

Virginia  
Fire Department Relief Association  
Annual Actuarial Valuation  
December 31, 1986

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May 29, 1987

Board of Trustees  
Virginia Fire Department Relief Association  
Virginia, Minnesota

Submitted in this report are the results of the December 31, 1986 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, 1988. 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.

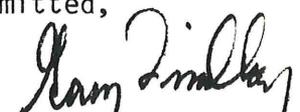
A description of the actuarial funding method and the risk experience assumptions used is contained in Section C. The economic risk experience assumptions, as well as the actuarial funding method to be used, are established by state law.

Information needed to comply with Statement No. 5 of the Governmental Accounting Standards Board 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 J. W. Smith

  
Gary W. Findlay

**Section A**



**Valuation Results**

## 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. 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, 1988

<u>Contributions for</u>	<u>If Paid Equally Throughout Year</u> <u>Normal Cost</u> <u>% of Active</u>	+	<u>UAAL Dollars</u>
<u>Payroll for 1988</u>			
Normal cost of annuities:			
Age & service: to members	13.87%		
Age & service: to survivors	3.22		
Disability	4.36		
Death before retirement	3.24		
Refunds of member contributions	0.17		
Total Normal Cost	24.86%		
Amortization of unfunded actuarial accrued liabilities (UAAL) (23 year level dollar payment)			
Retired lives			\$139,712
Active members			28,283
Total			167,995
 Total Cost of Benefits	 24.86%	 +	 \$167,995
 Member contributions	 8.00%		
 COMPUTED EMPLOYER RATE:			
(a) If Paid Equally Throughout Year	16.86%	+	\$167,995
(b) IF PAID AT CALENDAR YEAR END	17.28%	+	\$172,144

Virginia Fire Department Relief Association

Present Actuarial Condition

The Association's accrued actuarial assets were in excess of \$1.8 million on December 31, 1986 -- 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 \$1.8 million into perspective by showing the relationship between accrued actuarial 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 (19)		\$3,483,528		
Surviving Spouses (11)		235,944		
Surviving Children (0)		<u>0</u>		
Total (30)	\$1,788,233	\$3,719,472	\$1,931,239	48.1%
Deferred Members (0)	0	0	0	
Active Members (3)	<u>60,789</u>	<u>451,753</u>	<u>390,964</u>	13.5
Total	\$1,849,022	\$4,171,225	\$2,322,203	44.3%

Actuarial accrued liabilities represent the value, computed as of December 31, 1986 of:

- (i) retirement allowances likely to be paid the 30 retirants and beneficiaries; and
- (ii) the contributions assumed to have been made for the 3 active members from entry into the plan until December 31, 1986.

The value of retirement allowances likely to be paid the 30 retirants and beneficiaries, discounted for investment earnings and mortality, was computed to be \$3,719,472 as of December 31, 1986. To put this amount in perspective, the \$3,719,472, together with investment earnings, will just be sufficient to pay the 30 retirants and beneficiaries their allowances for their remaining lifetimes. This assumes the 30 retirants and beneficiaries live and die according to the assumed mortality and the \$3,719,472 is invested to yield an average annual return of 5.0% over the remaining lifetimes of the retirants and beneficiaries.

With respect to the active members, the actuarial accrued liability of \$451,753 represents the amount that would have been accumulated by December 31, 1986. This assumes the normal cost (which is expressed as a level percentage of pay) had been contributed from the date of hire until December 31, 1986 for the 3 actives, and that these amounts had earned 5.0% interest. It also assumes that 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
1986	4,171	1,849	44.3

\* After change in assumptions.

Virginia Fire Department Relief Association  
 Computed Contributions - Comparative Schedule

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Year Ended December 31		Total Normal Cost as a Percent of Valuation Payroll*	Contribution For Unfunded Actuarial Accrued Liabilities \$ or %
<u>Valuation</u>	<u>Fiscal</u>		
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
1986	1988	24.86	167,995

\* Includes employee contributions.

\*\* After change in assumptions.

Virginia Fire Department Relief Association  
 CONTRIBUTION FOR CALENDAR YEAR EFFECTIVE JANUARY 1, 1988

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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 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 1988		\$ _____
(2) Total normal cost % from page A-2		24.86%
(3) Total normal cost (Line 1 times line 2)		\$ _____
(4) Amortization payment on UAAL from page A-2		167,995
(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**

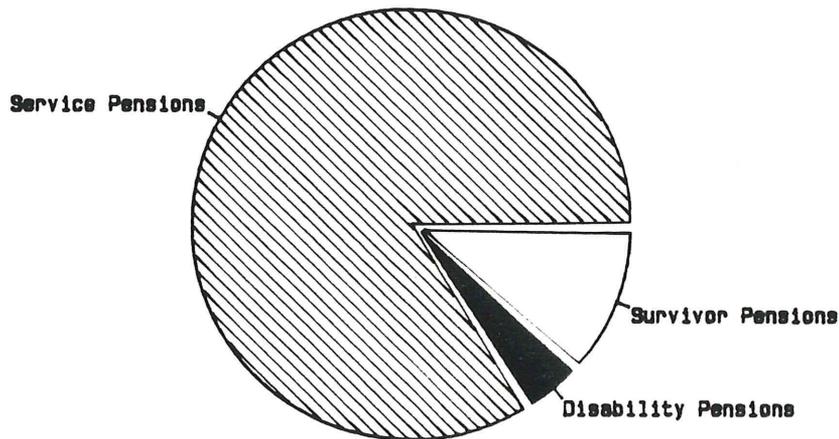
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**Valuation Data  
and  
Summary of Benefit Provisions**

Virginia Fire Department Relief Association  
 Retirants and Beneficiaries December 31, 1986  
 By Type of Annuity Being Paid

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<u>Type of Annuity Being Paid</u>	<u>No.</u>	<u>Monthly Amounts</u>	<u>Computed Actuarial Accrued Liabilities</u>
Retirants receiving:			
Age & Service	18	\$19,226.34	\$3,215,340
Disability	<u>1</u>	<u>1,054.14</u>	<u>268,188</u>
Totals	19	20,280.48	3,483,528
Beneficiaries receiving:			
Spouse	11	2,669.63	235,944
Child	<u>0</u>	<u>0.00</u>	<u>0</u>
Totals	11	2,669.63	235,944
Totals	30	\$22,950.11	\$3,719,472



**Monthly Amount Paid by Benefit**

Virginia Fire Department Relief Association  
 Retirants and Beneficiaries December 31, 1986  
 By Attained Ages

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<u>Attained Ages</u>	<u>Number</u>		
	<u>Age &amp; Service</u>	<u>Disability</u>	<u>Death Before Retirement</u>
50-54	2	1	
55-59	4		
60-64	4		
65-69	5		
70-74	5		
75-79	4		
80-84	2		
85-89	1		
90-94	<u>2</u>	<u>—</u>	<u>—</u>
Totals	29	1	0

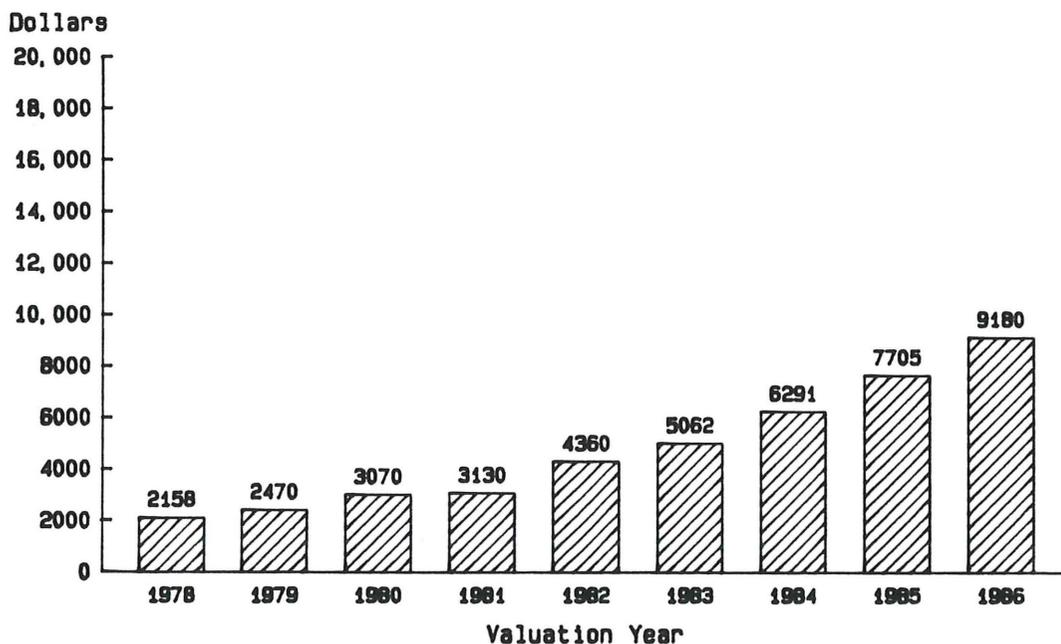
Virginia Fire Department Relief Association  
 Retirants and Beneficiaries Added to and Removed from Rolls  
 Comparative Statement

Valuation Date December 31	No. Added to Rolls	No. Removed from Rolls	Rolls End of Year		Discounted Value of Total Allowances
			No.	Annual Allowances	
1978			28	\$ 60,438	\$ 601,692
1979	0	3	25	61,748	605,522
1980	1	2	24	73,685	943,710*
1981	2	1	25	78,255	982,894
1982	1	3	23	100,272	1,102,287#
1983	3	3	23	116,432	1,353,643
1984	4	1	26	163,560	1,969,200
1985	5	0	31	238,844	3,142,872
1986	4	5	30	275,401	3,719,472

\* Plan Amendment (escalation of benefits to retirants).

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

**Average Annual Allowances**



Virginia Fire Department Relief Association  
 Active Members December 31, 1986  
 By Attained Age and Years of Service

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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
45-49				1				1	\$28,322
50-54				1				1	28,322
55-59					1			1	28,091
Totals				2	1			3	\$84,735

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

Age: 52.0 years.

Service: 20.6 years.

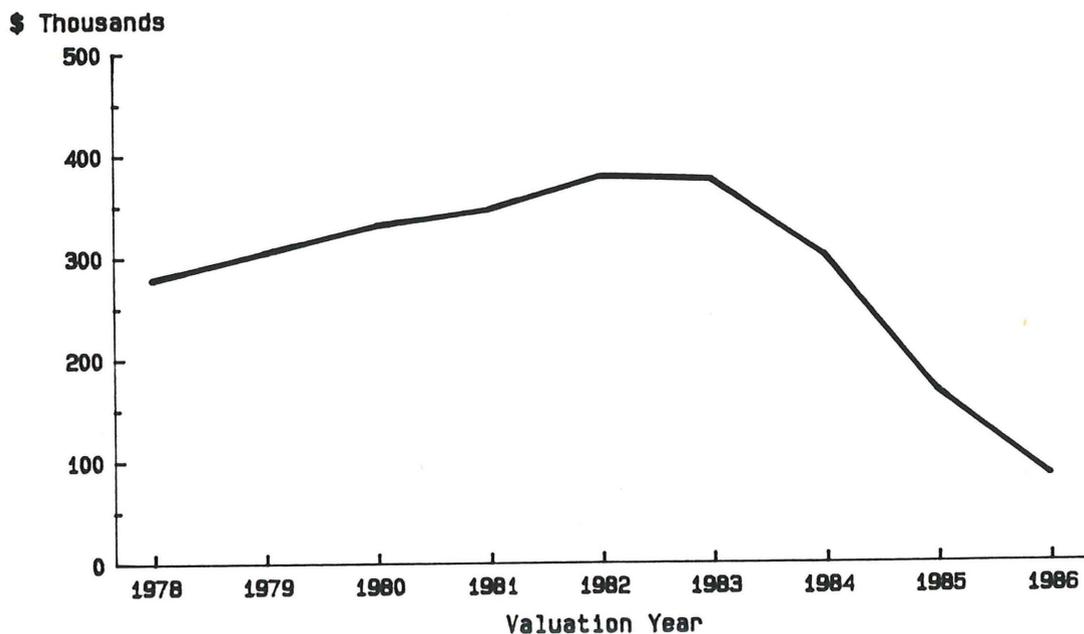
Annual Pay: \$28,245.

Virginia Fire Department Relief Association  
 Comparative Schedule  
 Of Active Members

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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
1986	3	84,735	52.0	20.6	28,245	1.6

**Valuation Payroll**



Virginia Fire Department Relief Association

Brief Summary (12/31/86) of Benefit Provisions Evaluated and/or Considered

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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**

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### **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) as required by state law used in making the valuation was 5.0 percent per annum, compounded annually. Age & service retirement was assumed to occur at age 62, or attained age if older.

Mortality Table\*

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

\* UP-1984 Table set forward 2 years for males and set back 3 years for females.

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

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<u>Sample Ages</u>	<u>Present Pay Resulting in Pay of \$1,000 at Age 60</u>	<u>Present 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.

Anticipated Disability Retirements

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<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**

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**The Pension Benefit Obligation  
and Certain Other Disclosures  
Required by Statement No. 5 of the  
Governmental Accounting Standards Board**

## PENSION BENEFIT OBLIGATION

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The amount shown below as the "pension benefit obligation" is a standardized disclosure measure of the present value of pension benefits, adjusted for the effects of projected salary increases, estimated to be payable in the future as a result of employee service to date. The measure is the actuarial present value of credited projected benefits and is intended to (i) help users assess the plan's funding status on a going-concern basis, (ii) assess progress being made in accumulating sufficient assets to pay benefits when due, and (iii) allow for comparisons among public employee retirement plans. The measure is independent of the actuarial funding method used to determine contributions to the plan.

The pension benefit obligation was determined as part of an actuarial valuation of the plan as of December 31, 1986. Significant actuarial assumptions used in determining the pension benefit obligation include (a) a rate of return on the investment of present and future assets of 5.0% per year compounded annually, (b) projected salary increases of 3.5% per year compounded annually, attributable to inflation, and (c) the assumption that benefits will increase 3.5% per year after retirement.

At December 31, 1986, the unfunded pension benefit obligation was \$2,309,115, determined as follows:

Pension Benefit Obligation:

Retirees and beneficiaries currently receiving benefits and terminated employees not yet receiving benefits	\$3,719,472
Current employees --	
Accumulated employee contributions including allocated investment income	60,789
Employer financed	<u>377,876</u>
Total Pension Benefit Obligation	\$4,158,137
Net assets available for benefits, at market (cost value of assets was not provided)	<u>1,849,022</u>
Unfunded Pension Benefit Obligation	\$2,309,115

## Appendices

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## APPENDIX I

### FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES

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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.

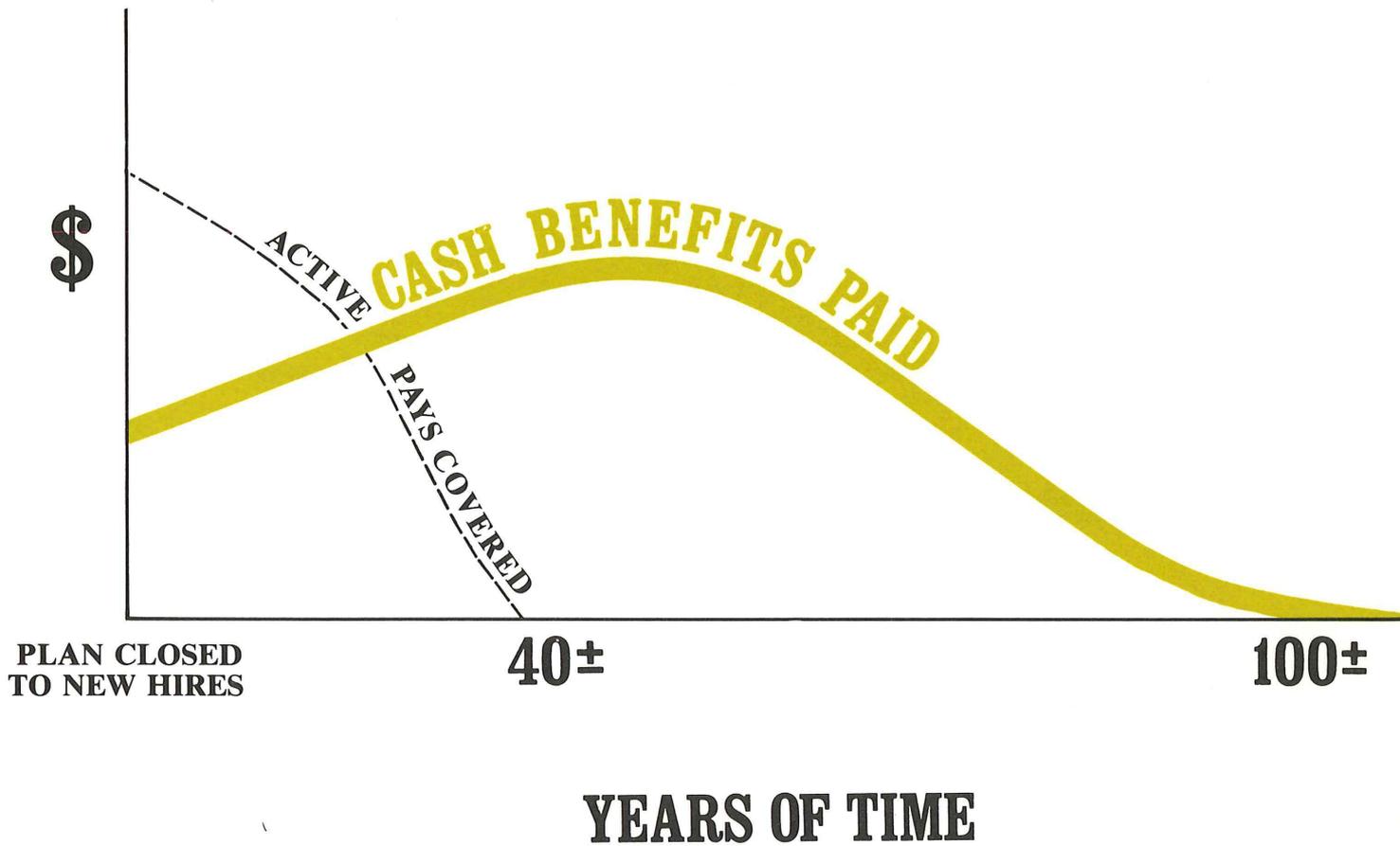
Computing Contributions To Support Plan Benefits. From a given schedule of benefits and from the employee data and asset data furnished him, the actuary determines the contribution rates to support the benefits by means of an actuarial valuation and a funding method.

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

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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.