

Report of  
AN ACTUARIAL VALUATION  
December 31, 1983 of the  
City of Moorhead  
Police Relief Association  
Moorhead, Minnesota

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GABRIEL, ROEDER, SMITH & COMPANY

ACTUARIES & CONSULTANTS

2090 First National Building  
Detroit, Michigan 48226  
Area 313: 961-3346

May 22, 1984

Board of Trustees  
City of Moorhead Police Relief Association  
Moorhead, Minnesota

Submitted in this report are the results of the December 31, 1983 actuarial valuation of the assets, actuarial values, and contribution requirements associated with the benefits provided by the City of Moorhead Police Relief Association.

The valuation results contained in Section A provide the actuarial information needed to determine the employer's "minimum obligation" effective January 1, 1985. 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.

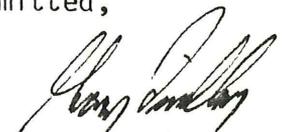
A description of the actuarial funding method and the risk experience assumptions used is contained in Section C. The economic risk experience assumptions, as well as the actuarial funding method to be used, are established by state law.

Information needed to comply with Statement of Financial Accounting Standards 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 J. 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 accrued liability by December 31, 2010.

Over the past few years, both the actual rates of salary increase and investment return have generally exceeded the assumed rates, resulting in increases in the dollar amount of unfunded accrued liabilities. If the financial experiences of recent years persist, and the economic assumptions and financing method are not changed, it is reasonable to expect that unfunded accrued liabilities will increase in actual dollar amount for a number of years. This is true even though a level dollar amortization schedule is being followed. Accordingly, it is reasonable to expect that under the described conditions the actual dollar contributions required to make amortization payments will increase for a number of years. On the other hand, if inflation subsides and actual economic activity approaches assumed experience, it is reasonable to expect the dollar amount of the contribution to amortize the unfunded accrued liability to remain relatively constant. The notion that amortization dollar amounts may be increasing is not necessarily cause for alarm. If adjusted for changes in purchasing power, any future increases in the dollar contributions may or may not reflect increases in terms of real dollars (inflation adjusted dollars).

It is also 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.

### Change in Non-Economic Assumptions

The results of the recent four year experience studies we completed for 49 Minnesota Police and Fire Relief Associations demonstrated a need to change actuarial assumptions regarding (i) pre and post-retirement mortality and (ii) rates of withdrawal from active service for reasons other than retirement, death and disability.

The contribution rate presented in this report was determined using revised assumptions. The new assumptions for mortality and withdrawal are shown on page C-1.

This change in assumptions increased the normal cost rate 1.71% of payroll and increased the amortization payment by \$17,013. The increase in the unfunded actuarial accrued liabilities (deficit) due to these assumption changes was \$250,639.

Moorhead Police Relief Association  
 CONTRIBUTION RATE TO PROVIDE BENEFITS  
 Member portion & Employer portion  
 Effective January 1, 1985

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	If Paid Equally Throughout Year		U.A.L. Dollars
Contributions for	Normal Cost % of Active Payroll for 1985	+	
Normal cost of annuities:			
Age & service: to members	14.52%		
Age & service: to survivors	0.94		
Disability	2.81		
Death before retirement	1.44		
Refunds of member contributions	0.15		
Total Normal Cost	19.86		
Amortization of unfunded accrued liabilities (UAL) (26 year level dollar payment)			
Retired lives			\$ 0
Active members			77,224
Total			77,224
 Total Cost of Benefits	 19.86%	 +	 \$77,224
 Member contributions	 8.00		
 COMPUTED EMPLOYER RATE:			
(a) If Paid Equally Throughout Year	11.86%	+	\$77,224
(b) IF PAID AT CALENDAR YEAR END	12.15%	+	\$79,131



Accrued liabilities represent the value, computed as of December 31, 1983 of:

- (i) retirement allowances likely to be paid the 16 retirants and beneficiaries; and
- (ii) the contributions assumed to have been made for the 23 active members from their entry into the plan until December 31, 1983.

To illustrate, the value of retirement allowances likely to be paid the 16 retirants and beneficiaries, discounted for investment earnings and mortality, was computed to be \$2,005,180 as of December 31, 1983. This means that if the 16 retirants and beneficiaries live and die according to the assumed mortality and if the \$2,005,180 can be invested to yield an average annual return of 5.0 percent over the remaining lifetimes of the 16 retirants and beneficiaries, then the \$2,005,180 together with investment earnings thereon will just be sufficient to pay the 16 retirants and beneficiaries their allowances for their remaining lifetimes.

With respect to active members, the accrued liability of \$1,349,974 represents the amount that would have been accumulated by December 31, 1983 if the normal cost (which is expressed as a level percentage of pay) had been contributed from the date of hire until December 31, 1983 for each of the 23 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>Accrued Liabilities</u>	<u>Accrued Assets</u>	<u>Percent Funded</u>
1978	\$1,072.4	\$1,191.1	100.0%
1979	1,695.1	1,392.7	82.2
1980	2,391.6	1,603.8	67.1
1981	2,842.4	1,797.3	63.2
1982	2,997.6	2,023.6	67.5
1983	3,239.4	2,352.4	72.6
After change in assumptions	3,490.1	2,352.4	67.4

Moorhead Police 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 Accrued Liabilities - \$ or %
Valuation	Fiscal		
1978	1980	10.16%	\$ 0
1979	1981	N/A	N/A
1980	1982	19.13	50,770
1981	1983	N/A	N/A
1982	1984	18.39	64,907
1983	1985	18.15	60,211
After change in assumptions		19.86	77,224

\* Includes employee contributions.

Moorhead Police Relief Association

CONTRIBUTION FOR CALENDAR YEAR EFFECTIVE JANUARY 1, 1985

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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 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 1985	\$ _____	
(2) Total normal cost % from page A-2	19.86%	
(3) Total normal cost (Line 1 times line 2)		\$ _____
(4) Amortization payment on UAL from page A-2		77,224
(5) Total contributions required (Line 3 plus line 4)		_____
(6) Employee contributions (Line 1 times 8%)	\$ _____	
(7) State amortization aid based on 12/31/78 UAL of \$None	_____	0
(8) Estimated insurance premium paid	_____	
(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

Moorhead Police Relief Association  
Retirants and Beneficiaries December 31, 1983  
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 Accrued Liabilities</u>
Retirants receiving:			
Age & Service	10	\$ 7,946.63	\$1,364,591
Disability	<u>2</u>	<u>1,837.43</u>	<u>482,084</u>
Totals	12	\$ 9,784.06	\$1,846,675
Beneficiaries receiving:			
Spouse	3	719.35	157,418
Child	<u>1</u>	<u>26.60</u>	<u>1,087</u>
Totals	4	745.95	158,505
Totals	<u>16</u>	<u>\$10,530.01</u>	<u>\$2,005,180</u>

Inactive Members Eligible for Deferred Benefits  
December 31, 1983

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<u>No.</u>	<u>Monthly Amount</u>	<u>Computed Accrued Liabilities</u>
1	\$665.92	\$134,906

Moorhead Police Relief Association  
 Retirants and Beneficiaries December 31, 1983  
 By Attained Ages

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<u>Attained Ages</u>	<u>Number</u>		
	<u>Age &amp; Service Retirants</u>	<u>Disability</u>	<u>Death Before Retirement</u>
Under 20	1		
45-49		1	
50-54	1	1	
55-59	1		
60-64	4		
65-69	4		
70-74	2		
75-79	1		
Totals	<u>14</u>	<u>2</u>	<u>0</u>

Moorhead Police Relief Association  
 Retirants and Beneficiaries Added to and Removed from Rolls  
 Comparative Statement

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<u>Valuation Date December 31</u>	<u>No. Added to Rolls</u>	<u>No. Removed from Rolls</u>	<u>Rolls End of Year</u>		<u>% Incr. in Annual Allowances</u>	<u>Average Allowances</u>	<u>Discounted Value of Allowances</u>	
			<u>No.</u>	<u>Annual Allowances</u>			<u>Total</u>	<u>Average</u>
1978			11	\$ 38,982	-%	\$3,544	\$ 395,424	\$ 35,948
1979	2	1	12	38,306	(2)	3,192	407,915	33,993
1980	3	1	14	73,960	93	5,283	988,038	70,574
1981		1	13	75,867	3	5,835	1,230,851	94,681
1982	2		15	107,978	42	7,199	1,624,125	108,275
1983	1		16	126,360	17	7,898	2,005,180	125,324

Moorhead Police Relief Association  
Active Members December 31, 1983  
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
25-29	1	1						2	\$ 47,000
30-34		8						8	195,000
35-39		1	4	1				6	154,500
40-44			3	3				6	164,000
45-49					1			1	23,500
Totals	1	10	7	4	1			23	\$584,000

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

Age: 36.3 years.

Service: 11.2 years.

Annual Pay: \$25,391.

Moorhead Police 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	39	\$619,168	35.1 yrs.	9.0 yrs.	\$15,876	- %
1979	36	669,667	36.2	10.3	18,602	17.2
1980	31	647,000	35.4	9.9	20,871	12.2
1981	30	713,004	36.1	10.7	23,767	13.9
1982	25	589,274	35.7	10.6	23,571	(0.1)
1983	23	584,000	36.3	11.2	25,391	7.7

Moorhead Police Relief Association

Brief Summary (12/31/83) of Benefit Provisions Evaluated and/or Considered

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Age & Service Retirement

Eligibility. 10 years of service and 55 years of age.

Amount. For first 20 years of service, 2 1/2% of "final average salary" per year. For each year in excess of 20 an additional 2% is added up to a maximum of 80% at 35 years of service. Members retiring after 6/15/80 receive an additional \$90 per month. (The latter benefit is not subject to the post retirement adjustment provisions.)

Final Average Salary means the average salary earned during the high 5 consecutive years of employment, on which contributions were made.

Disability Retirement

Eligibility. Totally and permanently disabled to the extent that no longer able to perform the duties of a police officer before being eligible for age & service retirement.

Amount. Benefit the member would have been eligible for had he been age 55 with 20 years of service. Disability benefits are offset by the amount of any worker's compensation benefit being received.

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

Eligibility.

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

Child. Younger than age 18 or, if full time student, younger than 22.

Amount.

Spouse. 30% of average monthly earnings during last 6 months service.

Child. One-Third of spouse benefit.

Maximum Family Benefit. \$5,400 annually.

Vested Deferred. 4 years of service if hired prior to 7/1 79 or 10 years of service if hired after 7/1/79. Payment beginning is deferred to attainment of age 55 or eligibility for age & service retirement had active membership continued.

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

Member Contributions. 8% of salary. Total member contributions are refundable, with 3% interest compounded annually, if no monthly benefit is payable upon separation from service. (No member contributions are made beyond 35 years of service.)

SECTION C  
VALUATION METHODS AND ASSUMPTIONS

Moorhead Police Relief Association

Valuation Methods and Assumptions

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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	\$286.32	\$314.75	29.50	34.00
50	163.12	177.21	252.05	280.82	25.20	29.50
55	147.50	163.12	218.10	246.55	21.16	25.20
60	130.52	147.50	184.99	212.60	17.42	21.16
65	112.87	130.52	153.78	179.49	14.05	17.42
70	95.20	112.87	125.20	148.28	11.09	14.05
75	77.77	95.20	99.33	119.70	8.52	11.09
80	61.71	77.77	77.19	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

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<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

Moorhead Police Relief Association

Statement of the Present Value of Accumulated Plan Benefits

December 31, 1983

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Actuarial Present Value of  
Accumulated Plan Benefits

Vested Benefits:

Participants currently receiving payments	\$2,014,384
Other participants	418,561
Total Vested Benefits	<u>2,432,945</u>

Non-Vested Benefits	304,603
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Total Actuarial Present Value of Accumulated Plan Benefits	<u><u>\$2,737,548</u></u>
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The actuarial present value of accumulated plan benefits as of January 1, 1983 was \$2,498,051. During the year the plan experienced a net increase of \$239,497 in the actuarial present value of plan benefits. Of that increase \$53,757 was attributable to changes in actuarial assumptions for determination of this value.

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

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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 cover 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 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.

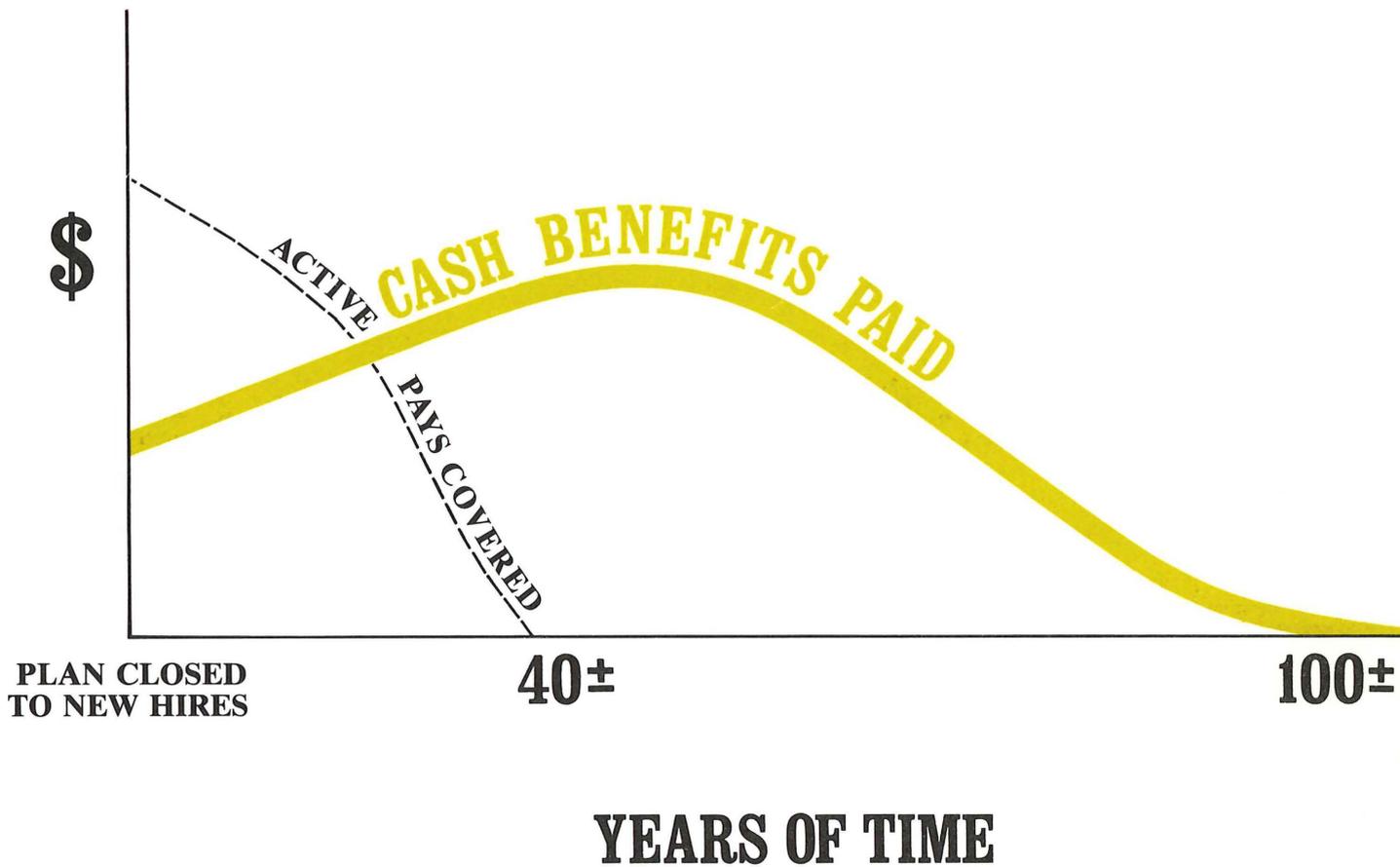
Computing Contributions to Support Plan Benefits. From a given schedule of benefits and from the employee data and asset data furnished him, the actuary determines the contribution rates to support the benefits by means of an actuarial valuation and a funding method.

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.

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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.

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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.