Crystal
Police Relief Association
Annual Actuarial Valuation
December 31, 1986

GABRIEL, ROEDER, SMITH & COMPANY
CONSULTING ACTUARIES

Crystal
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Annual Actuarial Valuation
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GABRIEL, ROEDER, SMITH & COMPANY
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May 19, 1987

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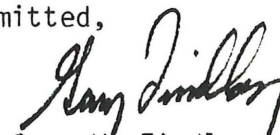
A description of the actuarial funding method and the risk experience assumptions used is contained in Section C. The economic risk experience assumptions, as well as the actuarial funding method to be used, are established by state law.

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

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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.

Crystal Police Relief Association

CONTRIBUTION RATE TO PROVIDE BENEFITS

Member portion & Employer portion
Effective January 1, 1988

Contributions for	If Paid Equally Throughout Year		
	Normal Cost % of Active Payroll for 1988	+	UAAL Dollars
Normal cost of annuities:			
Age & service: to members	17.20%		
Age & service: to survivors	2.83		
Disability	2.77		
Death before retirement	2.00		
Refunds of member contributions	0.25		
Total Normal Cost	25.05%		
Amortization of unfunded actuarial accrued liabilities (UAAL) (23 year level dollar payment)			
Retired lives			$ 24,720
Active members			92,936
Total			117,656
Total Cost of Benefits	25.05%	+	$117,656
Member contributions	8.00%		
COMPUTED EMPLOYER RATE:			
(a) If Paid Equally Throughout Year	17.05%	+	$117,656
(b) IF PAID AT CALENDAR YEAR END	17.47%	+	$120,562

Crystal Police Relief Association

Present Actuarial Condition

The Association's accrued actuarial assets were in excess of $4.2 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 $4.2 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.

	Accrued Actuarial Assets	Actuarial Accrued Liabilities	Unfunded Actuarial Accrued Liabilities	% Funded
Retirants and Beneficiaries				
Retired Members (17)		$4,337,064		
Surviving Spouses (0)		0		
Surviving Children (0)		0		
Total (17)	$3,995,352	$4,337,064	$ 341,712	92.1%
Deferred Members (0)	0	0	0	
Active Members (11)	235,249	1,519,902	1,284,653	15.5
Total	$4,230,601	$5,856,966	$1,626,365	72.2%

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

(i)   retirement allowances likely to be paid the 17 retirants and beneficiaries; and

(ii) the contributions assumed to have been made for the 11 active members from entry into the plan until December 31, 1986.

The value of retirement allowances likely to be paid the 17 retirants and beneficiaries, discounted for investment earnings and mortality, was computed to be $4,337,064 as of December 31, 1986. To put this amount in perspective, the $4,337,064, together with investment earnings, will just be sufficient to pay the 17 retirants and beneficiaries their allowances for their remaining lifetimes. This assumes the 17 retirants and beneficiaries live and die according to the assumed mortality and the $4,337,064 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 $1,519,902 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 11 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)

Valuation Date December 31	Actuarial Accrued Liabilities	Accrued Actuarial Assets	Percent Funded
1978	$2,321	$1,422	61.3%
1979	N/A	N/A	N/A
1980	3,034	1,834	60.4
1981	4,090	2,095	51.2
1982	4,572	2,415	52.8
1983	5,084	2,735	53.8
1983*	5,393	2,735	50.7
1984	5,711	3,104	54.3
1985	5,849	3,694	63.2
1986	5,857	4,231	72.2

*   After change in assumptions.

Crystal Police 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	24.20%	$ 58,850
1979	1981	N/A	N/A
1980	1982	25.31	77,300
1981	1983	N/A	N/A
1982	1984	26.10	143,730
1983	1985	25.56	159,438
1983	1985**	27.83	180,413
1984	1986	26.24	180,530
1985	1987	25.03	152,403
1986	1988	25.05	117,656

*   Includes employee contributions.

**   After change in assumptions.

Section B

Valuation Data
and
Summary of Benefit Provisions

Crystal Police Relief Association

Retirants and Beneficiaries December 31, 1986

By Type of Annuity Being Paid

Type of Annuity Being Paid	No.	Monthly Amounts	Computed Actuarial Accrued Liabilities
Retirants receiving:			
Age & Service	10	$11,783.36	$2,223,960
Disability	7	8,069.04	2,113,104
Totals	17	19,852.40	4,337,064
Beneficiaries receiving:			
Spouse	0	0.00	0
Child	0	0.00	0
Totals	0	0.00	0
Totals	17	$19,852.40	$4,337,064
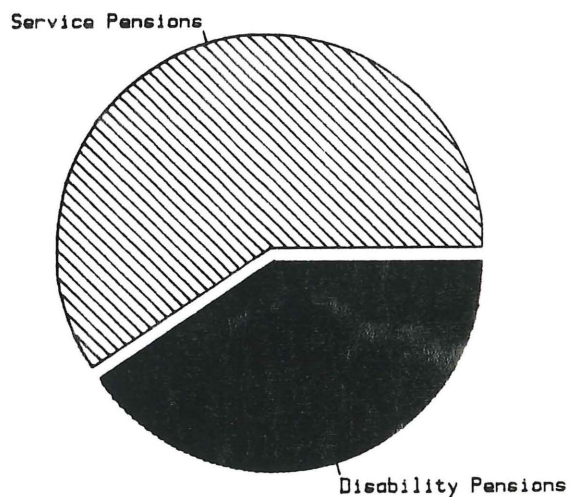
Monthly Amount Paid by Benefit

Crystal Police Relief Association

Retirants and Beneficiaries December 31, 1986

By Attained Ages

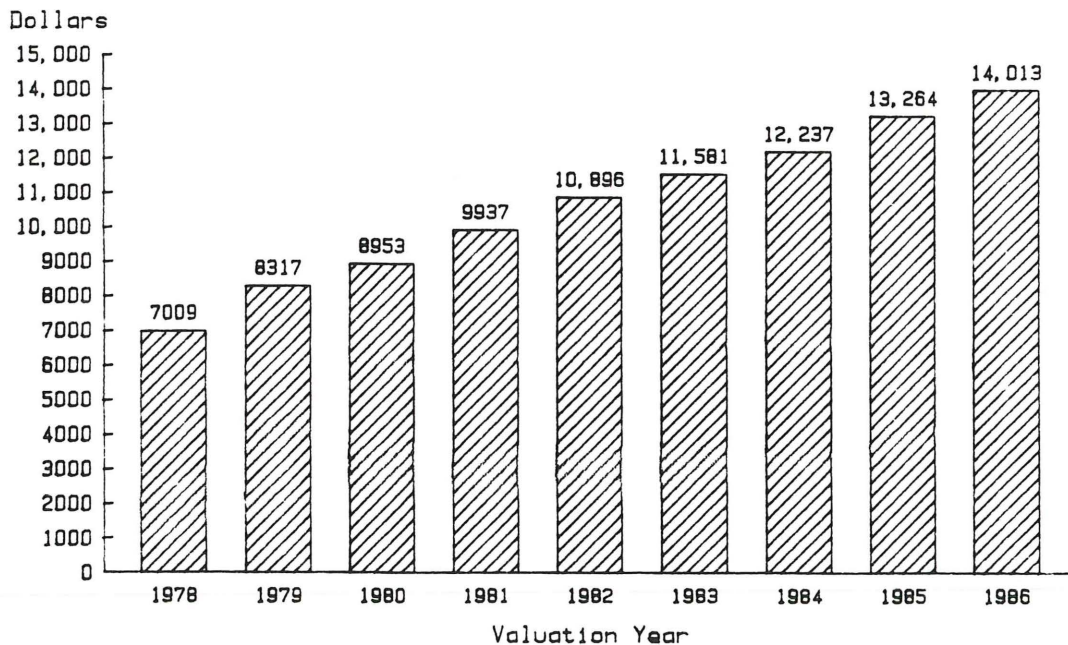| Attained Ages	Number		
	Age & Service	Disability	Death Before Retirement
35-39		1	
40-44		1	
50-54		2	
55-59	3	2	
60-64	4	1	
65-69	2		
70-74	1	—	—
Totals	10	7	0

Crystal Police 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 No.	Annual Allowances	Discounted Value of Total Allowances
1978			8	$ 56,070	$1,259,984
1979	2	0	10	83,170	1,542,374
1980	0	0	10	89,532	1,611,109
1981	2	0	12	119,241	2,349,854
1982	1	0	13	141,642	2,777,017
1983	1	0	14	162,130	3,370,214
1984	2	0	16	195,790	3,940,572
1985	1	1	16	212,221	4,235,160
1986	1	0	17	238,229	4,337,064

Average Annual Allowances

Dollars

Valuation Year	Value
1978	7009
1979	8317
1980	8953
1981	9937
1982	10,896
1983	11,581
1984	12,237
1985	13,264
1986	14,013

Crystal Police Relief Association

Active Members December 31, 1986

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
35-39			5					5	$160,620
40-44				1				1	32,124
45-49				1	1			2	64,248
50-54			1	1				2	64,248
55-59					1			1	32,124
Totals			6	3	2			11	$353,364

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

Age: 43.4 years.

Service: 15.6 years.

Annual Pay: $32,124.

Crystal Police Relief Association

Comparative Schedule

Of Active Members

Valuation Date December 31	Active Members	Valuation Payroll	Average			% Incr.
			Age	Service	Pay	
1978	23	$419,520	37.9 yrs.	9.4 yrs.	$18,240	- %
1979	21	409,752	39.1	10.4	18,512	1.5
1980	20	420,000	40.8	11.7	21,000	13.4
1981	18	453,168	42.7	12.8	25,176	19.9
1982	17	453,696	42.9	13.4	26,688	6.0
1983	16	448,352	43.7	14.3	28,022	5.0
1984	14	411,894	43.3	14.6	29,421	5.0
1985	12	368,928	43.9	15.7	30,744	4.5
1986	11	353,364	43.4	15.6	32,124	4.5

Valuation Payroll

$ Thousands
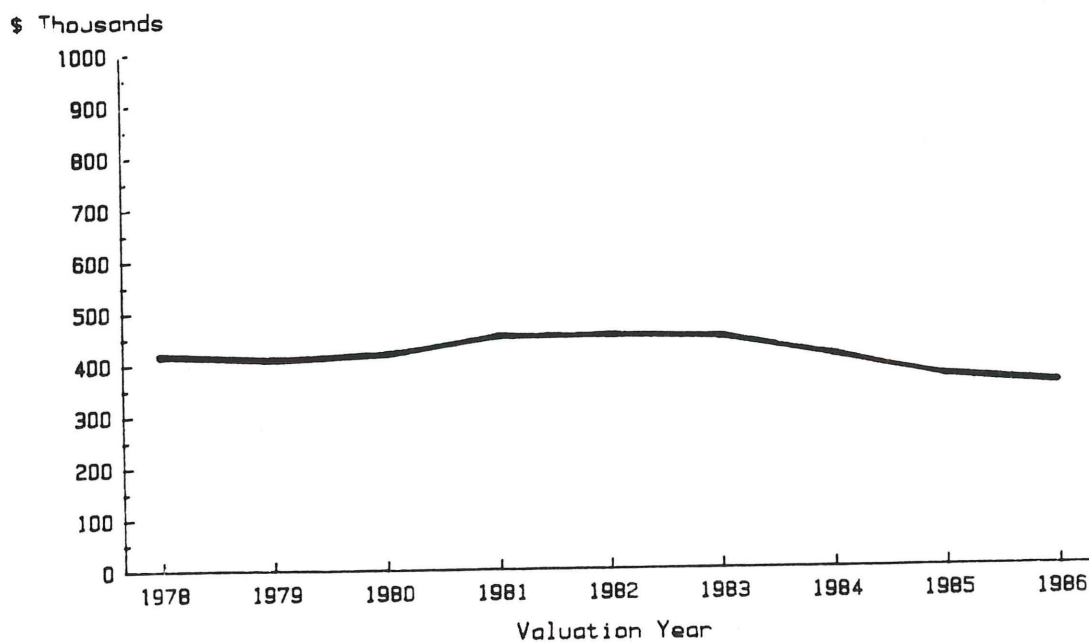
Valuation Year

Crystal Police 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, 36/80 of base pay at retirement. For each year in excess of 20, an additional 1/80 is added, up to a maximum of 43/80 of base pay for 27 or more years of service.

Pay Used For Plan Purposes. For benefit determination purposes "base pay" means the salary of a first grade patrolman for the second month of the previous fiscal year. For contribution purposes it means the present pay of a first grade patrolman.

Disability Retirement

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

Amount. 36/80 of base pay at time of disability. If service exceeds 21 years, the amount is recomputed as an age & service benefit at the time the retirant reaches age 50.

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

Eligibility.

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

Child. Younger than age 18.

Amount.

Spouse. 19/80 of base pay at separation from service.

Child. 6/80 of base pay per child. Children's maximum is 18/80 if spouse is receiving and 36/80 if no spouse is receiving.

<u>Vested Deferred.</u> 20 years of service and separated before age 50. Maximum bene-
fit is 40/80 of base pay. Payment beginning is deferred to attainment of age 50.

<u>Post-Retirement Adjustments ("Escalator").</u> Each time base pay is changed, payments
to all benefit recipients are simultaneously changed by the same percent that base
pay is changed.

<u>Member Contributions.</u> 8% of base pay. Total member contributions are refundable,
without interest, if no monthly benefit is payable upon separation from service.

Section C

Valuation Methods and Assumptions

Crystal Police 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 58, or attained age if older.

Mortality Table*

Single Life Values:
Present Value of $1 Monthly

Sample Ages	Level For Life		Increasing 3.5% Yearly		Future Life Expectancy (Years)	
	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

Sample Ages	Present Pay Resulting in Pay of $1,000 at Age 60	Present Increase in Pay During Next Year
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

Sample Ages	% of Active Members Becoming Disabled within Next Year
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

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

PENSION BENEFIT OBLIGATION

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 $1,796,511, determined as follows:

Pension Benefit Obligation:

Retirees and beneficiaries currently receiving benefits and terminated employees not yet receiving benefits	$4,337,064
Current employees --	
Accumulated employee contributions including allocated investment income	235,249
Employer financed	1,181,786
Total Pension Benefit Obligation	$5,754,099
Net assets available for benefits, at cost (market value was $4,776,626)	3,957,588
Unfunded Pension Benefit Obligation	$1,796,511

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

$

ACTIVE

CASH BENEFITS PAID

PAYS COVERED

**PLAN CLOSED
TO NEW HIRES**

40±

100±

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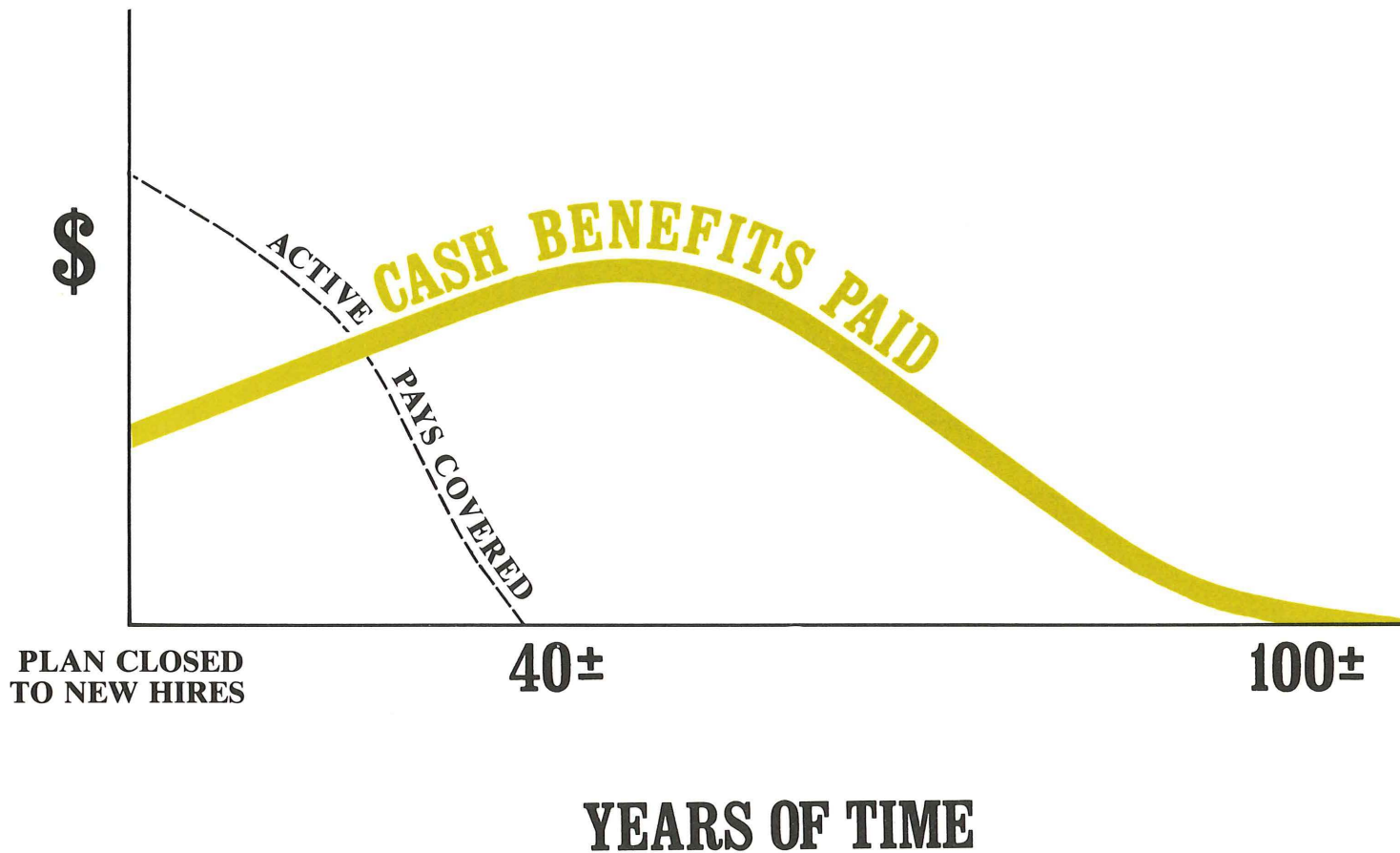
A plan becomes closed when no new hires are admitted to active membership. The persons covered by the plan at the time of closing continue their normal activities and continue to be covered by the plan, until the last survivor dies.

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 con-
versation, 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 estab-
lished ("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.