Town of Smithfield

Fire Department Pension Plan

Results of the Experience Study

Period Covering	July 1, 2009 – June 30, 2014

May 2015

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May 7, 2015

Mr. Randy R. Rossi
Finance Director
Town of Smithfield
64 Farnum Pike
Smithfield, RI 02917

Dear Randy:

The results of our experience study of the Town of Smithfield Fire Department Pension Plan covering the five-year period ending June 30, 2014, are described in this report, along with our recommendations for changes in the present assumptions.

The Table of Contents, which immediately follows, outlines the information contained in this report.

Respectfully submitted,

David L. Driscoll, FSA, EA, MAAA
Principal, Consulting Actuary

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Table of Contents

I.   Introduction

In order to accumulate funds to pay retirement benefits on a reasonable and relatively stable basis, the actuary prepares annual valuations of the Plan's assets and liabilities to measure the funded status and to ensure that funding is progressing at a rate that is adequate to meet the Plan's obligations.

The primary purposes of funding are to equitably allocate costs between generations of taxpayers and to provide security to members, who view the funds set aside as assurance that their benefits will be paid.

While the ultimate cost of the Plan is not determinable until all benefits are paid and expenses provided for, each actuarial valuation attempts to estimate costs based on assumptions selected to predict, as accurately as possible, future experience in order to produce stable contribution rates.

Overly conservative or aggressive assumptions will result in actuarial gains or losses each year. When translated into contributions, this will result in decreasing or increasing contribution rates and an inequitable allocation of costs.

The major actuarial assumptions are:

(a) Active service demographic assumptions,

(b) Compensation increase assumptions,

(c) Post-retirement mortality rates, and

(d) Interest rate.

Before presenting our analysis of the Plan's experience and discussion of the proposed assumptions, it is important to outline considerations that should govern the selection of actuarial assumptions. The recommendations of the American Academy of Actuaries are as follows:

(i)   The actuarial assumptions selected should reflect the actuary's best judgement of future events. They should take into account actual experience to the extent possible, but they should also reflect long-term future trends rather than give undue weight to recent past experience.

(ii) The actuary should consider the impact of inflation in selecting the actuarial assumptions to be used.

(iii) The actuary should give consideration to the reasonableness of each actuarial assumption independently as well as the combined impact of all the assumptions.

(iv) The actuary should give careful attention to changes in plan design that may significantly alter expected future experience. For example, a liberalization of early retirement benefits may make advisable a revision in the retirement assumption.

(v) The actuary, in choosing assumptions, should take into account general or specific information available from other sources, including the plan sponsor, plan administrator, investment managers, accountants, economists, etc.

The purpose of this Report is to provide the information necessary to decide on the appropriate assumptions to be used in future valuations. It should be noted that these decisions cannot be made "in a vacuum" but must reflect the present and expected situation within the State and the Plan.

The balance of this Report deals in detail with the various assumptions. In each area we have made recommendations as to what we believe are appropriate assumptions. These recommendations reflect our "best estimate" of the likely future experience based on:

(a) the recent past experience,

(b) the general economic views prevailing at this time, and

(c) anticipated trends.

II.   Active Service Demographic Assumptions

The active service demographic assumptions include rates of:

(a) Termination,

(b) Disability,

(c) Death before retirement, and

(d) Retirement.

Our review of active service demographic assumptions is based on the actuarial valuation data for the Plan.

The basis for analysis of the Plan's experience is a comparison of the actual number of separations from service under each category with those expected based on the assumptions currently in use.

The "expected" values are calculated by applying the various rates or probabilities to the individuals exposed to each respective event. For example, active members age 40 with 10 years of credited service would be exposed to the probabilities of withdrawal, death and disability. A member age 50 with 20 years of service would be exposed to death, disability and retirement.

Numerical summaries of the Plan's experience from July 1, 2009, through June 30, 2014, are presented in Appendix I. The tables show the ratios of the actual experience of the Plan as compared to that anticipated by the present actuarial assumptions.

The ratios of actual to expected experience indicate the extent of deviation from the assumptions. A ratio of 1.0 would mean the experience has been exactly as anticipated.

As an aid to those analyzing these results, we have also prepared a series of graphs, which present the statistical data summarized in Appendix I in visual form. Our comments will refer to these graphs, which immediately follow each of the following subsections.

Termination

The graphs that follow present the withdrawal and vesting experience of the Plan.

Reviewing the withdrawal and vesting experience, it can be seen that there are more members than expected leaving before service retirement. Three individuals terminated prior to retirement eligibility whereas the expected number under the valuation assumption was approximately two. However, in light of the size of the exposure, this experience is not sufficient to warrant a recommendation to change the assumption currently in use.

The graph presented on page 3 show the current rates and the actual rates of termination.

Disability and Death

The graphs that follow show the incidence of disability and active service mortality. The financial impact on the funding of the Plan of this experience is relatively minor. It should be noted that the low incidence of actual deaths and disabilities makes this experience susceptible to rather large fluctuations from year to year.

In the five-year period covered by this study, there were no actual disabilities. The current assumption predicted fewer than one. We do not recommend any change in the assumed disability rates at this time, as both the expected and actual numbers of participants becoming disabled is small.

II.   Active Service Demographic Assumptions (continued)

Also, during the five-year period, there were no actual deaths in service. The expectation under the current assumption was fewer than one. We also do not recommend any change in the assumed pre-retirement mortality rates at this time, as the number of both expected and actual deaths is small.

Active Service Experience - Terminations
July 1, 2009 through June 30, 2014
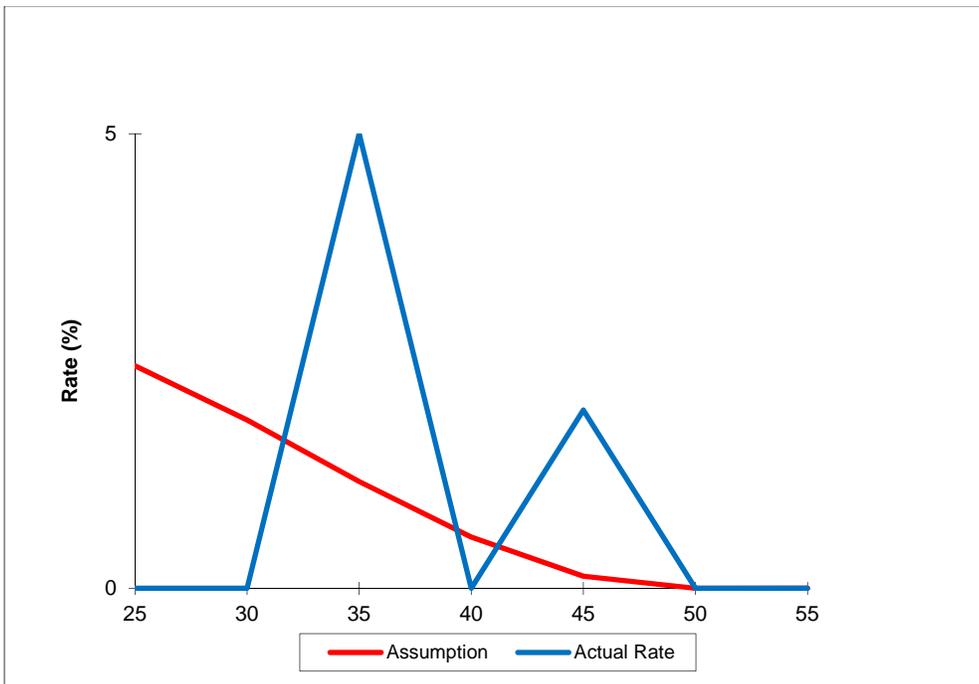
Active Service Experience - Disability Retirements
July 1, 2009 through June 30, 2014
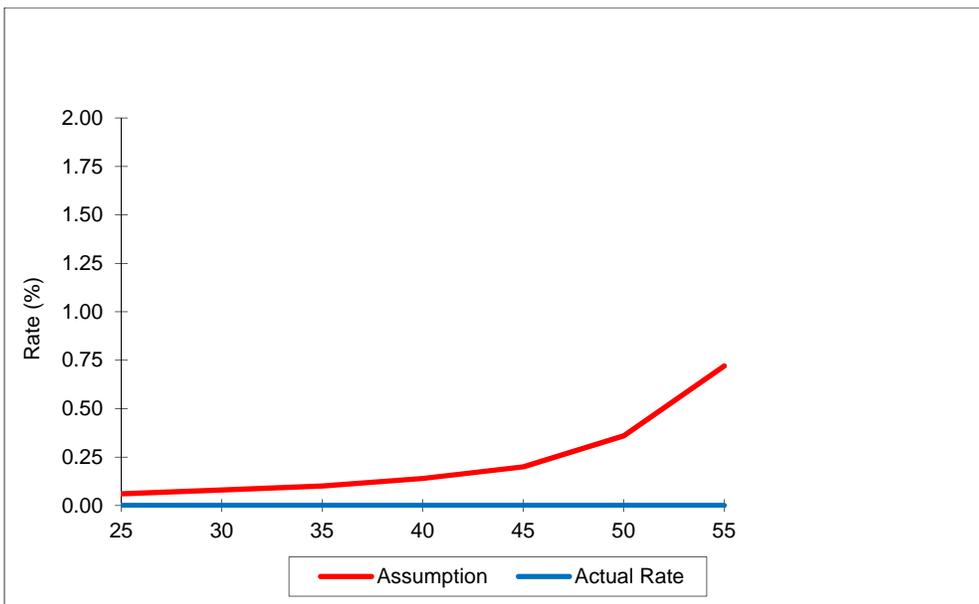
II. Active Service Demographic Assumptions (continued)

Active Service Experience - Deaths
July 1, 2009 through June 30, 2014
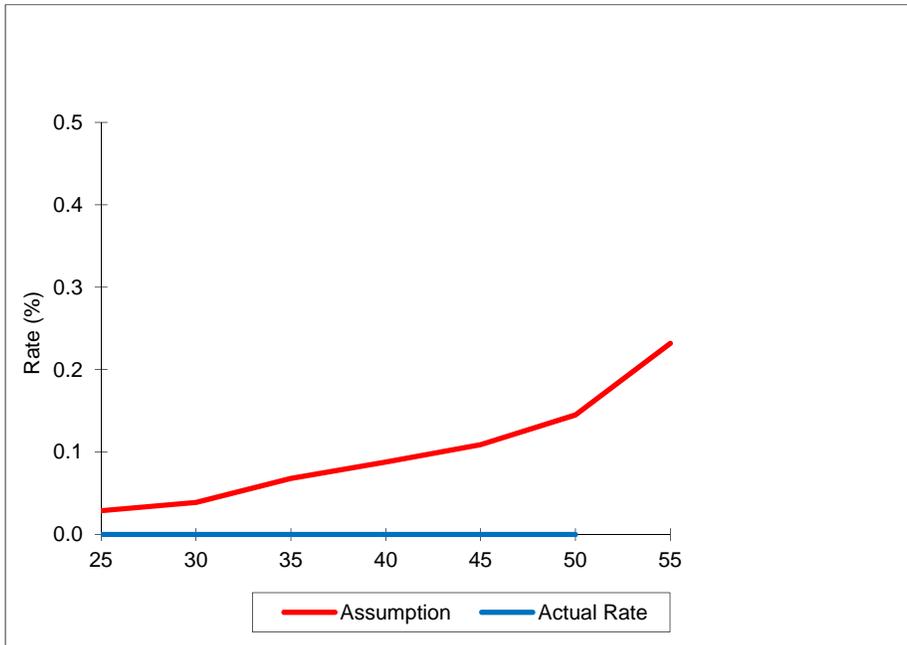
Service Retirement

The prior experience study found that service was the determining factor influencing retirement, and the assumption was set such that 25% of active members will retire upon the attainment of 20 years of service and the remainder at 25 years. During the five-year period covered by the study, there were nine retirements, three of which occurred upon the attainment of 20 years of service or shortly thereafter and four of which occurred after attainment by the retiree of 25 or more years of service. The other two occurred after 23 or 24 years of service. Given the size of the exposure, this experience is not sufficient to warrant a recommendation to change the assumption currently in use. The graph the follows shows the distribution of service retirements over the five-year period.

Appendix II shows the current and proposed tables of service retirement probabilities.

II. Active Service Demographic Assumptions (continued)

Active Service Experience - Service Retirements
July 1, 2009 through June 30, 2014

Retirement Based on Age

Retirement Based on Service
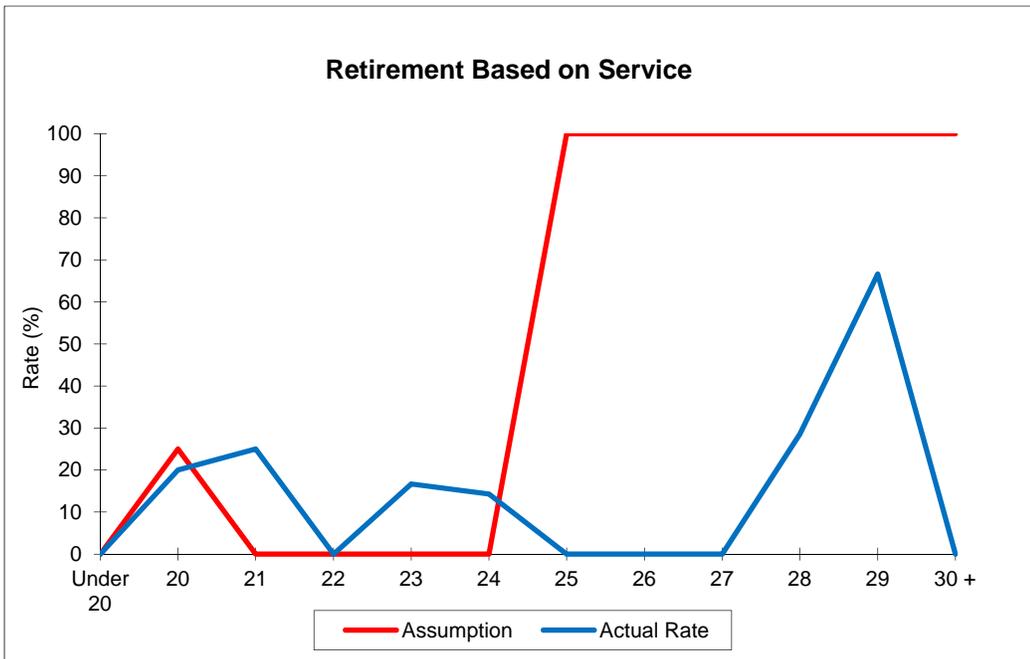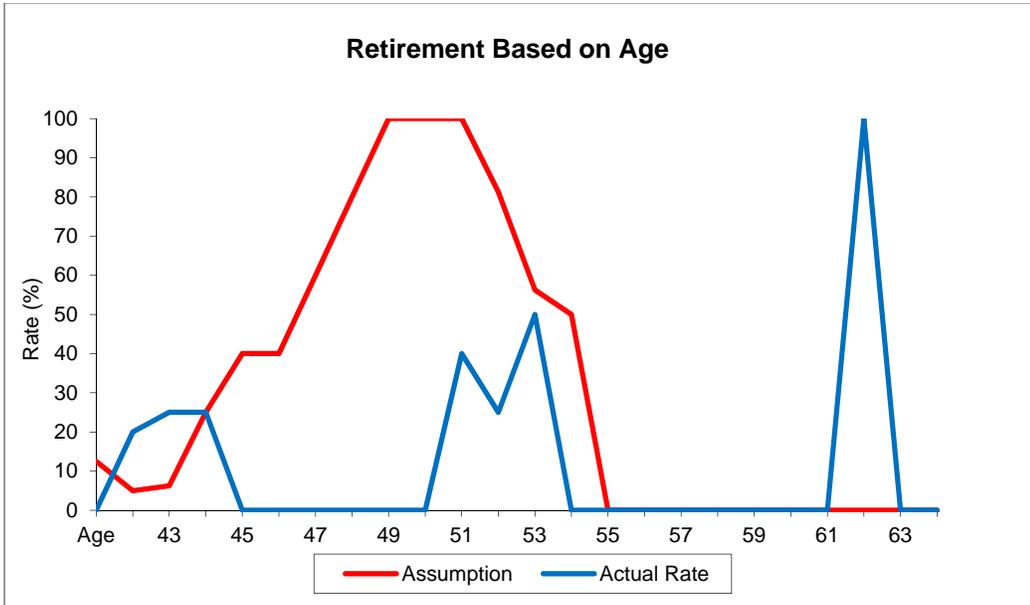
III.   Post-Retirement Mortality Rates

During the five-year period of this study, there were two retiree deaths. The expectation under the current mortality assumption was about one. This is summarized in Table 7 of Appendix I.

This small set of experience data does not constitute statistically credible experience; thus, we will not use it to establish a mortality assumption. Instead, we can examine the assumption used by the Employees' Retirement System of Rhode Island (ERSRI), which covers similar employees, and is sufficiently large to have statistically credible experience. This assumption is as follows:

- For male annuitants, 115% of the RP-2000 Combined Table for Healthy Males with White Collar adjustments, projected generationally with Scale AA from 2000.

- For female annuitants, 95% of RP-2000 Combined Table for Healthy Females with White Collar adjustments, projected generationally with Scale AA from 2000.

This assumption was reviewed in a recent (2014) experience study performed for ERSRI and found to be appropriate for continued use for that system.

IV. Economic Assumptions

Economic assumptions include:
(a) rates of compensation increase, and
(b) investment income.

Salary Increases

Currently a single compensation scale of 5.50% is used. Analysis of experience over the last five years shows significantly higher than assumed pay increases for those with fewer than two years of service. However, this plan was closed to new entrants after June 30, 2011, therefore, for purposes of this study, we have excluded from the analysis the experience for those with fewer than two years of experience. The summary of actual and expected salaries shown in Table 7 indicates that in the aggregate, after the first two years of service, the current salary scale exceeds the increases actually realized during the five-year period. The actual average increase rate during the five-year period was approximately 2.5%. The following graph sets forth the levels of <u>total</u> compensation increase during the five-year period.

Active Service Experience - Salary Experience
July 1, 2009 through June 30, 2014
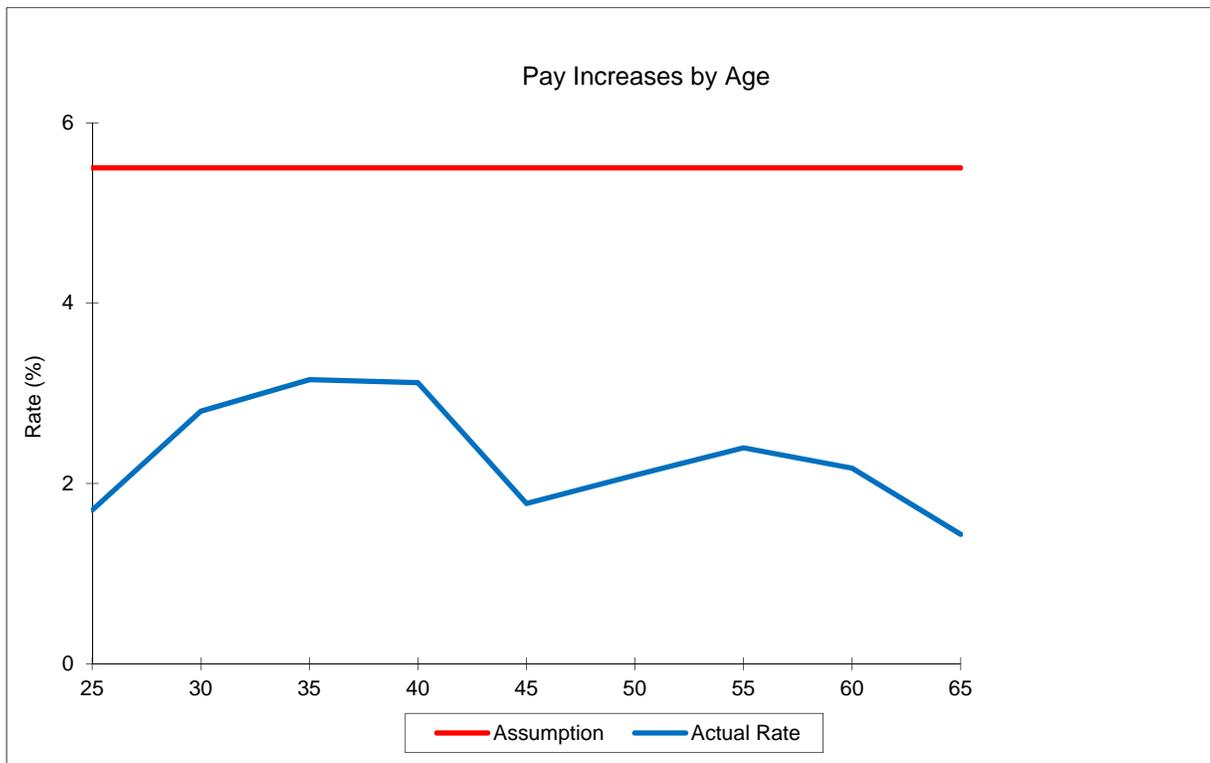
Furthermore, service does not appear to be a determining factor, as shown in the following graph.

Pay Increases by Years of Service
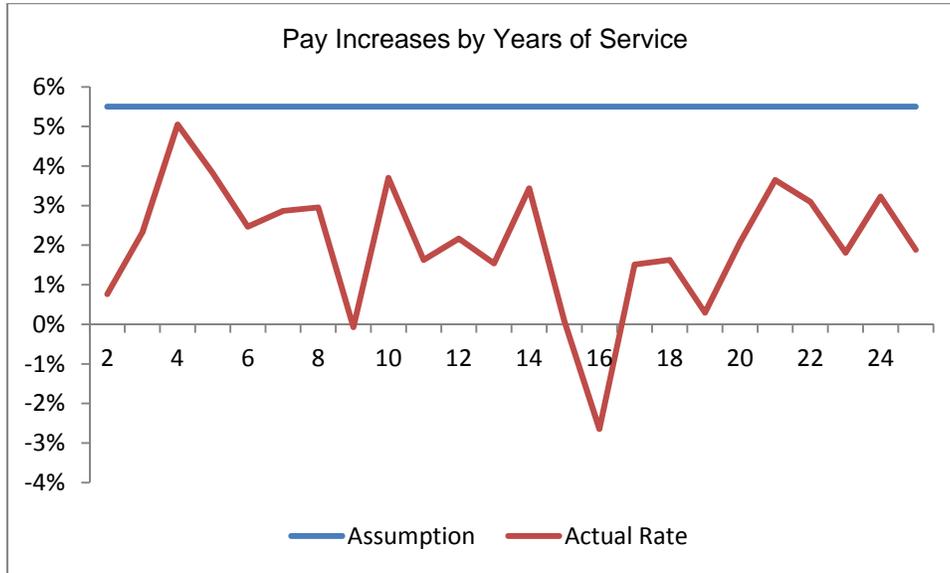
Generally, a participant's compensation is expected to increase over the long term in accordance with inflation, productivity growth, and merit adjustments. Thus, we recommend setting the salary scale assumption in terms of inflation plus an adjustment for productivity and merit. During the five-year period, inflation has increased on average by about 1.8% per year. Pay has increased by 2.5% over the same period, suggesting that productivity and merit might be around 0.7% per year. However, not wishing to give undue weight to actual experience given the small sample size under analysis, we recommend setting the productivity and merit factor at 1.0%.

As will be discussed in more detail at the end of this section, we recommend setting an assumption for inflation of 3.00%. This would imply that the salary scale would be set at 4.00%.

Interest Rate

The present interest assumption used in the funding of the Plan is 8.50% per year. Over the five years covered by the study, the annual rates of return earned on the assets of the Plan have fluctuated widely, as shown below:

Fiscal year ending in	Approximate rate of return
2010	10.9%
2011	23.1%
2012	7.1%
2013	19.0%
2014	22.4%

IV. Economic Assumptions (continued)

However, the focus of the analysis here is most appropriately directed to the expected future return on the assets held by the Plan. In an effort to forecast the expected long-term rate of return on Plan assets, we use a capital market model known as GEMS (General Economy and Market Simulator, described in more detail in Appendix III), in which individual asset class returns are estimated under a wide variety of simulated economic environments based on their underlying relationships to key economic variables, and then incorporated into a forecast of the performance of a portfolio invested in accordance with the Plan's present asset allocation. The model is calibrated to current economic and market conditions, and trends to a state of equilibrium. Over a 30- year period, the 50th percentile annual rate of return forecast for such a portfolio is approximately 10.50%. The 75th and 25th percentiles of the distributions of annual rate of return forecasts over 30 years are 12.56% and 8.34%, respectively. On the basis of these results, we recommend that the rate of return assumption used in the valuation be maintained at 8.50% per year.

Inflation Rate

The 50th percentile 30-year projection of inflation from GEMS is 3.01%. This is consistent with the rate of return assumptions developed here and suggests that setting the inflation assumption at 3.00% would be reasonable.

V.   Cost Analysis and Conclusions

To assist in the selection and approval of the final package of valuation assumptions to be used prospectively from July 1, 2015, we have recalculated the results of the valuation of the Plan as of July 1, 2014, to reflect the potential impact of the adoption of the recommended changes to the assumptions, which are as follows:

1. Replace the RP-2000 Mortality Table with projections specified by IRS Regulation 1.430(h)(3)-1, as applicable to the valuation year using a combined static table for both annuitants and non-annuitants, with the following:

   a. For male annuitants, 115% of the RP-2000 Combined Table for Healthy Males with White Collar adjustments, projected generationally with Scale AA from 2000.
   b. For female annuitants, 95% of RP-2000 Combined Table for Healthy Females with White Collar adjustments, projected generationally with Scale AA from 2000.

2. Reduce the assumed annual rate of salary increase from 5.5% to 4.0%.

Based on the revised valuation the recommended Town contribution for the year beginning July 1, 2014, would have decreased from $1,336,605 to $1,252,242. These results are summarized in Appendix II.

We would be pleased to discuss the results of this experience investigation with the Board prior to the preparation of the July 1, 2015 valuation of the Plan.

Appendix I: Actual and Expected Experience

Table 1:   **Comparison of Actual and Expected Separations From Active Service**

Terminations			
Central Age of Group	**Actual**	**Expected**	**Ratio of Actual To Expected**
Under 25	0	0.26	0.000
25-29	0	0.69	0.000
30-34	2	0.63	3.175
35-39	0	0.32	0.000
40-44	1	0.20	5.000
45-49	0	0.01	0.000
50-54	0	0.00	0.000
55 and over	0	0.00	0.000
Total	3	2.11	1.422

Table 2:   **Comparison of Actual and Expected Separations From Active Service**

Disability Retirements			
Central Age of Group	**Actual**	**Expected**	**Ratio of Actual To Expected**
Under 25	0	0.01	0.000
25-29	0	0.02	0.000
30-34	0	0.04	0.000
35-39	0	0.04	0.000
40-44	0	0.10	0.000
45-49	0	0.07	0.000
50-54	0	0.02	0.000
55 and over	0	0.14	0.000
Total	0	0.44	0.000

Appendix I: Actual and Expected Experience (continued)

Table 3:   Comparison of Actual and Expected Separations From Active Service

Deaths			
Central Age of Group	Actual	Expected	Ratio of Actual To Expected
Under 25	0	0.00	0.000
25-29	0	0.01	0.000
30-34	0	0.02	0.000
35-39	0	0.03	0.000
40-44	0	0.06	0.000
45-49	0	0.03	0.000
50-54	0	0.01	0.000
55-59	0	0.01	0.000
60-64	0	0.02	0.000
65 and over	0	0.00	0.000
Total	0	0.19	0.000

Appendix I: Actual and Expected Experience (continued)

Table 4:   Comparison of Actual and Expected Separations From Active Service

Service Retirements – Age Based			
Central Age of Group	Actual	Expected	Ratio of Actual To Expected
Under 45	1	0.50	2.000
45	1	0.25	4.000
46	1	1.00	1.000
47	0	2.00	0.000
48	0	2.00	0.000
49	0	3.00	0.000
50	0	4.00	0.000
51	0	4.00	0.000
52	0	3.00	0.000
53	2	5.00	0.400
54	1	3.25	0.308
55	2	2.25	0.889
56	0	1.00	0.000
57	0	0.00	0.000
58	0	0.00	0.000
59	0	0.00	0.000
60	0	0.00	0.000
61	0	0.00	0.000
62	0	0.00	0.000
63	0	0.00	0.000
64	1	0.00	0.000
65 and over	0	0.00	0.000
Total	9	31.25	0.288

Appendix I: Actual and Expected Experience (continued)

Table 5: Comparison of Actual and Expected Separations From Active Service

Service Retirements – Service Based			
Central Age of Group	Actual	Expected	Ratio of Actual To Expected
Under 20	0	0.00	0.000
20	1	1.25	0.800
21	2	0.00	0.000
22	0	0.00	0.000
23	1	0.00	0.000
24	1	0.00	0.000
25	0	5.00	0.000
26	0	6.00	0.000
27	0	8.00	0.000
28	2	7.00	0.286
29	2	3.00	0.667
30 +	0	1.00	0.000
Total	9	31.25	0.288

Appendix I: Actual and Expected Experience (continued)

Table 6:   Comparison of Actual and Expected Annual Salaries of Members

Central Age of Group	Annual Salaries		Ratio of Actual To Expected
	Actual	Expected	
Under 25	346,605	359,540	0.964
25-29	1,624,185	1,666,825	0.974
30-34	2,055,019	2,101,807	0.978
35-39	2,115,669	2,164,549	0.977
40-44	3,102,069	3,215,497	0.965
45-49	2,180,718	2,253,496	0.968
50-54	942,303	970,872	0.971
55-59	189,153	195,319	0.968
60-64	125,033	130,043	0.961
65 and over	-	-	0.000
Total	12,680,754	13,057,948	0.971

Table 7:   Summary of Mortality Experience of Pensioners

Group	Actual	Expected	Ratio of Actual To Expected
Service Retirees	2	1.43	1.399
Disability Retirees	0	0.05	0.000
Dependents of Deceased Members	0	1.13	0.000
Total	2	2.61	0.766

Appendix II: Comparative Valuation Results

Results for the Actuarial Valuation Prepared as of July 1, 2014, on Current and Recommended Assumptions

Item	Current Assumptions	Recommended Assumptions
1. Accrued Liabilities:		
Active and Members	$ 11,635,166	$ 11,188,492
Retired Members, Beneficiaries and Members Entitled to Deferred Vested Benefits	16,110,839	16,221,526
Total	$ 27,746,005	$ 27,410,018
2. Assets	19,240,197	19,240,197
3. Unfunded Actuarial Accrued Liability	$ 8,505,808	$ 8,169,821
4. 17-year Amortization of Unfunded Actuarial Liability	$ 888,304	$ 853,215
5. Normal Contribution	$ 375,878	$ 330,264
6. Expected Expenses	$ 19,000	$ 19,000
7. Adjustment for interest to mid-year	$ 53,423	$ 50,063
Total Recommended Contribution = (4) + (5) + (6) +(7)	$ 1,336,605	$ 1,252,542

Appendix III: About GEMS

About GEMS (General Economy and Market Simulator)

GEMS® is a cutting-edge Economic Scenario Generator (ESG) that enables users to simulate future states of the global economy and financial markets, including the pricing of derivatives and alternative assets. It uses financial models that are the most technologically advanced in the industry, ensuring that models perform consistently with history, provide a realistic representation of extreme events and support hedging strategies with market consistent pricing. GEMS includes comprehensive yield curve modeling and a multifactor arbitrage pricing model that develops asset-class return series based on asset-class relationships to underlying economic and capital market variables such as GDP, inflation, interest rates, credit spreads, and unemployment. The model is calibrated to current market conditions and trends the economic variables to longer-term historical norms – simulating a variety of economic environments and concomitant asset-class returns in the process.
Some of the other distinguishing features of GEMS are:

1. Many asset-class return distributions are non-normal even though many models historically have treated them as such. Asset classes exhibit non-normal return distribution characteristics such as skew and kurtosis. GEMS is more effective at capturing these characteristics. In doing so, it more effectively captures outlier fat-tail events (leptokurtosis) and positive or negative skew in a manner that more closely resembles what actually occurs.

2. Asset-class returns are linked to underlying economic conditions in the model so the user can relate a specific asset-class or portfolio return path to conditions that can be described in terms of economic variables.

3. Because GEMS is calibrated to current levels of economic activity and trends to a longer-term state of equilibrium, shorter-term asset returns forecasts in GEMS are more reflective of recent market activity and short-term characteristics and trends in economic and market variables, and longer-term returns reflect asset performance over complete market cycles.

4. There is empirical evidence that asset correlations are dynamic and move closer to unity when markets are volatile and under stress. GEMS models asset correlations dynamically.