3.32%
Expenses	0.26	0.26	0.26
UAAL	<u>14.38</u>	<u>14.77</u>	<u>16.05</u>
Total Employer Rate	20.73%	18.30%	19.63%
Actuarial accrued liability	\$ 3,124,205,593	\$ 3,160,812,289	\$ 3,234,447,553
Actuarial value of assets	\$ 1,801,691,408	\$ 1,801,691,408	\$ 1,801,691,408
UAAL	\$ 1,322,514,185	\$ 1,359,120,881	\$ 1,432,756,145



CERS SUMMARY AND COST OF CHANGES

Insurance

	CERS Non-Hazardous		
	Valuation 6/30/2013	Demographic Assumption Changes	All Assumption Changes
Employer Contribution Rate:			
Normal Cost Rate	3.32%	2.64%	2.72%
Expenses	0.20	0.20	0.20
UAAL	<u>1.83</u>	<u>1.90</u>	<u>2.19</u>
Total Employer Rate	5.35%	4.74%	5.11%
Actuarial accrued liability	\$ 2,443,894,100	\$ 2,476,471,085	\$ 2,574,442,904
Actuarial value of assets	\$ 1,628,244,197	\$ 1,628,244,197	\$ 1,628,244,197
UAAL	\$ 815,649,903	\$ 848,226,888	\$ 946,198,707

	CERS Hazardous		
	Valuation 6/30/2013	Demographic Assumption Changes	All Assumption Changes
Employer Contribution Rate:			
Normal Cost Rate	8.90%	6.26%	6.43%
Expenses	0.15	0.15	0.15
UAAL	<u>5.92</u>	<u>5.09</u>	<u>5.82</u>
Total Employer Rate	14.97%	11.50%	12.40%
Actuarial accrued liability	\$ 1,437,332,817	\$ 1,360,833,390	\$ 1,412,656,525
Actuarial value of assets	\$ 892,774,391	\$ 892,774,391	\$ 892,774,391
UAAL	\$ 544,558,426	\$ 468,058,999	\$ 519,882,134



SPRS SUMMARY AND COST OF CHANGES

As a result of the experience investigation, we are recommending revised rates of withdrawal, disability, pre-retirement mortality, service retirement and salary increases for active members. When these proposed assumption changes are applied to the June 30, 2013 valuation, the results will change. The change in results represents the financial impact of adopting the proposed assumptions. The table below summarizes the financial impact.

Pension

	State Police		
	Valuation 6/30/2013	Demographic Assumption Changes	All Assumption Changes
Employer Contribution Rate:			
Normal Cost Rate	8.05%	8.69%	8.76%
Expenses	0.41	0.41	0.41
UAAL	<u>45.44</u>	<u>47.55</u>	<u>50.74</u>
Total Employer Rate	53.90%	56.65%	59.91%
Actuarial accrued liability	\$ 65,180,654	\$ 670,609,014	\$ 685,816,016
Actuarial value of assets	\$ 241,800,327	\$ 241,800,327	\$ 241,800,327
UAAL	\$ 409,780,327	\$ 428,808,687	\$ 444,015,689

Insurance

	SPRS		
	Valuation 6/30/2013	Demographic Assumption Changes	All Assumption Changes
Employer Contribution Rate:			
Normal Cost Rate	11.91%	11.52%	11.95%
Expenses	0.41	0.41	0.41
UAAL	<u>9.54</u>	<u>9.74</u>	<u>10.93</u>
Total Employer Rate	21.86%	21.67%	23.29%
Actuarial accrued liability	\$ 222,326,743	\$ 224,116,167	\$ 231,927,769
Actuarial value of assets	\$ 136,321,060	\$ 136,321,060	\$ 136,321,060
UAAL	\$ 86,005,683	\$ 87,795,107	\$ 95,606,709



ACTUARIAL METHODS

Actuarial valuations utilize methods to determine the liabilities, assets, and costs. While these are not like other assumptions that may change over time, an experience study is still a good opportunity to review these methods to see if they are still appropriate for systematically funding the promised benefits. Significant methods are described below.

Actuarial Cost Method: The cost method is used to allocate the present value of benefits between past service (actuarial accrued liability) and future service (normal cost). Currently the valuation uses the entry age normal cost method. This is the most widely used cost method of large public sector plans and has demonstrated the highest degree of stability as compared to alternative methods. We recommend no change in the use of this method.

Actuarial Value of Assets: The purpose of the asset smoothing is to dampen the impact that market volatility has on valuation results by spreading the unexpected market gains and losses over several years. Currently the System uses smoothing method that recognizes 20% of the difference between the market value of assets and the expected actuarial value of assets, based on the assumed rate of return. The actuarial value of assets cannot be less than 80% or more than 120% of market value. We recommend no change in the use of this method.

Amortization Method: The unfunded actuarial accrued liability is amortized using a level percentage of payroll method over the amortization period. The period is a fixed 30 year period, starting July 1, 2013. The payroll growth assumption is used to determine the percentage of payroll required over the remaining amortization period to fully amortize the unfunded liability. The current wage inflation assumption is being changed from 4.50% to 4.00%. We recommend the same change for the payroll growth assumption be made.



HISTORICAL JUNE CPI (U) INDEX

Year	CPI (U)	Year	CPI (U)
1960	29.60	1987	113.50
1961	29.80	1988	118.00
1962	30.20	1989	124.10
1963	30.60	1990	129.90
1964	31.00	1991	136.00
1965	31.60	1992	140.20
1966	32.40	1993	144.40
1967	33.30	1994	148.00
1968	34.70	1995	152.50
1969	36.60	1996	156.70
1970	38.80	1997	160.30
1971	40.60	1998	163.00
1972	41.70	1999	166.20
1973	44.20	2000	172.40
1974	49.00	2001	178.00
1975	53.60	2002	179.90
1976	56.80	2003	183.70
1977	60.70	2004	189.70
1978	65.20	2005	194.50
1979	72.30	2006	202.90
1980	82.70	2007	208.35
1981	90.60	2008	218.82
1982	97.00	2009	215.69
1983	99.50	2010	217.96
1984	103.70	2011	225.72
1985	107.60	2012	229.48
1986	109.50	2013	233.50

**CAPITAL MARKET ASSUMPTIONS AND ASSET ALLOCATION****Rates of Real Return and Standard Deviation by Asset Class**

Asset Class	Real Return	Standard Deviation
Combined Equity	5.40%	18.35%
Combined Fixed Income	1.50%	6.00%
Real Return (Diversified Inflation Strategies)	3.50%	11.50%
Real Estate	4.50%	12.50%
Absolute Return (Diversified Hedge Funds)	4.25%	9.75%
Private Equity	8.50%	29.00%
Cash Equivalent	-0.25%	3.00%

Asset Class Correlation Coefficients

	EQ	Fixed	RR	RE	AR	PE	CE
Comb. Eq.	1.00	0.00	0.74	0.31	0.69	0.74	-0.03
Comb. Fixed Inc.	0.00	1.00	0.23	-0.06	0.13	-0.18	0.27
Real Return	0.74	0.23	1.00	0.36	0.61	0.61	-0.02
Real Estate	0.31	-0.06	0.36	1.00	0.22	0.51	0.08
Absolute Return	0.69	0.13	0.61	0.22	1.00	0.62	0.22
Private Equity	0.74	-0.18	0.61	0.51	0.62	1.00	0.08
Cash Equivalent	-0.03	0.27	-0.02	0.08	0.22	0.08	1.00



ASSET ALLOCATION TARGETS

KERS

Asset Class	Non-Hazardous	Hazardous
Combined Equity	42%	44%
Combined Fixed Income	20%	19%
Real Return (Diversified Inflation Strategies)	10%	10%
Real Estate	3%	5%
Absolute Return (Diversified Hedge Funds)	10%	10%
Private Equity	10%	10%
Cash Equivalent	5%	2%

CERS

Asset Class	Non-Hazardous	Hazardous
Combined Equity	44%	44%
Combined Fixed Income	19%	19%
Real Return (Diversified Inflation Strategies)	10%	10%
Real Estate	5%	5%
Absolute Return (Diversified Hedge Funds)	10%	10%
Private Equity	10%	10%
Cash Equivalent	2%	2%



SPRS

Asset Class	Hazardous
Combined Equity	44%
Combined Fixed Income	18%
Real Return (Diversified Inflation Strategies)	10%
Real Estate	5%
Absolute Return (Diversified Hedge Funds)	10%
Private Equity	10%
Cash Equivalent	3%

**SOCIAL SECURITY ADMINISTRATION WAGE INDEX**

Year	Wage Index	Annual Increase	Year	Wage Index	Annual Increase
1957	\$3,641.72		1985	\$16,822.51	4.26%
1958	3,673.80	0.88%	1986	17,321.82	2.97
1959	3,855.80	4.95	1987	18,426.51	6.38
1960	4,007.12	3.92	1988	19,334.04	4.93
1961	4,086.76	1.99	1989	20,099.55	3.96
1962	4,291.40	5.01	1990	21,027.98	4.62
1963	4,396.64	2.45	1991	21,811.60	3.73
1964	4,576.32	4.09	1992	22,935.42	5.15
1965	4,658.72	1.80	1993	23,132.67	0.86
1966	4,938.36	6.00	1994	23,753.53	2.68
1967	5,213.44	5.57	1995	24,705.66	4.01
1968	5,571.76	6.87	1996	25,913.90	4.89
1969	5,893.76	5.78	1997	27,426.00	5.84
1970	6,186.24	4.96	1998	28,861.44	5.23
1971	6,497.08	5.02	1999	30,469.84	5.57
1972	7,133.80	9.80	2000	32,154.82	5.53
1973	7,580.16	6.26	2001	32,921.92	2.39
1974	8,030.76	5.94	2002	33,252.09	1.00
1975	8,630.92	7.47	2003	34,064.95	2.44
1976	9,226.48	6.90	2004	35,648.55	4.65
1977	9,779.44	5.99	2005	36,952.94	3.66
1978	10,556.03	7.94	2006	38,651.41	4.60
1979	11,479.46	8.75	2007	40,405.48	4.54
1980	12,513.46	9.01	2008	41,334.97	2.30
1981	13,773.10	10.07	2009	40,711.61	-1.51
1982	14,531.34	5.51	2010	41,673.83	2.36
1983	15,239.24	4.87	2011	42,979.61	3.13
1984	16,135.07	5.88	2012	44,321.67	3.12



KENTUCKY EMPLOYEES RETIREMENT SYSTEMS

SUMMARY OF ACTUARIAL ASSUMPTIONS

Economic Assumptions

Investment Return: 7.50% net of investment expenses per annum, compounded annually for Non Hazardous Members

7.50% net of investment expenses per annum, compounded annually for Hazardous Members

Salary Increases: Sample rates below:

<u>Service Years</u>	<u>Non Hazardous Members % Increase</u>	<u>Hazardous Members % Increase</u>
0 - 1	16.50	20.50
1 - 2	8.50	8.50
2 - 3	6.00	6.50
3 - 4	5.50	6.00
4 - 5	5.50	5.50
5 - 6	5.50	5.00
6 - 7	5.00	4.50
7 - 8	5.00	4.50
8 - 9	5.00	4.50
9+	4.50	4.50

Payroll Growth: 4.00% per year



KENTUCKY EMPLOYEES RETIREMENT SYSTEMS

Demographic Assumptions

Annual Rates of Retirement Per 100 Eligible Members					
Non-Hazardous				Hazardous	
<u>Age</u>	<u>Those Eligible For Service Retirement*</u>	<u>Those Eligible For Service Retirement**</u>	<u>Service</u>	<u>Those Eligible For Service Retirement⁺</u>	<u>Those Eligible For Service Retirement⁺⁺</u>
55	8		20	40	
56	8		21	40	
57	8		22	40	
58	8		23	40	
59	8		24	40	
60	10	10	25	47	40
61	20	20	26	47	40
62	20	20	27	47	40
63	20	20	28	47	40
64	20	20	29	47	40
65	20	25	30	47	47
66	20	25	31	47	47
67	20	25	32	50	47
68	20	25	33	50	47
69	20	25	34	50	47
70	20	25	35	60	47
71	20	25	36	60	47
72	20	25	37	60	50
73	20	25	38	60	50
74	20	25	39	60	50
75	100	100	40	60	60

* For members participating before 9/1/2008. If service is at least 27 years, the rate is 35%.

** For members participating on or after 9/1/2008. If age plus service is at least 87, the rate is 35%.

+ For members participating before 9/1/2008. The annual rate of service retirement is 100% at age 65.

++ For members participating on or after 9/1/2008. The annual rate of service retirement is 100% at age 60.



KENTUCKY EMPLOYEES RETIREMENT SYSTEMS

Demographic Assumptions (continued)

Mortality Rates

Active participants	RP-2000 Combined Mortality Table projected to 2013 using Scale BB. The mortality rates were multiplied by 50% for females, and 30% for males.
Disabled pensioners	RP-2000 Combined Disabled Mortality Table projected to 2013 using Scale BB set back 4 years for males.
Retired Healthy pensioners	RP-2000 Combined Mortality Table projected to 2013 using Scale BB, set back one year for females.

Disability Rates:

Graduated rates

Disabled rates per 100 members

Nearest <u>Age</u>	Non-Hazardous Members		Hazardous Members	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
20	0.02	0.02	0.03	0.03
30	0.03	0.03	0.05	0.05
40	0.07	0.07	0.10	0.10
50	0.19	0.19	0.28	0.28
60	0.49	0.49	0.73	0.73



KENTUCKY EMPLOYEES RETIREMENT SYSTEMS

Demographic Assumptions (continued)

Withdrawal Rates:

<u>Service</u>	<u>Non Hazardous Rates of Termination</u>	<u>Hazardous Members Rates of Termination</u>
0 – 1	0.2250	0.2500
1 – 2	0.1550	0.1050
2 – 3	0.1250	0.0750
3 – 4	0.1050	0.0650
4 – 5	0.0900	0.0550
5 – 6	0.0650	0.0450
6 – 7	0.0550	0.0300
7 – 8	0.0500	0.0300
8 – 9	0.0450	0.0300
9 – 10	0.0450	0.0250
10 – 11	0.0400	0.0250
11 – 12	0.0400	0.0200
12 – 13	0.0400	0.0200
13 – 14	0.0350	0.0200
14 – 15	0.0350	0.0200
15 +	0.0300	0.0200

Marital Status:

Percentage Married 100%

Age difference Males are assumed to be three years older than spouses.

Form of Payment:

Participants are assumed to elect a life-only form of payment.



COUNTY EMPLOYEES RETIREMENT SYSTEM

SUMMARY OF ACTUARIAL ASSUMPTIONS

Economic Assumptions

Investment Return: 7.50% net of investment expenses per annum, compounded annually for Non Hazardous Members

7.50% net of investment expenses per annum, compounded annually for Hazardous Members

Salary Increases: Sample rates below:

<u>Service Years</u>	<u>Non Hazardous Members % Increase</u>	<u>Hazardous Members % Increase</u>
0 - 1	12.50	19.50
1 - 2	9.00	10.00
2 - 3	5.50	6.00
3 - 4	5.50	5.25
4 - 5	5.00	5.00
5 - 6	5.00	4.50
6 - 7	4.75	4.00
7 - 8	4.75	4.00
8 - 9	4.50	4.00
9 - 10	4.50	4.00
10 +	4.25	4.00

Payroll Growth: 4.00% per year



COUNTY EMPLOYEES RETIREMENT SYSTEM

Demographic Assumptions

Annual Rates of Retirement
Per 100 Eligible Members

Age	Non-Hazardous			Hazardous	
	Those Eligible For Service Retirement*	Those Eligible For Service Retirement**	Service	Those Eligible For Service Retirement ⁺	Those Eligible For Service Retirement ⁺⁺
55	5		20	22.5	
56	6		21	22.5	
57	7		22	22.5	
58	7		23	22.5	
59	8		24	30.0	
60	9	9	25	33.0	22.5
61	15	15	26	33.0	22.5
62	18	18	27	36.0	22.5
63	18	18	28	39.0	22.5
64	18	18	29	55.0	30.0
65	18	18	30	33.0	33.0
66	18	18	31	33.0	33.0
67	18	18	32	50.0	36.0
68	18	18	33	40.0	39.0
69	18	18	34	40.0	55.0
70	18	18	35	40.0	33.0
71	18	18	36	40.0	33.0
72	18	18	37	40.0	50.0
73	18	18	38	40.0	40.0
74	18	18	39	40.0	40.0
75	100	100	40	40.0	40.0

* If service is at least 27 years, the rate is 30% for members participating before 9/1/2008.

**If age plus service is at least 87, the rate is 30% for members participating on or after 9/1/2008.

+ Applies to members participating before 9/1/2008. The annual rate of service retirement is 100% at age 62.

++ Applies to members participating on or after 9/1/2008. The annual rate of service retirement is 100% at age 60.



COUNTY EMPLOYEES RETIREMENT SYSTEM

Demographic Assumptions (continued)

Mortality Rates

Active participants	RP-2000 Combined Mortality Table projected to 2013 using Scale BB. The mortality rates were multiplied by 50% for females, and 30% for males.
Disabled pensioners	RP-2000 Combined Disabled Mortality Table projected to 2013 using Scale BB set back 4 years for males.
Retired Healthy pensioners	RP-2000 Combined Mortality Table projected to 2013 using Scale BB, set back one year for females.

Disability Rates:

Graduated rates

Disabled rates per 100 members

Nearest <u>Age</u>	Non-Hazardous Members		Hazardous Members	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
20	0.02	0.02	0.05	0.05
30	0.03	0.03	0.09	0.09
40	0.07	0.07	0.20	0.20
50	0.19	0.19	0.56	0.56
60	0.49	0.49	1.46	1.46



COUNTY EMPLOYEES RETIREMENT SYSTEM

Demographic Assumptions (continued)

Withdrawal Rates:

<u>Service</u>	<u>Non Hazardous Rates of Termination</u>	<u>Hazardous Members Rates of Termination</u>
0 – 1	0.2800	0.2050
1 – 2	0.1600	0.1300
2 – 3	0.1200	0.1050
3 – 4	0.1000	0.0900
4 – 5	0.0800	0.0800
5 – 6	0.0600	0.0700
6 – 7	0.0500	0.0700
7 – 8	0.0500	0.0600
8 – 9	0.0400	0.0600
9 – 10	0.0400	0.0600
10 – 11	0.0400	0.0600
11 – 12	0.0400	0.0600
12 – 13	0.0400	0.0600
13 – 14	0.0400	0.0600
14 – 15	0.0300	0.0600
15 +	0.0300	0.0600

Marital Status:

Percentage Married 100%

Age difference Males are assumed to be three years older than spouses.

Form of Payment:

Participants are assumed to elect a life-only form of payment.



STATE POLICE RETIREMENT SYSTEM

SUMMARY OF ACTUARIAL ASSUMPTIONS

Economic Assumptions

Investment Return: 7.50% net of investment expenses per annum, compounded annually

Salary Increases: Sample rates below:

<u>Service Years</u>	<u>% Increase</u>
0 - 1	16.50
1 - 2	11.50
2 - 3	9.50
3 - 4	8.50
4 - 5	7.50
5 - 6	6.50
6 - 7	6.00
7 - 8	6.00
8 - 9	5.00
9 - 10	4.50
10 +	4.00

Payroll Growth: 4.00% per year



STATE POLICE RETIREMENT SYSTEM

Demographic Assumptions

<u>Service</u>	Annual Rates of Retirement Per 100 Eligible Members	
	Those Eligible For Service Retirement ⁺	Those Eligible For Service Retirement ⁺⁺
20	22	
21	22	
22	22	
23	28	
24	28	
25	28	22
26	28	22
27	28	22
28	44	28
29	44	28
30	44	28
31	58	28
32	58	28
33	58	44
34	58	44
35	58	44
36	58	58
37	58	58
38	58	58
39	58	58
40	58	58

+ For members whose participation began before 9/1/2008. The annual rate of service retirement is 100% at age 55.

++ For members whose participation began on or after 9/1/2008. The annual rate of service retirement is 100% at age 60.



STATE POLICE RETIREMENT SYSTEM

Demographic Assumptions (continued)

Mortality Rates

Active participants	RP-2000 Combined Mortality Table projected to 2013 using Scale BB. The mortality rates were multiplied by 50% for females, and 30% for males.
Disabled pensioners	RP-2000 Combined Disabled Mortality Table projected to 2013 using Scale BB set back 4 years for males.
Retired Healthy pensioners	RP-2000 Combined Mortality Table projected to 2013 using Scale BB, set back one year for females.

Disability Rates:

Graduated rates

Disabled rates per 100 members

Nearest <u>Age</u>	<u>Male</u>	<u>Female</u>
20	0.05	0.05
30	0.09	0.09
40	0.20	0.20
50	0.56	0.56
60	1.46	1.46



STATE POLICE RETIREMENT SYSTEM

Demographic Assumptions (continued)

Withdrawal Rates:

<u>Service</u>	<u>State Police Members Rates of Termination</u>
0 – 1	0.2000
1 – 2	0.0700
2 – 3	0.0300
3 – 4	0.0300
4 – 5	0.0300
5 – 6	0.0300
6 – 7	0.0300
7 – 8	0.0300
8 – 9	0.0300
9 – 10	0.0250
10 – 11	0.0250
11 – 12	0.0250
12 – 13	0.0250
13 – 14	0.0250
14 – 15	0.0250
15 +	0.0250

Marital Status:

Percentage Married	100%
Age difference	Males are assumed to be three years older than spouses.

Form of Payment: Participants are assumed to elect a life-only form of payment.