

Report of
AN ACTUARIAL VALUATION
December 31, 1985 of the
Virginia Fire Department
Relief Association
Virginia, Minnesota

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May 20, 1986

Board of Trustees
Virginia Fire Department Relief Association
Virginia, Minnesota

Submitted in this report are the results of the December 31, 1985 actuarial valuation of the assets, actuarial values and contribution requirements associated with the benefits provided by the Virginia Fire Department Relief Association.

The valuation results contained in Section A provide the actuarial information needed to determine the employer's "minimum obligation" effective January 1, 1987. Section A also contains comments regarding the valuation results.


The valuation was based upon information furnished by the association concerning benefits, financial transactions, active members, terminated members, retirants and beneficiaries. Data was checked for year to year consistency but was not otherwise audited by us. This information is summarized in Section B.

A description of the actuarial funding method and the risk experience assumptions used is contained in Section C. The economic risk experience assumptions, as well as the actuarial funding method to be used, are established by state law.

Information needed to comply with Statement of Financial Accounting Standards No. 35 is contained in Section D.

The actuarial valuation was prepared using generally accepted actuarial principles and practices based upon the methods, assumptions, summary of plan provisions and the member and financial data described in this report.

Respectfully submitted,


Ronald E. W. Smith


Gary W. Findlay

SECTION A
RESULTS OF THE VALUATION

COMMENTS

Economic Assumptions and Financing Method

The economic assumptions of 5% annual investment return and 3-1/2% annual salary increases are established by state law. State law also specifies that the annual minimum obligation of the municipality shall be determined by adding (i) the employer normal cost percent times covered payroll to (ii) the level dollar amount required to amortize the unfunded actuarial accrued liability by December 31, 2010.

It is worth noting that when the same assumptions and methods are applied to plans which differ in nature, the valuation results may not be comparable (for example, it is currently not valid to compare valuation results for a plan having full escalation to valuation results for a plan having a 3-1/2% cap on escalation). Caution should be exercised when attempting to assess the financial condition of one Association relative to another on the basis of valuation results produced using the assumptions and methods mandated by state law.

Virginia Fire Department Relief Association

CONTRIBUTION RATE TO PROVIDE BENEFITS

Member portion & Employer portion

Effective January 1, 1987

<u>Contributions for</u>	<u>If Paid Equally Throughout Year</u>	
	Normal Cost % of Active Payroll for 1987	+ UAAL Dollars
Normal cost of annuities:		
Age & service: to members	12.90%	
Age & service: to survivors	2.96	
Disability	4.23	
Death before retirement	3.08	
Refunds of member contributions	0.19	
Total Normal Cost	<u>23.36</u>	
Amortization of unfunded actuarial accrued liabilities (UAAL) (24 year level dollar payment)		
Retired lives		\$106,194
Active members		<u>65,553</u>
Total		\$171,747
Total Cost of Benefits	23.36%	+ \$171,747
Member contributions	8.00	
COMPUTED EMPLOYER RATE:		
(a) If Paid Equally Throughout Year	15.36%	+ \$171,747
(b) IF PAID AT CALENDAR YEAR END	15.74%	+ \$175,988

Virginia Fire Department Relief Association

Present Actuarial Condition

The Association's accrued actuarial assets were in excess of \$1.7 million on December 31, 1985 -- a considerable sum of money if unencumbered and allocated among a small group of persons. This is not the case with the Association's assets.

The following schedule puts the \$1.7 million into perspective by showing the relationship between actuarial accrued assets, actuarial accrued liabilities, and the number of persons with actual and potential claims on the Association's assets.

	<u>Accrued Actuarial Assets</u>	<u>Actuarial Accrued Liabilities</u>	<u>Unfunded Actuarial Accrued Liabilities</u>	<u>% Funded</u>
Retirants and Beneficiaries				
Retired Members (18)		\$2,868,456		
Surviving Spouses (13)		274,416		
Surviving Children (0)		<u>0</u>		
Total (31)	\$1,641,205	\$3,142,872	\$1,501,667	52.2%
Deferred Members (0)	0	0	0	
Active Members (6)	<u>112,927</u>	<u>1,039,898</u>	<u>926,971</u>	10.9
Total	\$1,754,132	\$4,182,770	\$2,428,638	41.9%

Actuarial accrued liabilities represent the value, computed as of December 31, 1985 of:

- (i) retirement allowances likely to be paid the 31 retirants and beneficiaries; and
- (ii) the contributions assumed to have been made for the 6 active members from their entry into the plan until December 31, 1985.

To illustrate, the value of retirement allowances likely to be paid the 31 retirants and beneficiaries, discounted for investment earnings and mortality, was computed to be \$3,142,872 as of December 31, 1985. This means that if the 31 retirants and beneficiaries live and die according to the assumed mortality and if the \$3,142,872 can be invested to yield an average annual return of 5.0 percent over the remaining lifetimes of the 31 retirants and beneficiaries, then the \$3,142,872 together with investment earnings thereon will just be sufficient to pay the 31 retirants and beneficiaries their allowances for their remaining lifetimes.

With respect to active members, the actuarial accrued liability of \$1,039,898 represents the amount that would have been accumulated by December 31, 1985 if the normal cost (which is expressed as a level percentage of pay) had been contributed from the date of hire until December 31, 1985 for each of the 6 actives, if these amounts had earned 5.0% interest and if the members in the past had lived, died, withdrawn, retired and received salary increases according to the actuarial assumptions shown in this report.

Historical Funding Ratio Schedule
(\$ in thousands)

<u>Valuation Date December 31</u>	<u>Actuarial Accrued Liabilities</u>	<u>Accrued Actuarial Assets</u>	<u>Percent Funded</u>
1978	\$1,564	\$ 577	36.9%
1979	N/A	N/A	N/A
1980	2,711	791	29.2
1981	N/A	N/A	N/A
1982	3,292	1,143	34.7
1983	3,453	1,324	38.3
1983*	3,715	1,324	35.6
1984	3,851	1,551	40.3
1985	4,183	1,754	41.9

* After change in assumptions.

Virginia Fire Department Relief Association
 Computed Contributions - Comparative Schedule

Year Ended December 31		Total Normal Cost as a Percent of Valuation Payroll*	Contribution for Unfunded Actuarial Accrued Liabilities - \$ or %
Valuation	Fiscal		
1978	1980	14.49%	\$ 61,713
1979	1981	N/A	N/A
1980	1982	23.40	123,721
1981	1983	N/A	N/A
1982	1984	22.21	143,165
1983	1985	22.18	144,546
1983	1985**	23.80	162,318
1984	1986	24.15	159,245
1985	1987	23.36	171,747

* Includes employee contributions.

** After change in assumptions.

Virginia Fire Department Relief Association
 CONTRIBUTION FOR CALENDAR YEAR EFFECTIVE JANUARY 1, 1987

For any period of time the percent-of-payroll contribution rate is converted to dollars. The amount of dollars for any calendar year depends upon the results of the last actuarial valuation, and upon the timing of contributions within the year. The later the contribution date, the greater the dollar amount will be.

The municipality's dollar contribution for the year may be determined as follows:

(1) Estimated covered payroll for 1987		\$ _____
(2) Total normal cost % from page A-2		23.36%
(3) Total normal cost (Line 1 times line 2)		\$ _____
(4) Amortization payment on UAAL from page A-2		171,747
(5) Total contributions required (Line 3 plus line 4)		_____
(6) Employee contributions (Line 1 times 8%)		\$ _____
(7) (a) State amortization aid based on 12/31/78 UAAL of \$986,135	\$14,841	
(b) State amortization aid based on 1984 legislation	<u>3,845</u>	
(c) Total State amortization aid		\$18,686
(8) Estimated insurance premium aid		_____
(9) Estimated total contributions from other sources (Line 6 plus line 7 plus line 8)		_____
(10) Employer's Minimum Obligation if payment is made in equal installments throughout the year. (Line 5 minus line 9)		\$ _____
(11) EMPLOYER'S MINIMUM OBLIGATION IF PAYMENT IS MADE AT YEAR END (Line 10 times 1.0247)		\$ _____

SECTION B
VALUATION DATA
AND
SUMMARY OF BENEFIT PROVISIONS

Virginia Fire Department Relief Association
 Retirants and Beneficiaries December 31, 1985
 By Type of Annuity Being Paid

<u>Type of Annuity Being Paid</u>	<u>No.</u>	<u>Monthly Amounts</u>	<u>Computed Accrued Liabilities</u>
Retirants receiving:			
Age & Service	17	\$15,780.00	\$2,593,620
Disability	<u>1</u>	<u>1,054.00</u>	<u>274,836</u>
Totals	18	16,834.00	2,868,456
Beneficiaries receiving:			
Spouse	13	3,069.63	274,416
Child	<u>0</u>	<u>0.00</u>	<u>0</u>
Totals	13	3,069.63	274,416
<hr/>			
Totals	31	\$19,903.63	\$3,142,872

Inactive Members Eligible for Deferred Benefits
 December 31, 1985

<u>No.</u>	<u>Monthly Amount</u>	<u>Computed Accrued Liabilities</u>
0	\$0	\$0

Virginia Fire Department Relief Association
 Retirants and Beneficiaries December 31, 1985
 By Attained Ages

<u>Attained Ages</u>	<u>Number</u>		
	<u>Age & Service</u>	<u>Disability</u>	<u>Death Before Retirement</u>
50-54	2	1	
55-59	3		
60-64	5		
65-69	3		
70-74	7		
75-79	4		
80-84	2		
85-89	3		
90-94	<u>1</u>	<u>—</u>	<u>—</u>
Totals	30	1	0

Virginia Fire Department Relief Association
Retirants and Beneficiaries Added to and Removed from Rolls
Comparative Statement

Valuation Date December 31	No. Added to Rolls	No. Removed from Rolls	Rolls End of Year		% Incr. in Annual Allowances	Average Allowances	Discounted Value of Allowances	
			No.	Annual Allowances			Total	Average
1978			28	\$ 60,438	%	\$2,159	\$ 601,692	\$ 21,489
1979	0	3	25	61,748	2.2	2,470	605,522	24,221
1980*	1	2	24	73,685	19.3	3,070	943,710*	39,321
1981	2	1	25	78,255	6.2	3,130	982,894	39,316
1982#	1	3	23	100,272	28.1	4,360	1,102,287#	47,926
1983	3	3	23	116,432	16.1	5,062	1,353,643	58,854
1984	4	1	26	163,560	40.5	6,291	1,969,200	75,738
1985	5	0	31	238,844	46.0	7,705	3,142,872	101,383

* Plan Amendment (escalation of benefits to retirants).

Plan Amendment (increased benefits to retirants & spouses with retirement date prior to 1974).

Virginia Fire Department Relief Association

Active Members December 31, 1985

By Attained Age and Years of Service

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
40-44				1				1	\$ 27,391
50-54				1				1	27,391
55-59					1	1	1	3	82,361
64							1	1	29,674
Totals				2	1	1	2	6	\$166,817

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 55.2 years.

Service: 25.1 years.

Annual Pay: \$27,803.

Virginia Fire Department Relief Association
 Comparative Schedule
 Of Active Members

Valuation Date December 31	Active Members	Valuation Payroll	Average			
			Age	Service	Pay	% Incr.
1978	17	\$278,235	52.3 yrs.	21.4 yrs.	\$16,367	- %
1979	17	304,017	53.3	22.4	17,883	9.3
1980	16	330,808	53.6	22.5	20,676	15.6
1981	15	345,888	54.6	23.6	23,059	11.5
1982	15	378,078	55.6	24.6	25,205	9.3
1983	14	374,208	55.9	25.1	26,729	6.0
1984	11	299,831	55.6	24.7	27,257	2.0
1985	6	166,817	55.2	25.1	27,803	2.0

Virginia Fire Department Relief Association

Brief Summary (12/31/85) of Benefit Provisions Evaluated and/or Considered

Age & Service Retirement

Eligibility. 20 years of service and 50 years of age.

Amount. For first 20 years of service, 45% of final year's salary. For each year in excess of 20, an additional 1% is added to a maximum of 50% of final year's salary for 25 or more years of service. For each year over 25, an additional 1/2% of base pay is added to the benefit. (The latter additional benefit is not subject to the post-retirement provisions.)

Disability Retirement

Eligibility. Totally or partially disabled to the extent that no longer able to perform duties of a fireman before being eligible for age & service retirement.

Amount.

Total Disability. 50% of final year's salary.

Partial Disability. 35% of final year's salary.

Member's Death While Active, Or In Deferred Status, Or Retired

Eligibility.

Spouse. Legally married to member before separation from service and residing with member at time of death. Benefits terminate upon remarriage.

Child. Younger than age 18.

Amount.

Spouse. 50% of benefit deceased was receiving or would have been eligible to receive. Based on minimum of 20 years of service.

Child. \$300 per child per year.

Maximum Family Benefit. Amount deceased was receiving or would have been eligible to receive.

Vested Deferred. 20 years of service and separated before age 50. Payment beginning is deferred to attainment of age 50.

Post-Retirement Adjustments ("Escalator"). Benefit payments to retired members are increased each January by the lesser of the following percentages: (1) 3-1/2% or (2) the preceeding year's percentage increase in the salary of a first grade fire-fighter.

Member Contributions. 8% of salary. Total member contributions are refundable, without interest, if no monthly benefit is payable upon separation from service.

SECTION C
VALUATION METHODS AND ASSUMPTIONS

Virginia Fire Department Relief Association

Valuation Methods and Assumptions

The Entry Age Normal Cost method was used to determine the normal cost of all benefits.

The rate of investment return (interest) used in making the valuation was 5.0 percent per annum, compounded annually. State law requires use of this assumption.

The mortality table used was the UP-1984 Table set forward 2 years for males and set back 3 years for females.

Sample Ages	Single Life Values: Present Value of \$1 Monthly				Future Life Expectancy (Years)	
	Level For Life		Increasing 3.5% Yearly		Men	Women
	Men	Women	Men	Women		
45	\$177.21	\$189.58	\$280.82	\$314.75	29.50	34.00
50	163.12	177.21	246.55	280.82	25.20	29.50
55	147.50	163.12	212.60	246.55	21.16	25.20
60	130.52	147.50	179.49	212.60	17.42	21.16
65	112.87	130.52	148.28	179.49	14.05	17.42
70	95.20	112.87	119.70	148.28	11.09	14.05
75	77.77	95.20	93.83	119.70	8.52	11.09
80	61.71	77.77	71.69	93.83	6.39	8.52

Age & service retirement was assumed to occur at age 62, or attained age if older.

Sample Rates of Separation From Active Employment Before Retirement, Death or Disability.

Sample Ages	% of Active Members Separating within Next Year
20	1.50%
25	1.25
30	1.00
35	0.75
40	0.50
45	0.25
50+	0.00

Pay Adjustment Factor Used To Project Current Pays

<u>Sample Ages</u>	<u>Present Pay Resulting in Pay of \$1,000 at Age 60</u>	<u>Percent Increase in Pay During Next Year</u>
20	\$ 253	3.5%
25	300	3.5
30	356	3.5
35	423	3.5
40	503	3.5
45	597	3.5
50	709	3.5
55	842	3.5
60	1,000	3.5

Use of the pay adjustment factor illustrated above is required by state law.

Disability retirements were assumed to occur as indicated below:

<u>Sample Ages</u>	<u>% of Active Members Becoming Disabled within Next Year</u>
20	0.08%
25	0.08
30	0.08
35	0.08
40	0.20
45	0.26
50	0.49
55	0.89

SECTION D
ACCUMULATED PLAN BENEFITS

Virginia Fire Department Relief Association
Statement of the Present Value of Accumulated Plan Benefits
December 31, 1985

Actuarial Present Value of
Accumulated Plan Benefits

Vested Benefits:	
Participants currently receiving payments	\$2,430,516
Other participants	498,741
Total Vested Benefits	<u>2,929,257</u>
Non-Vested Benefits	154,067
Total Actuarial Present Value of Accumulated Plan Benefits	<u><u>\$3,083,324</u></u>

The actuarial present value of accumulated plan benefits as of January 1, 1985 was \$3,458,176. During the year, the plan experienced a net decrease of \$374,852 in the actuarial present value of accumulated plan benefits due to general plan experience.

The accompanying notes are an integral part of the Statement of the Present Value of Accumulated Plan Benefits.

1. The actuarial present value of accumulated plan benefits presented in this statement was determined using the following assumptions:
 - a. Future salary increases prior to retirement were not considered for active members.
 - b. Future service was considered only to the extent that it would permit active plan participants to become eligible for benefits attributable to service rendered prior to the date of determination.
 - c. Regular valuation assumptions were used as to mortality, withdrawal, retirement ages and disability.
 - d. Investment return was assumed to be at the rate of 8% compounded annually.
 - e. Salary increase related post-retirement benefit adjustments were assumed to be at the rate of 6-1/2% compounded annually unless a lower rate is specified by law.
2. The calculation of the actuarial present value of accumulated plan benefits was made because of the requirements of the Financial Accounting Standards Board. Comparison of this value with plan assets is not indicative of the future ability of the plan to pay benefits when due or of their security in a termination situation.

Calculation of contribution requirements and related benefit value information in a "going concern" environment according to the principles of level cost financing is made by the annual actuarial valuations. The results of the contribution rate calculations cannot be simply replaced by the accumulated plan benefit results. To do so will mislead.

APPENDICES

APPENDIX I

FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES

Promises Made, and Eventually Paid. As each year is completed, the plan in effect hands an "IOU" to each member then acquiring a year of service credit -- the "IOU" says: "The Pension Plan owes you a portion of your retirement benefits, payments to be made in cash, commencing when you qualify for retirement."

The related key financial questions are:

Which generation of taxpayers contributes the money to cover the IOU?

The present taxpayers, who receive the benefit of the member's present year of service?

Or the future taxpayers, who happen to be in town paying taxes at the later time when the IOU becomes a cash demand?

A sound principle of sound retirement plan financing is to have this year's taxpayers contribute the money to cover the IOUs being handed out this year. By following this principle, THE CONTRIBUTION RATE WILL REMAIN APPROXIMATELY LEVEL FROM GENERATION TO GENERATION -- our children and grandchildren will contribute the same percents of active payroll we contribute now.

A PENSION PLAN BECOMES CLOSED

The diagram in this appendix shows two important activities which occur after a plan has been closed to employees hired in the future.

Cash benefits paid continue to increase for decades, while active member payroll begins to decrease to zero.

Funding Method. A funding method is the long-term, planned pattern for employer contributions.

For an open plan (a plan covering future employees), the level-percent-of-active-member payroll funding method is the basic funding method.

The level-percent funding method can also be applied to a closed plan. However, the resulting contribution percent usually jumps to a high rate, because the number of covered active members is decreasing.

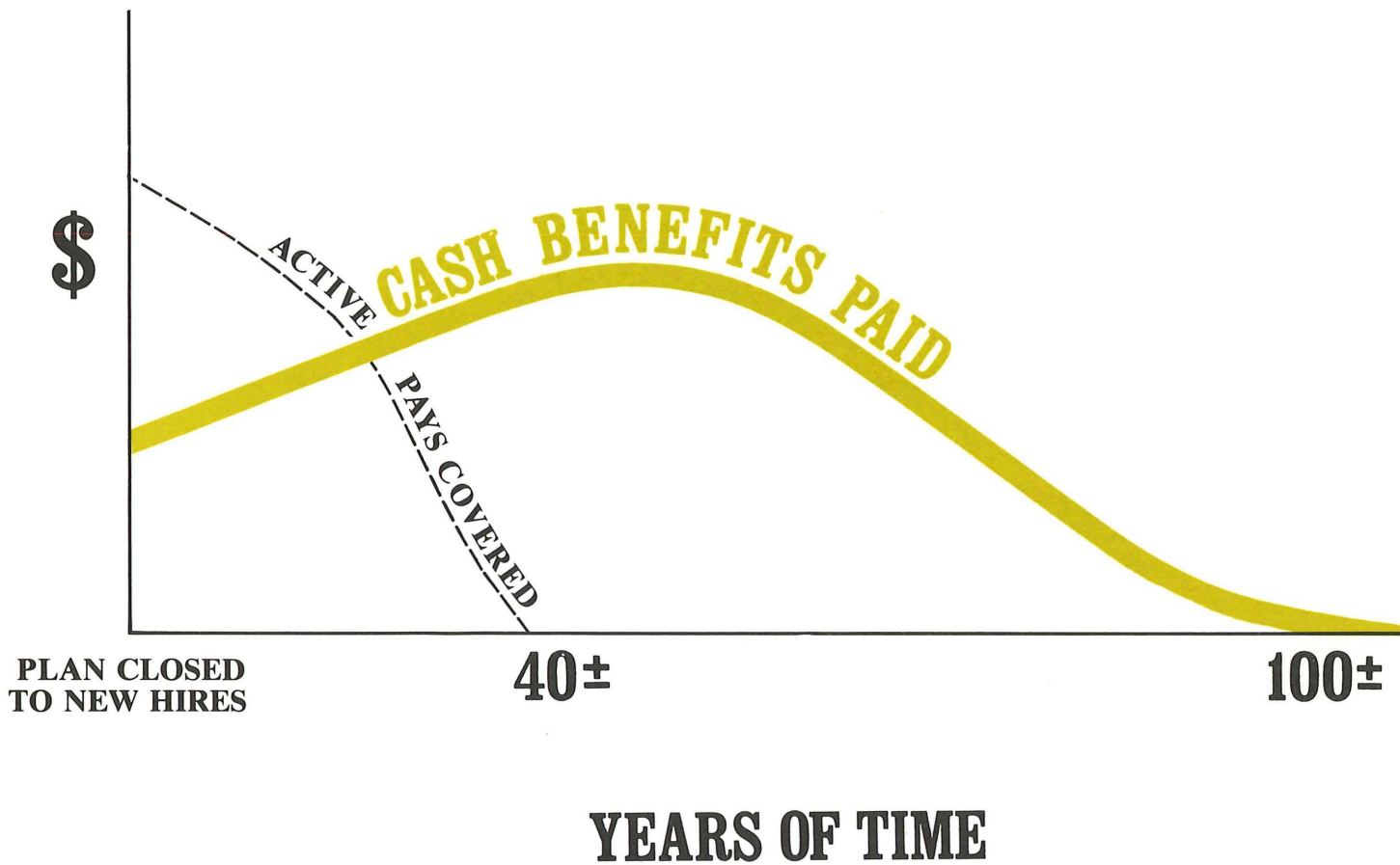
A preferred funding method for a closed plan consists of: level-percent funding for normal cost (the cost of members' service now being rendered); plus a level dollar contribution for unfunded actuarial accrued liabilities over a limited period of years. The period of years must be limited so that plan assets don't become zero while benefits are still payable.

Computing Contributions To Support Plan Benefits. From a given schedule of benefits and from the employee data and asset data furnished him, the actuary determines the contribution rates to support the benefits by means of an actuarial valuation and a funding method.

In making an actuarial valuation, assumptions must be made regarding anticipated financial experiences for the next year and for decades in the future. Only the subsequent actual experience of the plan can indicate the degree of accuracy of the assumptions. Reconciling Differences Between Assumed Experience and Actual Experience. Once actual experience has occurred and been observed, it will not coincide exactly with assumed experience, regardless of the wisdom of the assumptions or the skill of the actuary and the millions of calculations he made. The future can be predicted with considerable but not 100% precision, except for inflation which seems to defy reliable prediction.

A well-managed plan copes with these continually changing differences by having periodic actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is continuing adjustment in financial position.

A CLOSED PENSION PLAN



A plan becomes closed when no new hires are admitted to active membership. The persons covered by the plan at the time of closing continue their normal activities and continue to be covered by the plan, until the last survivor dies.

CASH BENEFITS LINE. After a pension plan becomes closed, the usual pattern is for cash benefits to continue to increase for decades of time. Eventually the cash benefits will peak, and then gradually decrease over more decades of time, ultimately to zero. The last cash benefit is likely to occur a century after the time the plan is closed.

The precise amounts of cash benefits cannot be known now, and must be estimated by assumptions of future experiences in a variety of financial risk areas.

APPENDIX II
MEANING OF UNFUNDED ACCRUED LIABILITIES

Almost every pension plan (public or private) has "unfunded accrued liabilities", so whatever they are, they aren't rare. Since the term is not part of everyday conversation, it needs some definition.

"Accrued liabilities" are the present value \$ of plan promises to pay benefits in the future based upon service already rendered - - - a liability has been established ("accrued") because the service has been rendered, but the resulting monthly cash benefit may not be payable until years in the future. Accrued liabilities \$ are the result of complex mathematical calculations, which are made by the plan's actuary (which is the name given to the specialist who makes such calculations).

If "accrued liabilities" at any time exceed the plan's accrued assets (cash & investments), the difference is "unfunded accrued liabilities". This is the common condition. If the plan's assets equalled the plan's "accrued liabilities", the plan would be termed "fully funded". This is a rare condition.

Each time a plan adds a new benefit which applies to service already rendered, an "accrued liability" is created, which is also an "unfunded accrued liability" because the plan can't print instant cash to cover the accrued liability. Payment for such unfunded accrued liabilities is spread over a period of years, commonly in the 20-40 year range.

Unfunded accrued liabilities can occur in another way: If actual financial experience is less favorable than assumed financial experience, the difference is added to unfunded accrued liabilities. In plans where plan benefits are directly related to an employee's pay near time of retirement (a common plan provision) rather than his average pay throughout his working career, unfunded accrued liabilities have been increasing in recent years because unexpected rates of pay increase have created additional accrued liabilities which could not be matched by reasonable investment results. Some of these unexpected pay increases are the direct result of inflation, which is a very destructive force on financial stability.

The existence of unfunded accrued liabilities is not bad, then (any more than a mortgage on your house is "bad"), but the changes from year to year in amount of unfunded accrued liabilities are important - - - "bad" or "good" or somewhere in between.

Nor are unfunded accrued liabilities a bill payable immediately (your food costs are payable immediately), but it is important that policy-makers prevent the amount from becoming unreasonably high and it is vital that your plan have a sound method for making payments toward them so that they are controlled.

The existence of large amounts of unfunded accrued liabilities indicates that total contributions in past years were less than level - - - an almost certain history if retired life liabilities are not fully funded now.