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Report of  
AN ACTUARIAL VALUATION  
December 31, 1984 of the  
Crookston Police Relief Association  
Crookston, Minnesota

GABRIEL, ROEDER, SMITH & COMPANY  
CONSULTING ACTUARIES

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Report of  
AN ACTUARIAL VALUATION  
December 31, 1984 of the  
Crookston Police Relief Association  
Crookston, Minnesota

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July 12, 1985

Board of Trustees  
Crookston Police Relief Association  
Crookston, Minnesota

Submitted in this report are the results of the December 31, 1984 actuarial valuation of the assets, actuarial values and contribution requirements associated with the benefits provided by the Crookston 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, 1986. 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.

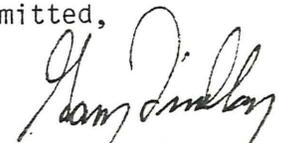
A description of the actuarial funding method and the risk experience assumptions used is contained in Section C. The economic risk experience assumptions, as well as the actuarial funding method to be used, are established by state law.

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 G. 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.

### Determining Actuarial Value of Assets

In 1984, a state law was enacted which prescribes the method to be used in determining the value of assets for purposes of an actuarial valuation. Specifically, the law states that the actuarial value of assets will be the book value plus one-third of the amount derived by subtracting book value from market value. We previously used the book value of your assets for valuation purposes. Since the book value of assets equals the market value of assets, this change in procedure did not change the value of assets for valuation purposes.

### Plan Amendment

The plan has been amended to include post-retirement adjustments ("escalator") to a maximum of 3.5% of the annual increase in the salary of a top grade patrol officer. This amendment increased the normal cost rate 2.96% of payroll, increased the amortization payment \$42,917 and increased the unfunded actuarial accrued liability \$619,873.

Crookston Police Relief Association  
 CONTRIBUTION RATE TO PROVIDE BENEFITS  
 Member portion & Employer portion  
 Effective January 1, 1986

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	<u>If Paid Equally Throughout Year</u>		<u>Normal Cost</u>
			<u>% of Active</u>
			<u>Payroll for 1986</u>
		+	<u>UAL Dollars</u>
Normal cost of annuities:			
Age & service: to members	23.77%		
Age & service: to survivors	5.08		
Disability	2.29		
Death before retirement	2.73		
Refunds of member contributions	0.14		
Total Normal Cost	34.01%		
Amortization of unfunded accrued liabilities (UAL) (25 year level dollar payment)			
Retired lives			\$ 948
Active members			83,547
Total			84,495
Total Cost of Benefits	34.01%	+	\$84,495
Member contributions	8.00		
COMPUTED EMPLOYER RATE:			
(a) If Paid Equally Throughout Year	26.01%	+	\$84,495
(b) IF PAID AT CALENDAR YEAR END	26.65%	+	\$86,582



Accrued liabilities represent the value, computed as of December 31, 1984 of:

- (i) retirement allowances likely to be paid the 6 retirants and beneficiaries; and
- (ii) the contributions assumed to have been made for the 10 active members from their entry into the plan until December 31, 1984.

To illustrate, the value of retirement allowances likely to be paid the 6 retirants and beneficiaries, discounted for investment earnings and mortality, was computed to be \$503,220 as of December 31, 1984. This means that if the 6 retirants and beneficiaries live and die according to the assumed mortality and if the \$503,220 can be invested to yield an average annual return of 5.0 percent over the remaining lifetimes of the 6 retirants and beneficiaries, then the \$503,220 together with investment earnings thereon will just be sufficient to pay the 6 retirants and beneficiaries their allowances for their remaining lifetimes.

With respect to active members, the accrued liability of \$1,342,078 represents the amount that would have been accumulated by December 31, 1984 if the normal cost (which is expressed as a level percentage of pay) had been contributed from the date of hire until December 31, 1984 for each of the 10 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)

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<u>Valuation Date December 31</u>	<u>Accrued Liabilities</u>	<u>Accrued Assets</u>	<u>Percent Funded</u>
1978	\$ 652	\$247	37.8%
1979	N/A	N/A	N/A
1980	984	385	39.1
1981	1,066	478	44.8
1982	1,043	565	54.2
1983	1,217	664	54.6
1983*	1,273	664	52.1
1984	1,374	773	56.3
1984#	1,993	773	38.8

\* After change in assumptions.

# After plan amended.

Crookston 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	21.88%	\$19,796
1979	1981	N/A	N/A
1980	1982	22.60	38,627
1981	1983	N/A	N/A
1982	1984	21.67	31,860
1983	1985	21.67	37,591
1983	1985**	23.03	41,358
1984	1986	23.05	41,578
1984	1986#	26.01	84,495

\* Includes employee contributions.

\*\* After change in assumptions.

# After plan amended.

Crookston Police Relief Association

CONTRIBUTION FOR CALENDAR YEAR EFFECTIVE JANUARY 1, 1986

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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 1986	\$ _____
(2) Total normal cost % from page A-2	26.01%
(3) Total normal cost (Line 1 times line 2)	\$ _____
(4) Amortization payment on UAL from page A-2	84,495
(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 UAL of \$405,703	\$6,106
(b) State amortization aid based on 1984 legislation	<u>980</u>
(c) Total State amortization aid	\$7,086
(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

Crookston Police Relief Association  
 Retirants and Beneficiaries December 31, 1984  
 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	4	\$1,993.10	\$406,644
Disability	<u>0</u>	<u>0.00</u>	<u>0</u>
Totals	4	1,993.10	406,644
Beneficiaries receiving:			
Spouse	2	475.25	96,576
Child	<u>0</u>	<u>0.00</u>	<u>0</u>
Totals	2	475.25	96,576
Totals	<u>6</u>	<u>\$2,468.35</u>	<u>\$503,220</u>

Inactive Members Eligible for Deferred Benefits  
 December 31, 1984

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<u>No.</u>	<u>Monthly Amount</u>	<u>Computed Accrued Liabilities</u>
1	\$687.50	\$148,104

Crookston Police Relief Association  
 Retirants and Beneficiaries December 31, 1984  
 By Attained Ages

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<u>Attained Ages</u>	Number		
	<u>Age &amp; Service</u>	<u>Disability</u>	<u>Death Before Retirement</u>
55-59	2		
60-64	1		
65-69	1		
70-74	1		
75-79	<u>1</u>	<u>—</u>	<u>—</u>
Totals	6	0	0

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

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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			5	\$16,562	%	\$3,312	\$183,504	\$36,701
1979	0	0	5	16,562	0.0	3,312	180,408	36,081
1980	1	1	5	22,588	36.4	4,518	269,603	53,921
1981	0	0	5	22,588	0.0	4,518	263,500	52,700
1982	2	1	6	29,620	31.1	4,937	334,821	55,804
1983			6	29,620	0.0	4,937	362,097	60,350
1984*			6	29,620	0.0	4,937	503,220	83,870

\* Plan amended.

Crookston Police Relief Association  
Active Members December 31, 1984  
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	\$ 24,002
30-34		1						1	26,473
35-39			3					3	76,690
40-44			1					1	24,798
45-49				1	2			3	79,053
50-54				1				1	26,061
<b>Totals</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>2</b>			<b>10</b>	<b>\$257,077</b>

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

Age: 41.0 years.

Service: 14.1 years.

Annual Pay: \$25,708.

Crookston 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	12	\$165,891	39.7 yrs.	11.6 yrs.	\$13,824	%
1979	13	199,582	39.6	11.6	15,352	11.1
1980	13	245,489	37.5	9.7	18,884	23.0
1981	13	270,226	38.5	10.7	20,787	10.1
1982	10	210,856	39.0	12.1	21,086	1.4
1983	10	243,087	40.0	13.1	24,309	15.3
1984	10	257,077	41.0	14.1	25,708	5.8

Crookston Police Relief Association

Brief Summary (12/31/84) of Benefit Provisions Evaluated and/or Considered

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Age & Service Retirement

Eligibility. 10 years of service and 50 years of age.

Amount. For first 10 years of service, 25% of final salary. For each year in excess of 10, an additional 2-1/2% is added up to a maximum of 75% of final salary for 30 or more years of service.

Disability Retirement

Eligibility. Disabled to the extent that unable to perform duties of police officer before being eligible for age and service retirement.

Amount. For service up to 11 years, 25% of final salary. For each year in excess of 11, 2-1/2% is added. In addition, \$300 per year is payable for dependent child who is under age 18. Maximum benefit is 50% of final salary.

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 age 21 if full-time student.

Amount.

Spouse. 30% of final salary.

Child. 10% of final salary per child.

Maximum Family Benefit. \$5,400 per year.

Vested Deferred. 10 years of service and separated before age 50. Payment beginning is deferred to attainment of age 50.

Post-Retirement Adjustments ("Escalator"). Each time the salary of a top grade patrol officer is changed, payments to all benefit recipients are simultaneously changed by the same percent. Maximum 3.5% increase in any year.

Member Contributions. 8% of compensation. Total member contributions are refundable, without interest, if no benefit is payable upon separation from service. B-6

SECTION C

VALUATION METHODS AND ASSUMPTIONS

Crookston 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	\$280.82	\$314.75	\$29.50
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 58, 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

Crookston Police Relief Association

Statement of the Present Value of Accumulated Plan Benefits

December 31, 1984

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Actuarial Present Value of  
Accumulated Plan Benefits

Vested Benefits:

Participants currently receiving payments	\$ 498,840
Other participants	<u>569,040</u>
Total Vested Benefits	1,067,880

Non-Vested Benefits	<u>119,408</u>
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Total Actuarial Present Value of Accumulated Plan Benefits	<u>\$1,187,288</u>
---------------------------------------------------------------	--------------------

The actuarial present value of accumulated plan benefits as of January 1, 1984, was \$653,476. During the year, the plan experienced a net increase of \$533,812 in the actuarial present value of accumulated plan benefits. The net change for the year was attributable to an increase of \$51,730 due to general plan experience and an increase of \$482,082 due to plan amendment.

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.

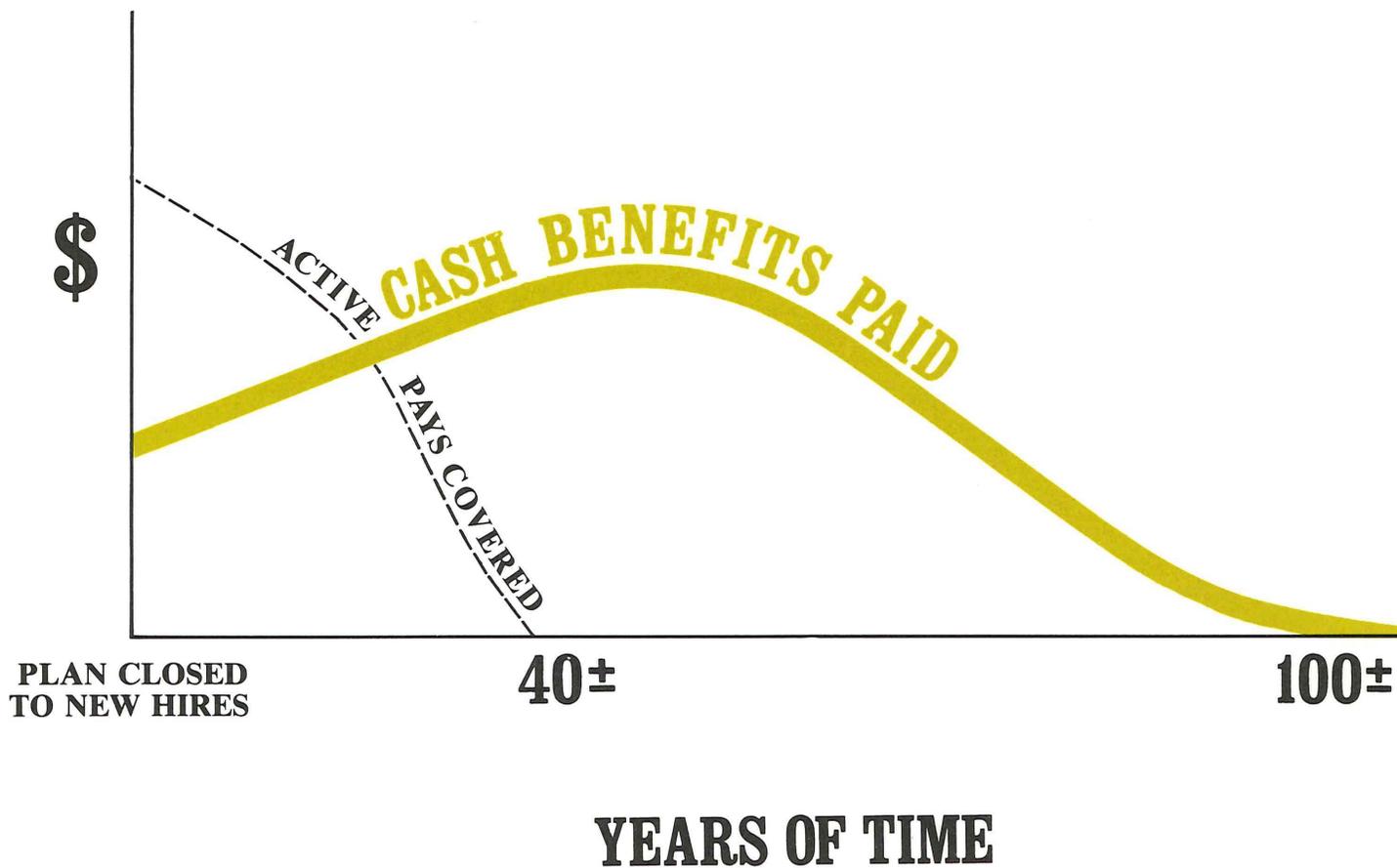
A preferred funding method for a closed plan consists of: level-percent funding for normal cost (the cost of member's service now being rendered); plus a level dollar contribution for unfunded accrued liabilities over a limited period of years. The period of years must be limited so that plan assets 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.

-----  
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 (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.