

**NEW MEXICO EDUCATIONAL  
RETIREMENT BOARD**

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***ACTUARIAL EXPERIENCE STUDY  
AS OF JUNE 30, 2002***

**Gabriel, Roeder, Smith & Company**

June 13, 2003

Board of Trustees  
Educational Retirement Board of New Mexico  
701 Camino de los Marquez  
Santa Fe, NM 87501

Dear Members of the Board:

**Subject: Results of 2002 Experience Study**

We are pleased to present our report on the results of the 2002 Experience Study for the New Mexico Educational Retirement Board (ERB). It includes our recommendations for new actuarial assumptions to be effective for the June 30, 2003 actuarial valuation, and it describes the actuarial impact produced by these recommendations as though they had been effective for the June 30, 2002 actuarial valuation.

With the Board's approval of the recommendations in this report, we believe the actuarial condition of the System will be more accurately portrayed. The Board's decisions should be based on the appropriateness of each recommendation individually, not on their collective effect on the funding period or the unfunded liability.

We wish to thank the ERB staff for their assistance in providing data for this study.

Sincerely,  
Gabriel, Roeder, Smith & Company



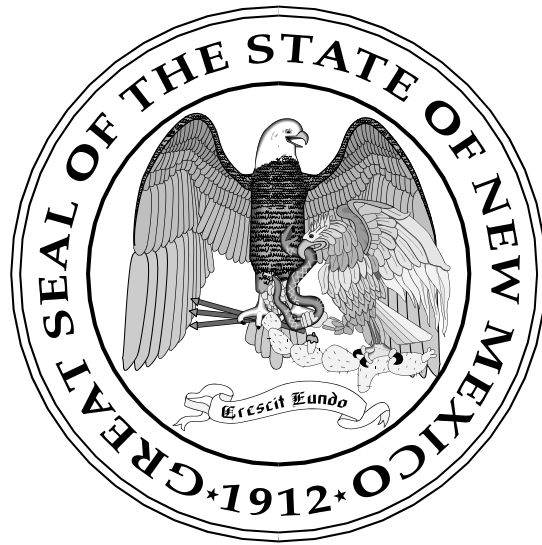
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## SECTION I

### EXECUTIVE SUMMARY

## Section I

### Executive Summary

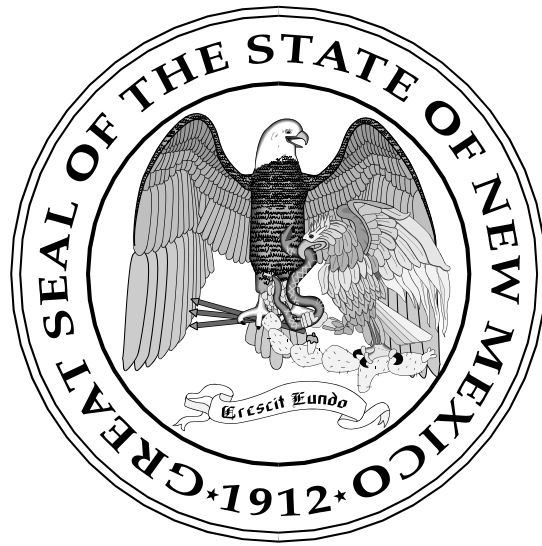
- Purpose
  - To review actuarial assumptions and methods and to compare to actual experience
  - Use data from five-year period ending June 30, 2002 (use a ten-year period for salary analysis)
  
- Inflation rate
  - Currently 3.00%
  - Recommend no change in rate
  - Five-year average increase in CPI-U is 2.3%, ten-year average is 2.5%, twenty-year average is 3.1%
  - Component of investment return assumption, COLA assumption, salary increase assumption, and assumed payroll growth rate
  
- Investment return rate
  - Currently 8.00%
  - Actual net market return of 4.1% for last 5 years and 8.7% for last 8 years
  - Recommend no change in rate
  - Rate is net of administrative and investment expenses
  - Rate is comprised of 3.00% inflation and 5.00% real return
  - Justified by current asset allocation and expected returns by asset class
  - Still most common rate for large public retirement systems
  
- Payroll growth rate
  - Rate at which total ERB payroll is expected to grow
  - Will be lower than expected salary increases for the average member, because members who terminate, retire, etc. are usually replaced with lower-paid members
  - Only affects funding period, not liability
  - Current assumed payroll growth rate is 3.00%, consistent with assumed inflation
  - Assumes no membership growth, per GASB #25
  - In last five years, payroll grew 6.4%, including the effect of 1.5% membership growth
  - In last ten years, payroll grew 5.6%, including effect of 1.8% membership growth
  - Recommend increasing rate to 3.75%. (This lowers funding period.)
  - This anticipates that new hire pay will grow faster than inflation, reasonable given demographic shift.

- Salary increase rate
  - Comprised of inflation, overall “productivity” increases, and longevity/promotional component
  - 3.00% inflation, plus 1.50% across-the-board increases, plus additional service-related increases during first 10 years of service
  - Produces expected average increase of about 6.00%
  - Recommend no change
  - Experience matches service-related component (longevity/promotional) of assumption closely
  - Study covers ten-year period. (Longer period used to smooth out impact of legislative activity on annual salary increases.)
  - Actual average increase over 10-year study was 6.40%, higher than assumed
  - For members with more than 10 years of service, actual average increase was 5.4% over period, vs. 4.5% assumption
  - But this results from large increases during last two years (FY 2000 to FY 2001 and FY 2001 to FY 2002), when average increases were 9% or more in each year
  - We will continue to monitor this assumption, but we believe current results are either an aberration or intended to catch up teacher pay, and will not continue
  - Especially because of tight budgets being experienced now
  
- Cost-of-living increases
  - Current assumption of 2.00%, recommend no change
  - Deferred to age 65, except for disabled retirees
  - Based on inflation assumption (3.00%) and current provisions (one-half CPI, maximum 4%, but not less than the smaller of a 2% increase or 100% CPI increase)
  
- Post-retirement mortality rates (nondisabled retirees):
  - Current tables: 1994 Uninsured Pensioner Mortality Table, males set back 2 years and females set back one year
  - 1,048 male deaths and 1,390 female deaths (excludes beneficiaries and disabled)
  - Expected 1,036 male deaths and 1,353 female deaths
  - A/E ratio (actual to expected deaths) on current tables is 101% for males and 103% for females
  - Mortality improvements (longer life expectancies) have used up almost all of the margin for future improvement
  - We prefer to set this assumption with more margin
  - Therefore, we recommend that the Board adopt new rates based on the 1994 Uninsured Pensioner Mortality Table, males set back 3 years and females set back 2 years
  - New assumptions produce A/E ratios of 112% (males) and 114% (females)

- Disabled mortality rates:
  - Recommend no changes, good fit to experience
  - 50 male deaths and 76 female deaths
  - 100% A/E ratio for males, 103% for females, overall ratio is 102%
  
- Retirement rates:
  - 2,130 male retirements during five-year period, and 3,814 female retirements (from active employment)
  - Average retirement age of 57.6 for males and 58.1 for females
  - Current tables produce A/E ratios of 78% for males and 93% for females
  - Recommend modifying male rates, but make no change to female rates
  - Proposed new retirement rates for males produces an A/E of 100%
  - Using assumptions, expected average age of retirement is 57.8 for males and 57.9 for females
  
- Termination rates:
  - Recommend no changes to rates set in 1996
  - A/E ratios at 105% for males and 112% for females
  - Ratios over 100% for this assumption are conservative
  - Ratios increased very slightly from last experience study
  
- Refunds:
  - Currently we assume that vested members choose the more valuable of a refund or a deferred benefit
  - Conservative & reasonable. Assumes members choose wisely.
  - Recommend retaining this assumption.
  
- Other assumptions:
  - Active member mortality, disability, etc.
  - Recommend no changes in any of these assumptions
  - A/E for disability was 78% (males), 119% (females), and 103% (combined)
  - Small numbers and close match on combined results justifies making no change at this time
  
- Actuarial methods:
  - Entry Age actuarial method still appropriate
  - Most widely used method among public, statewide plans
  - Actuarial asset method (five-year smoothing) still appropriate
  - Recommend updating hypothetical group of new entrants used to determine normal cost
  - Reflects actual distribution of new members in last four plan years
  - Almost no change (average age = 36.9, 72% are female, avg. pay = \$23,781)

- Summary of recommendations:
  - Update new entrant profile for normal cost calculations
  - Modify post-retirement mortality assumption to add an extra year in setback, lowering the rates and increasing anticipated life expectancies
  - Modify male retirement rates (lower at most age/service combinations)
  - Increase payroll growth rate from 3.00% to 3.75%
  
- Impact of all recommended changes:
  - Increases normal cost from 12.72% to 12.92%
  - Increases present value of future benefits by \$97 million, which is less than a 1% increase.
  - UAAL increases by \$56 million, from \$1,152 million to \$1,208 million
  - (The rest of the \$97 million increase is accounted for in the increase to normal cost.)
  - Funding period from 27.2 years to 28.4 years
  - Decreases funded ratio from 86.8% to 86.3%
  - Increases 30-year funding cost from 8.48% to 8.55%, still less than 8.65% statutory rate.





**SECTION II**  
**INTRODUCTION**

## **Section II**

### **Introduction**

In determining liabilities, contribution rates and funding periods for retirement plans, actuaries must make assumptions about the future. Among the assumptions that must be made are:

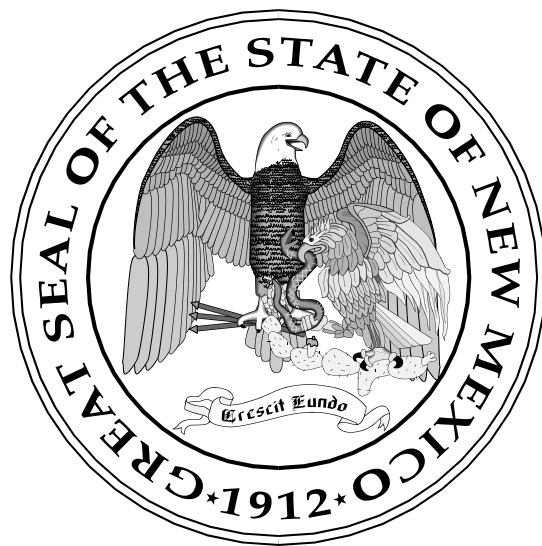
- Retirement rates
- Mortality rates
- Turnover rates
- Disability rates
- Investment return rate
- Salary increase rates
- Inflation rate

For some of these assumptions, such as the mortality rates, past experience provides important evidence about the future. For other assumptions, such as the investment return rate, the link between past and future results is much weaker. In either case, though, actuaries should review their assumptions periodically and determine whether these assumptions are consistent with actual past experience and with anticipated future experience.

For this purpose, therefore, we have reviewed and analyzed ERB's data for the period from June 30, 1997 through June 30, 2002. (In examining salary increase rates, however, we used the longer period from June 30, 1992 through June 30, 2002, in order to smooth some of the year-to-year fluctuations and in order to increase the soundness of our conclusions.) In our view, a period this long is reasonable. Sufficient data can usually be gathered so that the results have statistical significance. Legislation, such as plan improvements or changes in statewide salary schedules, can sometimes affect the results. Using a several-year period prevents giving too much weight to such short-term effects. Finally, using a much longer period would water down real changes that may be occurring, such as mortality improvement or a change in the ages at which teachers retire.

In an experience study, we first determine the number of deaths, retirements, etc. that occurred during the period. Then we determine the number expected, based on the current actuarial assumptions. Finally we calculate the A/E ratio, where "A" is the actual number (of retirements, for example) and "E" is the expected number. If the current assumptions were "perfect", the A/E ratio would be 100.0%. When it varies much from this figure, it is a sign that new assumptions may be needed. Of course we not only look at the assumptions as a whole, but we also review how well they fit the actual results by sex, by age, and by service.

Finally, the actuary "graduates" or smoothes the results, since the raw results can be quite uneven from age to age or from service to service.



### **SECTION III**

## **ANALYSIS OF EXPERIENCE AND RECOMMENDATIONS**

## Section III

### Analysis of Experience and Recommendations

We will begin by discussing the economic assumptions: inflation, the investment return rate, the salary increase assumption, the cost-of-living increases and the payroll growth rate. Then we will discuss the demographic assumptions: mortality, disability, termination and retirement. Finally we will discuss the actuarial methods used.

#### Inflation rate

The inflation assumption underlies all the other economic assumptions. It impacts investment return, salary increases and retiree benefit increases. The current inflation assumption is 3.75%.

Over the five-year period from June 1997 through June 2002, the CPI-U has increased at an average rate of 2.3%. However, the assumed inflation rate is only weakly tied to past results, and this has been a period of relatively low inflation. The average over the ten-year period beginning June 1992 and ending June 2002 is 2.5%, and the average over the last 20 years is 3.1%. Since 1913, inflation has averaged about 3.3%.

We have decided to recommend reducing this assumption to 3.00%, close to the very long-term average rate of inflation. Given the inflation experienced over the last few years, we do expect that in the short run, the 3.00% assumption will overstate actual inflation.

#### Investment return rate

Currently, ERB assumes an investment return rate of 8.00%. This is the rate used in discounting future payments in order to determine the actuarial present value of those payments. It is intended to represent the fund's return net of all investment expenses and administrative expenses.

For the last five years, the average market return net of investment and administrative expenses has been 4.1%, and for the last eight years, since the fund began reporting on a market-value basis, the average net return has been 8.7%. However, for this assumption, past performance, even averaged over a five- or ten-year period, is not a reliable indicator of future performance.

There are several reasons for this. First, investment returns, at least theoretically, include an allowance for inflation. Returns achieved in a period of high inflation would not necessarily be achieved in a period of low inflation. Second, the asset allocation of the trust will impact the overall performance. If the allocation changes, older performance figures may become meaningless. Finally, the real rates of return for many asset classes, especially equities, vary so dramatically from year to year—as we have had demonstrated clearly over the last five years—that even a ten-year or twenty-year period may not be long enough to provide reasonable guidance.

## Analysis of Experience and Recommendations - Continued

The current target asset allocation for the fund is:

Equities – large cap US	48%
Equities – small cap US	5%
Equities – international (EAFE)	15%
Equities – emerging markets	2%
Fixed income	30%
Total	100%

We tested the current 8.00% investment return assumption using the capital market assumptions of several investment consulting firms, after adjusting their assumptions for our 3.00% assumed inflation rate. We found that the current 8.00% assumption was generally close to the median returns under the tests, even after reducing the return by 17 basis points to account for investment and administrative expenses. This is true even though most of the investment consulting firms have lowered their expected returns over the last three years. Therefore, we are not recommending any change to this assumption.

You should note that 8.00% is still the most common investment return assumption used by large public pension plans. You should also keep in mind that actual returns can vary significantly from this assumption. A Monte Carlo simulation shows that even over a period as long as 20 years, there is still about a 25% chance that the average return for the period could exceed 9.5% and about a 25% chance that it could be less than 6.5%.

### Salary increase rates

For this assumption, we used data over a ten-year period, since in our experience, salary increases tend to vary significantly from year to year, and a longer period provides a more accurate picture. The average pay increases for members active in both valuations are as follows:

- 1992/1993 3.9%
- 1993/1994 6.1%
- 1994/1995 8.0%
- 1995/1996 5.0%
- 1996/1997 3.4%
- 1997/1998 6.8%
- 1998/1999 6.3%
- 1999/2000 6.2%
- 2000/2001 9.0%
- 2001/2002 9.6%

The geometric average of these is 6.4%.

The current salary increase rates vary by service. They range from 13.25% for new teachers to 4.75% for the teachers with 10 or more years of service. The average increase, taking into account ERB's age/service distribution, is about 6.00%.

## **Analysis of Experience and Recommendations - Continued**

Theoretically, the salary increase rates can be divided into three components: (i) inflation, (ii) a productivity component that applies to all employees regardless of service, and (iii) a longevity/merit/promotional component that is a function of service. During the study period, inflation averaged 2.5%, and productivity—the excess increase for members with 10 or more years of service—averaged 2.9%. However, the apparent productivity component is up dramatically from just two years ago, when it was just 1.8%.

Large pay increases occurred between the 2000 and 2001 school years, and again between the 2001 and 2002 school years. We are inclined to discount this spike as short term in nature. It may reflect an attempt to quickly remedy a salary schedule that was perceived to be uncompetitive. In any case, we believe we will not see increases like these in the near future, as the current budget crunch restricts the ability of states to increase teacher pay significantly. Therefore, we are recommending no change to this assumption. It should be noted that the service-related part of the assumption matched experience closely.

### **Payroll growth rate**

The salary increase rates discussed above are assumptions applied to individuals. They are used in projecting future benefits. We also use a separate payroll growth assumption, currently 3.00%, in determining the charge needed to amortize the unfunded actuarial accrued liability. The amortization payments are calculated to be a level percentage of payroll, so as payroll increases over time, these charges do too. The amortization percentage is dependent on the rate at which payroll is assumed to increase.

Over the last five years, payroll growth has averaged 6.4%, and it has averaged 5.6% over the last ten years.

Payroll can grow at a rate different from the average pay increase for individual members. There are two reasons for this. First, when older, longer-service members terminate, retire or die, they are generally replaced with new teachers who have a lower salary. Because of this, in most populations that are not growing in size, the growth in total payroll will be smaller than the average pay increase for members. Second, payroll can grow due to an increase in the size of the group. However, despite the fact that ERB has been experiencing substantial growth in membership (at an average of 1.8% over the last ten years), GASB 25 prohibits systems from using anticipated membership growth in setting the payroll growth assumption.

Theoretically, over the long term the total payroll for a population of constant size should grow at about the rate that starting pays increase. These will generally rise with inflation, plus some adjustment for the excess of wage inflation over price inflation, plus an industry-specific adjustment. Although the payroll growth rate has been set at the assumed inflation rate for the last several years, we have become convinced by the data that even after backing out the effect of membership growth, payroll should continue to increase at a rate higher than the inflation rate. Therefore, we are recommending an increase to this assumption from 3.00% to 3.75%. We are therefore assuming that one-half of the 1.50% productivity increase will be passed on in the form of future increases in starting pays. This has no impact on the liabilities of ERB, but it does shorten the amortization period, since we assume there will be more future contributions that can be used to amortize the unfunded actuarial accrued liability.

## **Analysis of Experience and Recommendations - Continued**

### **Cost-of-living increase assumption**

ERB provides automatic post-retirement increases to retired members after they reach 65. Currently, increases are assumed to be 2.00% per year. Some members in a grandfathered group receive an increase before age 65, also assumed to be 2.00%.

The amount of the increase depends on the increase in the CPI-U index, but in most cases it is 50% of the CPI-U increase, not more than 4.00%, and not less than the smaller of 2.00% and 100% of the CPI-U index. When inflation is 3.00%, the ERB benefit increase will still be 2.00%. Therefore, we have left this assumption unchanged.

### **Post-retirement mortality rates**

The mortality table currently being used for non-disabled retirees and for beneficiaries receiving benefits is the 1994 Uninsured Pensioner Mortality Table. The table has separate rates for males and females. The rates are then adjusted by using a two-year setback for males and a one-year setback for females. I.e., we used the table rates for a female, age 59 when determining the probability that a 60-year-old female will die. Using the setbacks recognizes some mortality improvement since the table was produced, and it recognizes the lower mortality experienced by teachers compared to the population studied when the table was developed.

There were 1,048 deaths among the male retirees and 1,390 deaths among female retirees during the last five years. (These figures exclude deaths among beneficiaries and disabled retirees.) Based on the current tables, we expected 1,036 and 1,353 deaths respectively. This produced A/E ratios of 101% for males and 103% for females. This is a good match, but we expect to see continuing mortality improvement (longer life expectancies) in the future. We prefer to have tables set with A/E ratios in the 105% to 115% range, to take this continued improvement into account. Therefore, we are recommending increasing the set backs from two and one year to three and two years for males and females respectively. This will give some room for future improvement in life expectancy. Using the proposed assumption change, the A/E ratios would be 112% for males and 114% for females.

### **Disabled mortality rates**

This is a minor assumption, and it has little impact on the liabilities of ERB. There were 50 male deaths and 76 female deaths among the disabled retirees during the five-year study period. This produced A/E ratios of 100% and 103% respectively. Because of the small numbers involved, we cannot expect a close fit between the assumptions and experience at individual ages. Therefore, we are recommending no change to this assumption.

### **Active mortality rates**

A separate mortality table is used for active teachers. Because there were some problems with some of the files reporting deaths for active members, we could not study this assumption. We do not think this is a serious problem, though, since this assumption has a very minor impact. Therefore, we recommend that we continue to use the current mortality rates for active members.

## **Analysis of Experience and Recommendations - Continued**

### **Disability rates**

Disability is also a minor assumption, with little effect on the liabilities. We found a reasonably close fit between experience and the disability assumption, so we are not recommending making any changes to this assumption either. The A/E ratio was 78% for males but it was 119% for females, and on a combined basis it was 103%. This is considered a good match, given the small numbers of disabled lives.

### **Retirement rates**

We currently use retirement rates that vary by age, service, and sex.

There were 2,130 male retirements during the five-year period, and there were 3,814 female retirements. (This includes only members who retired from active status. It excludes those who were inactive for over a year before retiring.) This produces A/E ratios of 78% for males and 93% for females. (Rates less than 100% are conservative.)

In the last study, the male A/E was 82%, but we decided to take a wait-and-see position with regard to this assumption. With the pattern being reconfirmed in this study, we decided that the male rates are now too high. Therefore, we lowered these at most ages, producing a new set of rates that gives an A/E of 100%. We decided not to modify the female rates, because we believe a 93% ratio is still a reasonably good fit. The average age at retirement closely matches the expected age based on the assumptions (including the new male rates). For males the actual average was 57.6 and the new expected average is 57.8. For females the average age of retirement was 58.1, compared to an expected average of 57.9.

It does appear that the trend of members retiring earlier and earlier that this plan experienced in the early to mid 1990s has slowed or stopped.

### **Termination rates**

Termination rates reflect members who leave for any reason other than death, disability or service retirement. They apply whether the termination is voluntary or involuntary, and whether the member takes a refund or keeps his/her account balance on deposit in ERB. The current termination rates reflect the member's age, service and sex, and we want to continue this practice.

In the aggregate, the current assumptions produce an A/E ratio for males of 105% and an A/E ratio for females of 112%. For this assumption, A/E ratios over 100% are conservative. This is a reasonably good match, and we do not recommend making a change at this time.

### **Other assumptions and refunds**

There are other assumptions made in the course of a valuation, such as the percentage of members who are married, the age difference between husbands and wives, the likelihood that a terminating employee will take a refund, etc. We reviewed these, and decided to recommend no changes to these other assumptions.

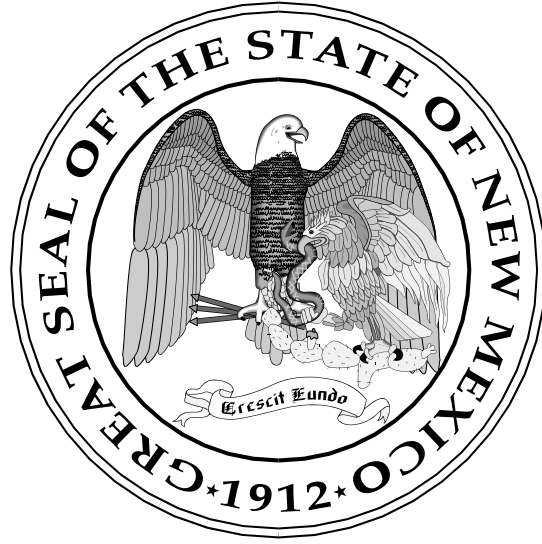


## **Analysis of Experience and Recommendations - Continued**

### **Actuarial methods**

We have reviewed the actuarial cost method being used—the Entry Age Normal cost method—and we continue to believe that this is the method of choice for this plan, since this method usually does the best job of keeping costs level as a percentage of payroll. We also believe the method used to determine the actuarial value of assets (AVA) is appropriate, since it does a good job of smoothing asset gains and losses, and reduces fluctuations in the funding period.

However, the version of the Entry Age cost method that is being used for ERB uses a hypothetical group of new members to determine the normal cost. The current “profile” was based on new members who joined ERB in FY 2000. We have reset the profile based on the age-sex-pay mix of members who joined ERB during the last four years. This had little effect on the plan’s costs, since the new profile looks very similar to the one we had been using. However, we prefer to update this assumption in each Experience Study, so that we do not miss a change in the hiring pattern for new members.



## **Section IV**

### **Actuarial Impact of Recommendations**

## Section IV

### Actuarial Impact of Recommendations

Shown below is a table that compares key statistics from the June 30, 2002 actuarial valuation before and after taking into account the recommended new assumptions. The net result of making all the recommended changes makes only a small change in the picture of ERB's actuarial status.

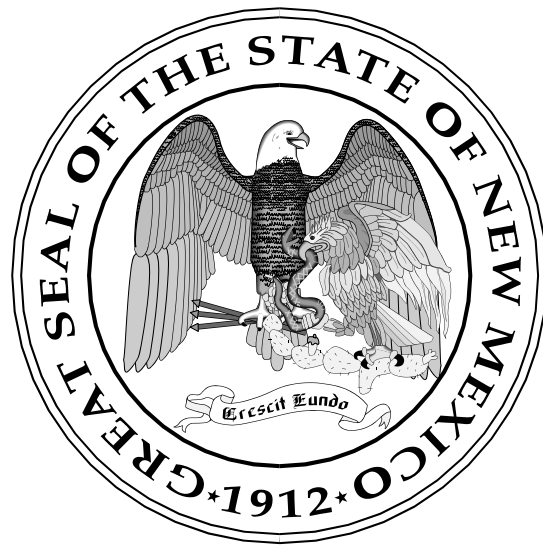
Basis	Normal Cost	UAAL (\$ millions)	Funding Period (Years)
2002 results, before assumption changes	12.72%	\$1,153	27.2
Changing: new entrant profile	12.80%	\$1,133	27.3
Plus: post-retirement mortality rates	12.96%	\$1,238	37.3
Plus: new retirement rates (males)	12.92%	\$1,205	33.7
Plus: incr. payroll growth rate to 3.75%	12.92%	\$1,205	28.4

The normal cost is the average expected cost for a typical new member. The figures shown include both the 7.60% contribution paid by members and the balance to be paid by the employers. The difference between the total 8.65% contribution paid by the employers, and the portion devoted to the normal cost, is used to amortize the unfunded actuarial accrued liability (UAAL). The UAAL is the portion of the total present value of future benefits that is assigned to past years and is in excess of the actuarial value of assets. The funding period is the number of years that will be required to amortize the UAAL, assuming that the employer contribution rate remains at 8.65%. The amortization calculations are made assuming payments increase annually at the payroll growth rate.

Here is a comparison of the 30-year funding costs (the sum of the employer normal cost and a 30-year amortization of the UAAL, assuming payments increasing at the assumed payroll growth rate):

Basis	30-Year Funding Cost
2002 results, before assumption changes	8.48%
Changing: new entrant profile	8.49%
Plus: post-retirement mortality rates	8.98%
Plus: new retirement rates (males)	8.84%
Plus: incr. payroll growth rate to 3.75%	8.55%

As you can see, none of the individual changes are especially significant. The change in mortality rates has the largest effect, and it increases liabilities. The change to the male retirement rates offsets part of this effect. The increase in the payroll growth rate does not affect the liabilities but does lower the contribution rate, because a higher payroll growth implies more contributions available in the future to amortize the UAAL.



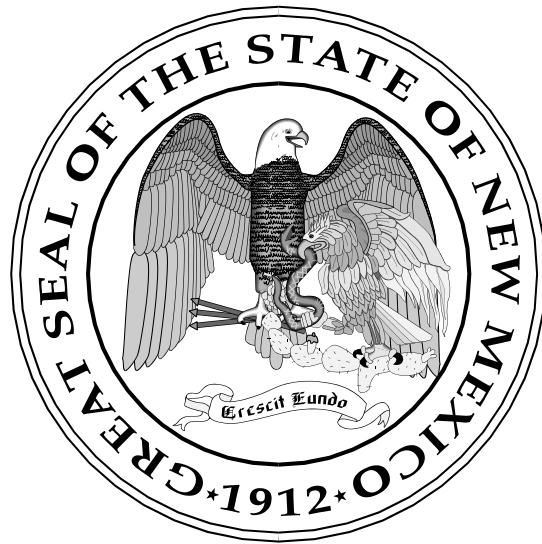
**SECTION V**  
**SUMMARY OF RECOMMENDATIONS**

## **Section V**

### **Summary of Recommendations**

Our recommendations may be summarized as follows:

1. Change the profile of typical new hires to one based on new members during the 1999 through 2002 actuarial valuations. (The previous profile was based on new members reported in the 2000 valuation.)
2. Change the post-retirement mortality tables for non-disabled lives. The current rates are based on the UP-1994 mortality table, with male rates set back two years and female rates set back one year. The proposed new table would increase the setbacks to three years for males and two years for females. This effectively lowers assumed mortality and increases the assumed life expectancies.
3. Change the male retirement rates as shown in the next section. This lowers the probability of retirement at most ages for members with 25 or more years of service.
4. Increase the payroll growth rate from 3.00% to 3.75%.
5. Make no changes to the other actuarial assumptions and methods being used.



## SECTION VI

### **SUMMARY OF ASSUMPTIONS AND METHODS INCORPORATING THE RECOMMENDED ASSUMPTIONS**

## Section VI

### Summary of Assumptions and Methods Incorporating the Recommended Assumptions

#### I. Valuation Date

The valuation date is June 30th of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

#### II. Actuarial Cost Method

The contribution rate is set by statute for both employees and for the employers. The funding period is determined, as described below, using the Entry Age Normal actuarial cost method.

The Entry Age Normal actuarial cost method assigns the plan's total unfunded liabilities (the actuarial present value of future benefits less the actuarial value of assets) to various periods. The unfunded actuarial accrued liability is assigned to years prior to the valuation, and the normal cost is assigned to the year following the valuation. The remaining costs are the normal costs for future years. Then each year's contribution is composed of (i) that year's normal cost, plus (ii) a payment used to reduce the unfunded actuarial accrued liability.

The normal cost is the level (as a percentage of pay) contribution required to fund the benefits for a new member. This is determined based upon a hypothetical group of new entrants. This group is based on the age-pay-sex distribution of new members joining ERB during the four-year period ending June 30, 2002. Part of the normal cost is paid from the employees' own contributions. The local employers pay the balance from their contributions.

The actuarial accrued liability is the difference between the total present value of future benefits and the actuarial present value of future normal costs. The unfunded actuarial accrued liability is the excess of the actuarial accrued liability over the actuarial value of assets.

The balance of the employers' contributions--the remainder after paying their share of the normal cost--is used to reduce the unfunded actuarial accrued liability. The funding period is the length of time required for the unfunded actuarial accrued liability to be completely amortized, assuming that the portion used to reduce the unfunded remains level as a percentage of total payroll, which is assumed to grow 3.75% per year. The 3.00% contribution made by employers to ERB on behalf of employees who elected to participate in the Alternative Retirement Plan is also used to amortize the unfunded actuarial accrued liability.

It is assumed that amortization payments are made monthly at the end of the month.

## Summary of Actuarial Methods and Assumptions - Continued

### III. Actuarial Value of Assets

The actuarial value of assets is based on the market value of assets with a five-year phase-in of actual investment return in excess of (less than) expected investment income. Expected investment income is determined using the assumed investment return rate and the market value of assets (adjusted for receipts and disbursements during the year). Returns are measured net of all investment and administrative expenses.

### IV. Actuarial Assumptions

#### A. Economic Assumptions

1. Investment return: 8.00%, compounded annually, net of expenses. This is made up of a 3.00% inflation rate and a 5.00% real rate of return.
2. Salary increase rate: Inflation rate of 3.00% plus productivity increase rate of 1.50% plus step-rate/promotional as shown:

<u>Years of Service</u>	<u>Annual Step-Rate/Promotional Component Rates of Increase</u>	<u>Total Annual Rate of Increase</u>
0	8.50%	13.00%
1	2.75%	7.25%
2	1.75%	6.25%
3	1.25%	5.75%
4	1.00%	5.50%
5	0.75%	5.25%
6	0.50%	5.00%
7	0.25%	4.75%
8	0.25%	4.75%
9	0.25%	4.75%
10 or more	0.00%	4.50%

3. Cost-of-living increases:
  - a. All retirees and beneficiaries - 2% per year increase, beginning in the year the member reaches age 65
  - b. Members retired prior to July 1, 1984 - 2% per year until they reach age 65
4. Payroll growth:  
3.75% per year (with no allowance for membership growth)



## Summary of Actuarial Methods and Assumptions - Continued

### B. Demographic Assumptions

#### 1. Mortality after termination or retirement -

- a. Healthy males - 1994 Uninsured Pensioner Mortality Table for males, set back three years
- b. Healthy females - 1994 Uninsured Pensioner Mortality Table for females, set back two years
- c. Disabled males and females - 1981 Disability Table

See sample rates below:

Age	Deaths per 100 Lives		
	Healthy Males	Healthy Females	Disabled Males and Females
40	.10	.06	1.76
45	.13	.09	2.08
50	.20	.13	2.42
55	.35	.21	2.83
60	.60	.36	3.29
65	1.09	.72	3.76
70	1.94	1.26	4.36
75	3.06	1.97	5.62
80	4.86	3.41	8.84
85	8.12	5.90	12.95

#### 2. Mortality rates of active members - As shown below for sample ages:

Age	Deaths per 100 Members	
	Males	Females
25	.10	.02
30	.10	.02
35	.08	.04
40	.08	.03
45	.11	.05
50	.15	.10
55	.23	.17
60	.31	.24
65	.46	.31

## Summary of Actuarial Methods and Assumptions - Continued

3. Disability - As shown below for selected ages (rates are only applied to eligible members — members with at least 10 years of service):

Age	Occurrence of Disability per 100 Members	
	Males	Females
25	.00	.00
30	.00	.03
35	.06	.07
40	.13	.12
45	.19	.16
50	.24	.19
55	.26	.20
60	.24	.19
65	.18	.16

4. Retirement - Select and ultimate as shown below for selected ages (rates are only applied to members eligible for retirement):

### Retirement Per 100 Members

Age	<u>Males</u> Years of Service					
	0-4	5-9	10-14	15-19	20-24	25+
45	0.00	0.00	0.00	0.00	0.00	20.00
50	0.00	0.00	0.00	0.00	0.00	20.00
55	0.00	0.00	0.00	0.00	5.00	20.00
60	0.00	0.00	0.00	15.00	20.00	25.00
62	0.00	0.00	40.00	40.00	35.00	35.00
65	0.00	25.00	40.00	45.00	45.00	45.00
70	100.00	100.00	100.00	100.00	100.00	100.00

Age	<u>Females</u> Years of Service					
	0-4	5-9	10-14	15-19	20-24	25+
45	0.00	0.00	0.00	0.00	0.00	20.00
50	0.00	0.00	0.00	0.00	0.00	20.00
55	0.00	0.00	0.00	0.00	6.00	23.00
60	0.00	0.00	0.00	20.00	15.00	30.00
62	0.00	0.00	50.00	35.00	35.00	40.00
65	0.00	35.00	35.00	35.00	35.00	35.00
70	100.00	100.00	100.00	100.00	100.00	100.00

## Summary of Actuarial Methods and Assumptions - Continued

5. Termination (for causes other than death, disability or retirement) - Select and ultimate as shown below for selected ages:

<u>Terminations per 100 Members</u>											
<u>Males</u>											
Years of Service											
<u>Age</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10+</u>
25	45.10	33.50	23.39	17.10	13.75	11.68	10.21	8.94	7.79	7.10	8.86
30	42.28	28.78	20.12	14.85	11.95	10.34	9.17	8.08	7.04	6.28	5.99
35	40.37	26.82	18.43	13.40	10.65	9.29	8.37	7.48	6.58	5.80	3.84
40	39.28	26.65	17.89	12.64	9.85	8.56	7.82	7.13	6.38	5.65	2.40
45	38.59	26.98	18.04	12.55	9.58	8.20	7.49	6.94	6.37	5.79	1.81
50	37.83	27.06	18.60	13.10	9.90	8.24	7.35	6.83	6.45	6.13	2.50
55	36.87	26.97	19.58	14.29	10.83	8.70	7.43	6.77	6.54	6.59	5.30
60	35.79	27.22	21.09	16.11	12.36	9.58	7.69	6.74	6.57	7.11	10.67
65	34.67	28.18	23.21	18.55	14.47	0.00	0.00	0.00	0.00	0.00	0.00

<u>Females</u>											
Years of Service											
<u>Age</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10+</u>
25	40.50	29.30	21.62	17.88	16.08	14.90	13.60	11.81	9.39	6.66	7.55
30	36.06	25.45	18.97	15.08	12.93	11.68	10.69	9.58	8.12	6.36	5.47
35	33.25	23.24	16.75	12.79	10.57	9.37	8.62	7.94	7.11	6.03	3.87
40	31.79	22.00	15.10	11.14	9.05	7.99	7.34	6.86	6.35	5.66	2.76
45	31.29	21.37	14.28	10.40	8.46	7.48	6.83	6.32	5.87	5.32	2.20
50	31.49	21.39	14.49	10.65	8.71	7.71	6.96	6.32	5.74	5.18	2.27
55	32.32	22.32	15.72	11.79	9.67	8.47	7.57	6.76	6.02	5.39	3.10
60	33.76	24.34	17.95	13.71	11.24	9.62	8.51	7.54	6.72	6.07	4.95
65	35.82	27.54	21.14	16.33	13.36	0.00	0.00	0.00	0.00	0.00	0.00

Rates are not applied after the member is eligible for reduced or unreduced retirement benefits.

## Summary of Actuarial Methods and Assumptions - Continued

### C. Other Assumptions

1. Age difference: Male members are assumed to be three years older than their spouses, and female members are assumed to be three years younger than their spouses. All beneficiaries are assumed to be spouses.
2. Percent electing annuity on death: It is assumed that beneficiaries of deceased members will elect to receive the refund of contributions with interest, unless the member is eligible for early or normal retirement, in which case the beneficiary will elect to receive the survivor annuity.
3. Percent electing deferred termination benefit: All vested active members terminating prior to eligibility for a retirement benefit are assumed to elect the more valuable of (i) an immediate refund, or (ii) a deferred annuity commencing when the member is eligible for an unreduced retirement benefit.
4. Assumed age for commencement of deferred benefits: Members electing to receive a deferred benefit are assumed to commence receipt when eligible for an unreduced benefit (or attained age if later).
5. Investment and administrative expenses: The assumed investment return rate is intended to be the net rate of return after payment of all investment and administrative expenses.

### V. Participant Data

Participant data was supplied on electronic file for (i) active members, (ii) inactive members, who are entitled to either a future deferred benefit or a refund of their employee contributions and the accumulated interest, and (iii) members and beneficiaries receiving benefits.

The data for active and inactive, non-retired members included birth date, sex, years of service, salary, and accumulated employee contributions (without interest). For retired members and beneficiaries, the data included date of birth, sex, beneficiary or joint annuitant date of birth (where applicable), current monthly benefit, date of retirement, and a form of payment code.

Salary supplied for the current year was the total earnings for the year preceding the valuation date.