



**State of Alaska**

**Teachers' Retirement System**

**Review of Inflation Component  
of Economic Assumptions**

**October 1994**

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# Section 1

## Introduction

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### Role of Inflation Assumption in Funding the System

The ultimate cost of a pension plan cannot be determined in advance as it depends upon three factors, the precise effects of which can only be known once the last member has left the plan. These factors are:

- the investment returns generated by the fund's assets;
- the costs of administration, actuarial and advisory services, and
- the actual experience over the duration of the plan with respect to retirement, termination from service, mortality, disability, salary increases and health inflation.

One of the primary functions of an actuarial valuation is to determine an annual contribution amount that is expected to adequately provide for future benefits and that is expected to remain relatively stable from year to year. To determine the annual contribution amount, assumptions must first be made that estimate the amount and incidence of future benefit payouts and the economic value of those payouts as of the valuation date.

The assumptions chosen for the actuarial valuation are central to funding the plan in an orderly way and with assurance that the funds accumulated through annual contributions and investment returns will provide participants with promised benefits. Since economic and demographic factors change over time, periodic studies of the assumptions and their relation to past and expected future experience are undertaken to determine whether they continue to be valid or if changes should be made. These studies are usually done every four or five years. The most recent study, which encompassed all actuarial assumptions used in funding the System, was prepared and presented to the TRS Board in October 1991.

There are two general categories of assumptions, demographic and economic. Demographic assumptions relate to the System's population and how it is expected to change over time. Examples of demographic assumptions include rates of retirement, disability, termination, and death. These assumptions tend to be fairly stable over time, and are not included in this review.

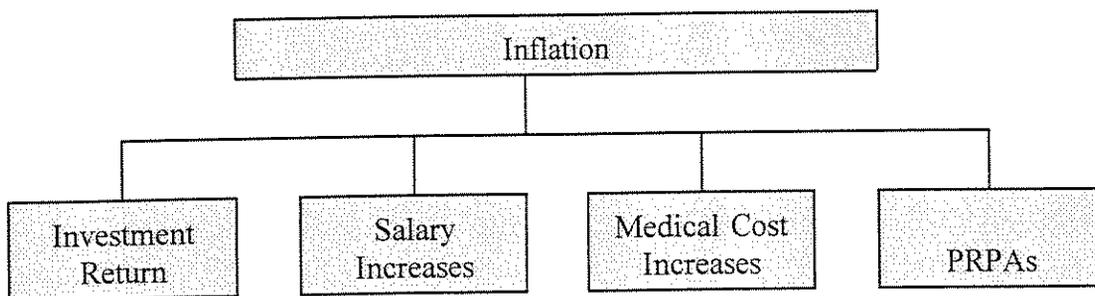


## Section 1 Introduction (continued)

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Economic assumptions refer to the expected long-term financial experience of the System, and include:

- investment return on the System's assets
- salary increases
- retiree health premium inflation
- future Post-Retirement Pension Adjustments (PRPAs)



As depicted in the diagram above, each of these assumptions directly depends upon the assumed rate of future inflation. The inflation assumption adopted for the System is therefore crucial to its proper funding.

While each of the economic assumptions has an inflation component, changes in the assumptions as a result of a change in assumed inflation will affect plan liabilities in different ways. Changes in the assumed rate of investment return rate will affect System liabilities in the opposite direction. In other words, decreasing the investment return rate will increase System liabilities and contribution requirements, since System assets would be expected to grow at a slower rate. In contrast to this, changes in each of the other economic assumptions will affect liabilities in the same direction. For example, decreases in the salary increase assumption, the medical cost assumption or PRPA will lower System liabilities and contribution requirements. This would have the effect of offsetting the increases resulting from a lower investment return rate.

# Section 1

## Introduction (continued)

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The following table indicates the direction in which liabilities would move for given changes in the assumed inflation rate.

Effect on Plan Liabilities		
	Inflation	
	↑	↓
Investment Return	↓	↑
Salary Increases	↑	↓
Medical Cost Increases	↑	↓
PRPAs	↑	↓

The inflation assumption currently being used by the TRS is 5% per year. Inflation is typically measured by the Consumer Price Index (CPI) for urban wage earners and clerical workers. This statistic is published by the U.S. Department of Labor, Bureau of Labor Statistics.

Based on CPI data over the last 20 years and on reasonable expectations of future levels, we recommend that the inflation assumption for the System be reduced from 5% to 4% per year. The reasoning behind this recommendation is discussed in Section 2 of the Report. Section 7 of this Report summarizes the effects of this change on the FY96 contribution rate and the funding ratio as of June 30, 1993. We have also investigated the sensitivity of changes in this assumption on the contribution rate and funding ratio. In particular, the effects of assuming 3½% and 4½% inflation have been summarized in Section 8.

Sections 3 – 6 examine in more detail how inflation impacts the assumptions on investment return, salaries, retiree health premiums and the PRPA.

# Section 1 Introduction (continued)

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This analysis is based on employee census information provided annually by the State of Alaska to perform the actuarial valuation of the System. Generally acceptable actuarial methods and techniques were used to evaluate the financial effect on the System of the proposed changes. The current actuarial assumptions used by the System are summarized in the Appendix. The undersigned are available to answer any questions with respect to this report.

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## Section 2

# Analysis of the Consumer Price Index

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The Consumer Price Index is a measure of the average change in prices over time of a defined basket of goods and services. It is based on prices of food, clothing, shelter, fuels, transportation, medical fees and other day-to-day living expenses. The index is created by calculating price changes for the various items. A weighted average of these price changes is then used to create the index. The index is calculated for selected individual cities and then averaged to create the national index.

The following schedule summarizes annualized CPI data since 1964. The data are shown separately for Anchorage and for the U.S. and were obtained from the Bureau of Labor Statistics.

	<u>Anchorage</u>	<u>National</u>
1964 – 93	4.5%	5.3%
1979 – 93	4.3%	5.2%
1984 – 93	2.9%	3.7%
1989 – 93	4.0%	3.9%
4 quarters ending 06/30/94	2.1%	2.5%
2 quarters ending 06/30/94	3.2%	3.0%

These data confirm that inflation, as measured by the CPI, has been trending lower since the latter half of the 1970s and the early 1980s. Inflation for the most recent four quarters was just 2.1% per year in Anchorage and 2.5% for the country as a whole. Although inflation in Anchorage during the last 15 years was lower than the country as a whole, it was roughly the same on average for the last 5 years, indicating significantly lower inflation in Anchorage during the 1980s.

There may be some justification for adopting two inflation assumptions for the System, one for Anchorage (as a proxy for the State) and the other for the country as a whole. The rationale behind this approach is that the inflation component of investment return should reflect inflationary expectations for the U.S. in general, whereas the inflation component of the salary scale and the PRPA should reflect inflation expectations for Alaska. As discussed above, recent history shows some differences between the inflation rates of Anchorage and the U.S. and this could be attributed primarily to the recession in Alaska caused by the oil price decline. As we



## Section 2

# Analysis of the Consumer Price Index

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cannot reasonably anticipate that a similar divergence could occur in the future, we recommend that one inflation assumption be adopted.

Overall declining inflationary trends over the last 15 years can be attributed to three main factors:

- increasing use of monetary policy to control inflationary pressures
- global recession
- general reduction in energy prices

The energy crisis of the early 1970s is generally believed to be the major factor which caused the historically high inflation rates of the late 1970s. During that period inflation nationally averaged in excess of 9% per year reaching a high of 13.3% in 1979.

On a shorter-term basis, there have been several indications that the downward trend in inflation may be reversing as the current economic growth cycle matures. Such indications include rising commodity prices, including the gold price, and strong rising trends in the producer price index and in capacity utilization. Also, stronger inflationary trends could result as some countries in Europe and the Far East emerge from recession. Some of these factors have caused the Federal Reserve to move to slow economic growth by increasing short-term interest rates this year.

As with the other elements of the actuarial basis, historical inflation statistics can only be used as a guide in determining appropriate assumptions which reflect reasonable expectations of future inflation levels.

In summary, we do not believe that a long-term 5% inflation assumption continues to be appropriate. Inflation rates will vary from time to time as the U.S. moves through the natural expanding and contracting economic cycles but, in deciding on a stable long-term rate, we recommend a 4% inflation assumption be adopted for the System. This is consistent with the average inflation rate during the past 5 – 10 years, as well as with the outlook for the future. The effects on the FY96 contribution rate and the funding level at June 30, 1993, are shown in Section 7 of this report. We have also illustrated the sensitivity of the inflation assumption by comparing results using 3½% and 4½% inflation rates with the proposed 4% rate. These comparisons are shown in Section 8.



## Section 3

# Elements of the Actuarial Basis Which Depend on Inflation – Investment Return

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The investment return assumption is one of the most important elements of the actuarial basis in that it covers the entire lifetime of System participants, making the results of the valuation extremely sensitive to this assumption. The investment return assumption represents the average long-term rate of return expected to be realized on the investment portfolio of the System over the System's future lifetime. Current System liabilities and recommended contribution rates are determined by discounting all future benefits payable to current and future retirees and their beneficiaries at this rate of interest. It is important not to overestimate the expected future investment returns, otherwise actuarial losses could occur resulting in unanticipated contribution rate increases. However, it should be remembered that short-term expectations of interest rate levels should have little influence on the determination of a valuation assumption which should rather represent best estimates of the long-term average return which can be anticipated for the System assets.

The annual investment return is comprised of three major components:

- The increase in overall productivity
- The risk premium associated with each investment class
- Inflation

The first two of these represent the "real" rate of return. Since 1991, the real rate of return implicit in the investment rate has been 3¾% for PERS and 4% for TRS. Last Spring, the Alaska State Pension Investment Board commissioned a study of expected investment return and used a 4% real return assumption. We believe this remains reasonable and propose to use 4% for both PERS and TRS.

In the last section we recommended reducing the inflation assumption from 5% to 4% per year. When added to a real rate of return assumption of 4%, the investment return assumption becomes 8%, a reduction of ¾% from the current 8¾% rate. We have commented in recent years that the State's assumption of 8¾% is, in general, at the high end of the range of assumptions adopted by other State systems. A reduction in the rate to 8% would bring the assumption closer to the median of the range.

The effect of a lower investment return assumption would, when considered in isolation, increase the liabilities of the System as the Fund's assets would be expected to accrue at a slower rate.



## Section 4

# Elements of the Actuarial Basis Which Depend on Inflation – Salary Scale

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As System benefits are based on participants' salaries, an assumption needs to be made of future salary increases while an employee is a participant of the System. Anticipated salary increases should not be underestimated as this could generate unanticipated additional liabilities which would result in increasing contribution levels. In recent years, the System has consistently experienced actuarial gains from salary increases as they have tended to be less than anticipated by the assumption.

The salary scale can be separated into three major components:

- merit
- productivity
- inflation

The merit and productivity increase components represent that portion of future salary increases relating to an employee's increasing responsibility and efficiency but, in terms of impact on funding the System, the inflation component is far more important. The System currently assumes a 5% inflation component, a ½% productivity component, and a 1% merit component during the first 5 years of service. Reducing the inflation component to 4% while holding the other components constant would result in a salary scale assumption of 5½% for the first 5 years of employment and 4½% thereafter.

Taken on its own, the effect of reducing the inflation component of the salary scale would be to reduce liabilities as expected benefit levels at retirement are lower. However, as discussed in the preceding section, this effect is offset by a similar reduction in the investment return assumption which increases System liabilities by discounting future benefits at a lower rate of interest.

When assessing the impact on the funding of the System of changes in the salary scale and investment return assumptions, the relationship between the two is of far greater importance than their absolute amounts. As we are proposing a reduction of 1% in both assumptions, the combined effect on the liabilities and funding of the System is somewhat offset.



## Section 5

# Elements of the Actuarial Basis Which Depend on Inflation – Health Cost Trend

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A unique feature of the TRS is the fact that it provides major medical insurance coverage to certain participants receiving benefits from the System and to their spouses and dependent children. Assumptions, therefore, need to be made for the rate of increase of future medical premiums. In recent years, the System has experienced actuarial losses as health premiums have increased faster than the TRS assumption.

It is well known that, during the 1980s and early 1990s, medical inflation has significantly exceeded the general CPI, due in part to improving medical technology and increased utilization of services. This fact is recognized in the funding of the System as the assumed increase in retiree medical premiums is significantly greater than the assumed inflation rate of 5%. However, it is not reasonable to assume that medical inflation can exceed general price inflation by a significant margin indefinitely and the TRS assumptions recognize this by trending the excess down over time. Currently, the health cost trend assumption, which comprises inflation and other factors such as utilization, is:

FY95:	9½% per year
FY96:	8½% per year
FY97 and later:	7½% per year

The System therefore currently assumes that the excess of health inflation over general price inflation will remain consistent at 2½% per year after FY96. Whether this excess is reasonable in the longer term will depend to a large extent on how health reform emerges in Alaska or the nation. Because the outcome is still uncertain, in Section 8 we have shown the effects on the funding ratio and contribution rates of two changes in the health cost trend for each inflation assumption. One change reduces the trend from 9.5% in FY95 by steps of 1% each year until it reaches the assumed inflation rate. The other reduces the trend by steps of 1% each year until it reaches the inflation rate + 1½%. As the population ages, we expect that the health cost trend will continue to increase faster than general price inflation due to increased utilization of services. We therefore propose the latter approach, i.e., a health trend assumption reducing ultimately to inflation + 1½%.

It is important not to underestimate future medical inflation as this would generate actuarial losses which would result in unanticipated additional liabilities. Nevertheless, taken on its own, a reduction in the ultimate assumed rate of increase of retiree medical premiums will result in lower System liabilities and contribution levels.



## **Section 6**

# **Elements of the Actuarial Basis Which Depend on Inflation – The PRPA**

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Post-retirement pension adjustments (PRPAs) are granted annually to eligible benefit recipients when the Anchorage CPI increases during the preceding calendar year. If the recipient is at least 65 or on disability, the increase is 75% of the increase in the CPI or 9%, whichever is less. An increase of the lesser of 50% of the CPI or 6% is granted to recipients who are at least 60 or, if not age 60, have been receiving benefits for at least eight years.

It is important not to underestimate future inflation levels as this would result in unanticipated liability increases and increases in cost. A reduction in the inflation assumption would result in smaller anticipated PRPAs for current and future benefit recipients which would reduce System liabilities. This impact would be mitigated by the fact that these future benefits would be discounted at a lower rate of interest which increases the current value of those benefits.

## Section 7 Summary of Results



	Current Basis	Proposed Basis
Inflation Assumption	5%	4%
Investment Return Assumption	9%	8%
Salary Scale	6½%/5½%	5½%/4½%
Health Trend Assumption	9½%→7½%	9½%→5½%

Information as of 06/30/93 (\$,000s)

Accrued Liability	\$2,429,456	\$2,533,247
Valuation Assets	2,261,082	2,261,082
<b>Funding Ratio</b>	93.1%	89.3%
FY96 Normal Cost Rate	9.06%	9.65%
FY96 Past Service Rate	<u>3.42%</u>	<u>5.13%</u>
<b>Total Calculated FY96 Employer Rate</b>	12.48%	14.78%
Actuarial Projection Rate	12.00%	12.00%

The results under the proposed basis are shown assuming the health trend assumption declines ultimately to the inflation rate + 1½%.

The results show that the combined effect of reducing the inflation rate from 5% to 4% and of modifying the health trend assumption from the current basis results in a decrease in the funding ratio and an increase in the calculated FY96 contribution rate.

The graph on the next page shows the effect of these changes on the Actuarial Projections shown in your June 30, 1993 valuation report. As you can see, the calculated rate is higher, but the smoothed 12.00% funding rate can still be supported. Of course, we will recalculate this rate annually and adjust the smoothed rate in the future, if necessary.

# State of Alaska TRS Projected Contribution Rates 4% CPI Assumption Change

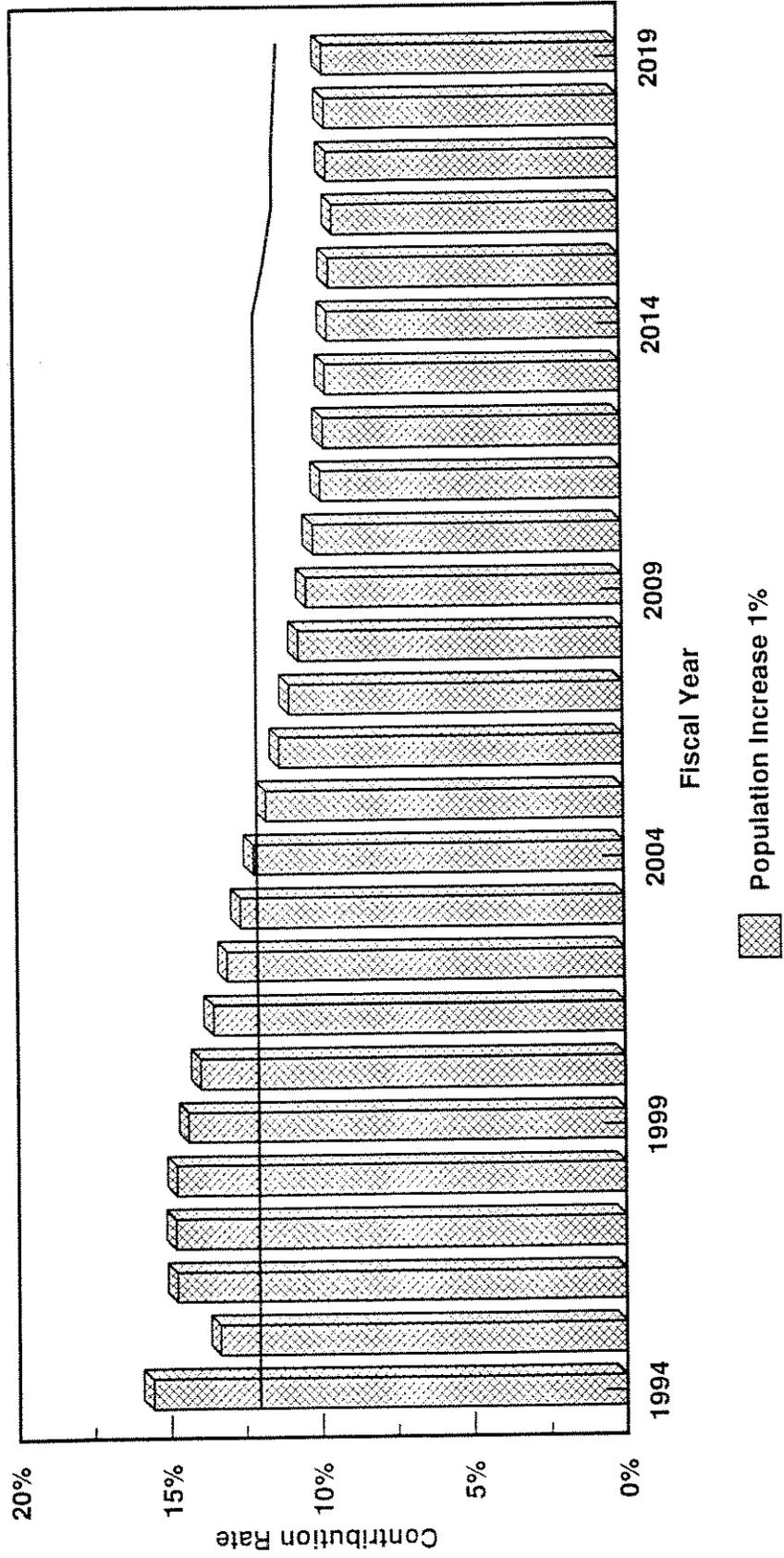


Table 2

State of Alaska TRS  
Financial Projections ('000 omitted)

As of June 30	Investment Return 8.00%			Valuation Amounts on July 1			Surplus* (Deficit)			Total Salaries			Flow Amounts During Following 12 Months			Annual Population Increase 1.00%			Ending Asset Value	
	Total Assets	Accrued Liability	Funding Ratio	Total Assets	Accrued Liability	Funding Ratio	Total Salaries	Surplus* (Deficit)	Total Salaries	Employer Ctb Rate	Employee Ctb Rate	Total Contributions	Total Payments	Net Contribs	Investment Earnings	Net Contribs	Investment Earnings	Total Assets	Accrued Liability	Funding Ratio
1993	2,261,082	2,533,247	89.3%	(272,165)	459,744	15.59%	72,308	40,457	112,766	129,428	(16,662)	180,220	2,424,640							
1994	2,424,640	2,698,795	89.8%	(274,155)	467,877	13.36%	63,378	41,699	105,077	138,894	(33,817)	192,619	2,583,441							
1995	2,583,441	2,868,951	90.0%	(285,509)	480,898	14.78%	72,101	42,828	114,929	150,587	(35,658)	205,249	2,753,033							
1996	2,753,033	3,042,944	90.5%	(289,912)	494,687	14.82%	74,291	43,970	118,261	165,213	(46,952)	218,365	2,924,445							
1997	2,924,445	3,216,928	90.9%	(292,483)	508,052	14.78%	76,161	45,142	121,303	181,042	(59,739)	231,566	3,096,272							
1998	3,096,272	3,389,453	91.4%	(293,180)	522,594	14.39%	76,606	46,570	123,176	195,192	(72,017)	244,821	3,269,077							
1999	3,269,077	3,563,868	91.7%	(294,791)	541,863	13.99%	77,179	48,201	125,380	213,267	(87,887)	258,011	3,439,201							
2000	3,439,201	3,733,712	92.1%	(294,511)	561,132	13.54%	77,266	49,828	127,094	231,771	(104,677)	270,949	3,605,473							
2001	3,605,473	3,898,731	92.5%	(293,258)	580,401	13.07%	77,123	51,451	128,574	250,587	(122,013)	283,557	3,767,018							
2002	3,767,018	4,058,859	92.8%	(291,841)	599,670	12.61%	76,821	53,070	129,892	268,989	(139,097)	295,798	3,923,718							
2003	3,923,718	4,214,220	93.1%	(290,502)	618,939	12.16%	77,102	55,155	132,257	287,920	(155,663)	307,671	4,075,726							
2004	4,075,726	4,365,129	93.4%	(289,403)	648,984	11.74%	77,973	57,702	135,676	306,128	(170,452)	319,240	4,224,514							
2005	4,224,514	4,512,089	93.6%	(287,575)	679,029	11.28%	78,260	60,244	138,504	324,901	(186,397)	330,505	4,368,622							
2006	4,368,622	4,655,793	93.8%	(287,170)	709,074	10.94%	79,234	62,779	142,013	343,053	(201,040)	341,448	4,509,030							
2007	4,509,030	4,797,122	94.0%	(288,092)	739,119	10.63%	80,166	65,309	145,475	360,232	(214,758)	352,132	4,646,405							
2008	4,646,405	4,937,150	94.1%	(290,745)	769,164	10.36%	82,032	68,476	150,508	375,814	(225,306)	362,700	4,783,800							
2009	4,783,800	5,077,137	94.2%	(293,337)	814,093	10.13%	84,768	72,362	157,131	391,012	(233,881)	373,349	4,923,267							
2010	4,923,267	5,218,534	94.3%	(295,267)	859,023	9.86%	86,897	76,249	163,146	405,697	(242,551)	384,159	5,064,875							
2011	5,064,875	5,362,982	94.4%	(298,107)	903,952	9.77%	90,505	80,135	170,640	419,240	(248,600)	395,246	5,211,522							
2012	5,211,522	5,512,310	94.5%	(300,789)	948,881	9.68%	94,058	84,021	178,080	432,585	(254,505)	406,742	5,363,758							
2013	5,363,758	5,668,539	94.6%	(304,781)	993,811	9.61%	98,621	88,727	187,348	445,403	(258,056)	418,778	5,524,481							
2014	5,524,481	5,833,876	94.7%	(309,395)	1,057,684	9.55%	104,068	94,252	198,320	456,993	(258,673)	431,612	5,697,419							
2015	5,697,419	6,010,721	94.8%	(313,301)	1,121,559	9.42%	108,680	99,777	208,458	466,414	(257,957)	445,475	5,884,938							
2016	5,884,938	6,201,660	94.9%	(316,723)	1,185,433	9.60%	116,807	105,302	222,109	478,539	(256,430)	460,538	6,089,046							
2017	6,089,046	6,409,473	95.0%	(320,427)	1,249,307	9.64%	123,542	110,828	234,369	491,275	(256,906)	476,847	6,308,987							
2018	6,308,987	6,637,125	95.1%	(328,138)	1,313,181	9.68%	127,129	113,590	240,719	505,155	(264,436)	494,142	6,538,693							

\* Surpluses reduce employer contributions over 5 years  
\* Deficits increase employer contributions over 25 years



## Section 8 Sensitivity Analysis

Information as of 06/30/93 (\$,000s)

Inflation Assumption	Proposed Basis		4% -----4%-----	3½% -----3½%-----		4½% -----4½%-----
	9½%→4%	9½%→5½%		9½%→3½%	9½%→4½%	
Accrued Liability	\$2,492,433	\$2,533,247	\$2,562,090	\$2,602,982	\$2,426,342	\$2,468,488
Valuation Assets	2,261,082	2,261,082	2,261,082	2,261,082	2,261,082	2,261,082
<b>Funding Ratio</b>	90.7%	89.3%	88.3%	86.9%	93.2%	91.6%
FY96 Normal Cost Rate	9.07%	9.65%	9.60%	10.19%	8.56%	9.15%
FY96 Past Service Rate	<u>4.36%</u>	<u>5.13%</u>	<u>5.46%</u>	<u>6.21%</u>	<u>3.24%</u>	<u>4.06%</u>
<b>Total FY 96 Employer Rate</b>	13.43%	14.78%	15.06%	16.40%	11.80%	13.21%

# Appendix

## Summary of the Current Valuation Assumptions

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1. Investment Return 9% per year, compounded annually, net of expenses.
2. Salary Scale  
Inflation - 5.0%  
Productivity - 0.5%  
Merit (first 5 years) - 1.0%
3. Total Inflation Total inflation as measured by the Consumer Price Index for urban and clerical workers for Anchorage is assumed to increase 5% annually.
4. Health Cost Trend  
FY92 - 12.5%  
FY93 - 11.5%  
FY94 - 10.5%  
FY95 - 9.5%  
FY96 - 8.5%  
FY97 and later - 7.5%
5. Mortality 1984 Unisex Pension Mortality Table, set forward one year for male members and set backward four years for female members. All deaths are assumed to result from nonoccupational causes.
6. Turnover Based upon the 1986 – 90 actual total turnover experience. (See Table 1).
7. Disability Incidence rates based upon the 1986-90 actual experience, in accordance with Table 2. Post-disability mortality in accordance with rates published by the Pension Benefit Guaranty Corporation to reflect mortality of those receiving disability benefits under Social Security.
8. Retirement Age Retirement rates based upon the 1986 – 90 actual experience in accordance with Table 3.
9. Spouse's Age Wives are assumed to be four years younger than husbands.