Report of
AN ACTUARIAL VALUATION
December 31, 1984 of the
Duluth Police Pension Association
Duluth, Minnesota

TABLE OF CONTENTS

Pages	Item
1	Signature Page
A-1	Comments
A-2	Contribution Rate
A-3	Present Actuarial Condition
A-5	Comparative Contribution Schedule
A-6	Contribution Worksheet
B-1	Retirant and Beneficiary Data
B-4	Active Member Data
B-6	Brief Summary of Benefits
C-1	Valuation Method and Assumptions
D-1	Accumulated Plan Benefits Schedule (for FASB 35 compliance)

Appendix I Financial Principles and Operational Techniques

Appendix II Meaning of Unfunded Accrued Liabilities

GABRIEL, ROEDER, SMITH & COMPANY ACTUARIES & CONSULTANTS

2090 First National Building Detroit, Michigan 48226

Detroit, Michigan 48226 Area 313: 961-3346

April 1, 1985

Board of Trustees

Duluth Police Pension Association

Duluth, Minnesota

<u>Submitted in this report</u> 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 Duluth Police Pension 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 <u>actuarial funding method</u> 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. Findla

-1/-

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 <u>level dollar</u> 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. This change in procedure decreased the amortization payment by \$7,898 and decreased the unfunded actuarial accrued liability by \$114,070.

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

	If Paid Equally Normal Cost	/ Thi	roughout Year
Contributions for	% of Active Payroll for 1986	+	U.A.L. Dollars
Normal cost of annuities: Age & service: to members Age & service: to survivors Disability Death before retirement Refunds of member contributions Total Normal Cost	15.60% 3.70 3.03 2.02 0.00 24.35		
Amortization of unfunded accrued liabilities (UAL) (25 year level dollar payment) Retired lives Active members Total			\$ 241,559 1,038,405 1,279,964
Total Cost of Benefits	24.35%	+	\$1,279,964
Member contributions	8.00		¥
COMPUTED EMPLOYER RATE:			
(a) If Paid Equally Throughout Year	16.35%	+	\$1,279,964
(b) IF PAID AT CALENDAR YEAR END	16.75%	+	\$1,311,573

Duluth Police Pension Association Present Actuarial Condition

The Association accrued actuarial assets were in excess of \$12.7 million on December 31, 1984 -- a considerable sum of money if unencumbered and allocated among a small group of persons. This is not the case with Association assets.

The following schedule puts the \$12.7 million into perspective by showing the relationship between accrued assets, accrued liabilities, and the number of persons with actual and potential claims on the Association's assets.

	Accrued Actuarial Assets	Accrued Liabilities	Unfunded Accrued Liabilities	% Funded
Retirants and Beneficiaries Retired Members (70) Surviving Spouses (43) Surviving Children (4)		\$13,020,413 3,197,237 63,934		
Total (117)	\$12,792,645	\$16,281,584	\$ 3,488,939	78.6%
Deferred Members (0)	0	0	0	
Active Members (117)	0	14,998,128	14,998,128	0.0
Total	\$12,792,645	\$31,279,712	\$18,487,067	40.9%

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

- (i) retirement allowances likely to be paid the 117 retirants and beneficiaries; and
- (ii) the contributions assumed to have been made for the 117 active members from their entry into the plan until December 31, 1984.

To illustrate, the value of retirement allowances likely to be paid the 117 retirants and beneficiaries, discounted for investment earnings and mortality, was computed to be \$16,281,584 as of December 31, 1984. This means that if the 117 retirants and beneficiaries live and die according to the assumed mortality and if the \$16,281,584 can be invested to yield an average annual return of 5.0 percent over the remaining lifetimes of the 117 retirants and beneficiaries, then the \$16,281,584 together with investment earnings thereon will just be sufficient to pay the 117 retirants and beneficiaries their allowances for their remaining lifetimes.

With respect to active members, the accrued liability of \$14,998,128 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 117 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)

Valuation Date December 31	Accrued Liabilities	Accrued Assets	Percent Funded
1978	\$18,464	\$ 4,116	22.3%
1979	N/A	N/A	N/A
1980	23,412	5,182	22.1
1981	25,724	6,712	26.1
1982	26,465	8,862	33.5
1983	28,415	10,265	36.1
1983*	30,519	10,265	33.6
1984	31,280	12,793	40.9

^{*} After change in assumptions.

Duluth Police Pension Association

Computed Contributions - Comparative Schedule

Year En December Valuation		Total Normal Cost as a Percent of Valuation Payroll*	Contribution For Unfunded Accrued Liabilities - \$ or %
1978	1980	19.66%	\$ 700,109
1979	1981	N/A	N/A
1980	1982	22.08	1,174,851
1981	1983	N/A	N/A
1982	1984	22.16	1,173,070
1983	1985	22.09	1,232,004
1983	1986**	24.44	1,374,863
1984	1986	24.35	1,279,964

^{*} Includes employee contributions.

^{**} After change in assumptions.

Duluth Police Pension Association CONTRIBUTION FOR CALENDAR YEAR EFFECTIVE JANUARY 1, 1986

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	24.35%	
(3)	Total normal cost (Line 1 times line 2)		\$
(4)	Amortization payment on UAL from page A-2		1,279,964
(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 \$14,347,966 \$215,937 (b) State amortization aid based on 1984 legislation (c) Total state amortization aid 		
(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 OBIIGATION IF PAYMENT IS MADE AT YEAR END (Line 10 times 1.0247)		\$

SECTION B

VALUATION DATA

AND

SUMMARY OF BENEFIT PROVISIONS

Duluth Police Pension Association

Retirants and Beneficiaries December 31, 1984

By Type of Annuity Being Paid

Type of Annuity Being Paid	No.	Monthly Amounts	Computed Accrued Liabilities
Retirants receiving: Age & Service Disability	70 0	\$ 78,458.18 0	\$13,020,413 0
Totals	70	78,458.18	13,020,413
Beneficiaries receiving: Spouse Child	43 4	24,778.32 921.98	3,197,237 63,934
Totals	47	25,700.30	3,261,171
Totals	117	\$104,158.48	\$16,281,584

Inactive Members Eligible for Deferred Benefits
December 31, 1984

No.	Monthly Amount	Computed Accrued Liabilities
0	\$0	\$0

Duluth Police Pension Association
Retirants and Beneficiaries December 31, 1984
By Attained Ages

		Number	
Attained Ages	Age & Service	Disability	Death Before Retirement
Under 20			3
20-24			1
40-44 45-49 50-54	1 3		1
55-59	10		3
60-64	15		1
65-69 70-74 75-79	29 17 10		1 2
80-84 85-89 90-94 95-99	10 6 3 1		
Totals	105		12

Duluth Police Pension Association

Retirants and Beneficiaries Added to and Removed from Rolls

Comparative Statement

	Valuation Date December 31	No. Added to Rolls	No. Removed from Rolls	<u>No.</u>	End of Year Annual Allowances	% Incr. in Annual Allowances	Average Allowances	Discour Value of All Total	
	1978			112	\$ 758,658		\$ 6,774	\$10,508,859	\$ 93,829
	1979	6	5	113	894,700	17.9%	7,918	11,573,872	102,424
ï	1980	7	7	113	984,432	10.0	8,712	12,489,174	110,524
	1981	7	10	110	1,055,190	7.2	9,593	13,361,680	121,470
	1982	7	5	112	1,092,499	3.5	9,754	13,554,353	121,021
	1983	8	2	118	1,218,472	11.5	10,326	16,208,468	137,360
	1984	9	10	117	1,249,902	2.6	10,683	16,281,584	139,159

Duluth Police Pension Association Active Members December 31, 1984 By Attained Age and Years of Service

Attained Age	0-4	Years 5-9	of Serv 10-14	ice to 15-19	Valuati 20-24	on Date 25-29 3	0 Plus	No.	Totals Valuation Payroll
25-29 30-34 35-39	1	1 15 7	1 20	6				2 16 33	\$ 55,320 442,560 912,780
40-44 45-49 50-54 55-59			5 1	15 11	3 8 3 1	1 7 2	7	23 21 10 10	636,180 580,860 276,600 276,600
Totals	1	23	27	32	15		7	117	\$3,236,220

While not used in the financial computations, the following $\underline{\text{group averages}}$ are computed and shown because of their general interest.

Age: 42.5 years.

Service: 16.9 years.

Annual Pay: \$27,660.

Duluth Police Pension Association

Comparative Schedule

Of Active Members

Valuation Date		Valuation		Avera	ge	
December 31	Active Members	Payroll	Age	Service	Pay	% Incr.
1978	123	\$2,318,796	40.4 yrs.	14.6 yrs.	\$18,852	
1979	135	2,775,060	39.3	13.6	20,556	9.0%
1980	133	2,986,116	39.8	14.0	22,452	9.2
1981	132	3,229,776	40.6	14.8	24,468	9.0
1982	129	3,219,840	41.2	15.4	24,960	2.0
1983	121	3,210,372	41.9	16.2	26,532	6.3
1984	117	3,236,220	42.5	16.9	27,660	4.3

Duluth Police Pension Association

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

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

Amount. For first 20 years of service 31.8/80 of base pay. For the 21st year an additional 1/80 is added and for each year in excess of 21 an additional 2/80 is added up to a maximum of 40.8/80 of base pay for 25 or more years of service.

Pay Used For Plan Purposes. "Base pay" means the salary of a first class patrolman with 16 years of service.

Disability Retirement

<u>Eligibility</u>. Permanently disabled to the extent that no longer able to perform the duties of a police officer before being eligible for age & service retirement.

 $\underline{\text{Amount}}$. Determined by Board. No less than 1.5/80 of base pay for each year of service and no more than 40.8/80 of base pay.

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

Eligibility.

Spouse. Legally married to member at least 1 year before separation from service and residing with member at time of death. Benefits terminate upon remarriage but may be reinstated upon termination of a subsequent marriage.

<u>Child</u>. Younger than age 18, or younger than age 22 if enrolled in an accredited college or vocational school.

Amount.

Spouse. 20/80 of base pay.

<u>Child.</u> 8/80 of base pay per child. Children's maximum is 20/80 if spouse is receiving or 40/80 if no spouse is receiving.

<u>Vested Deferred</u>. 20 years of service and separated before age 50. 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.

Member Contributions. 8% of base pay. Non-refundable.

SECTION C VALUATION METHODS AND ASSUMPTIONS

Duluth Police Pension Association Valuation Methods and Assumptions

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

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

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

Single Life Values:

	Pres	thly					
	Lev	Level		Increasing		Future Life	
Sample	For L	For Life		3.5% Yearly		y (Years)	
Ages	Men	Women	Men	Women	Men	Women	
45 50 55 60	\$177.21 163.12 147.50 130.52	\$189.58 177.21 163.12 147.50	\$280.82 246.55 212.60 179.49	\$314.75 280.82 246.55 212.60	29.50 25.20 21.16 17.42	34.00 29.50 25.20 21.16	
65 70 75 80	112.87 95.20 77.77 61.71	130.52 112.87 95.20 77.77	148.28 119.70 93.83 71.69	179.49 148.28 119.70 93.83	14.05 11.09 8.52 6.39	17.42 14.05 11.09 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	% of Active Members
Ages	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

Sample Ages	Present Pay Resulting in Pay of \$1,000 at Age 60	Percent 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.

<u>Disability retirements</u> were assumed to occur as indicated below:

Sample Ages	<pre>% of Active Members Becoming Disabled Within Next Year</pre>
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

Duluth Police Pension Association

Statement of the Present Value of Accumulated Plan Benefits

December 31, 1984

Actuarial Present Value of Accumulated Plan Benefits

Vested Benefits: Participants currently receiving payments Other participants Total Vested Benefits	\$16,124,108 5,557,413 21,681,521
Non-Vested Benefits	4,211,681
Total Actuarial Present Value of Accumulated Plan Benefits	\$25,893,202

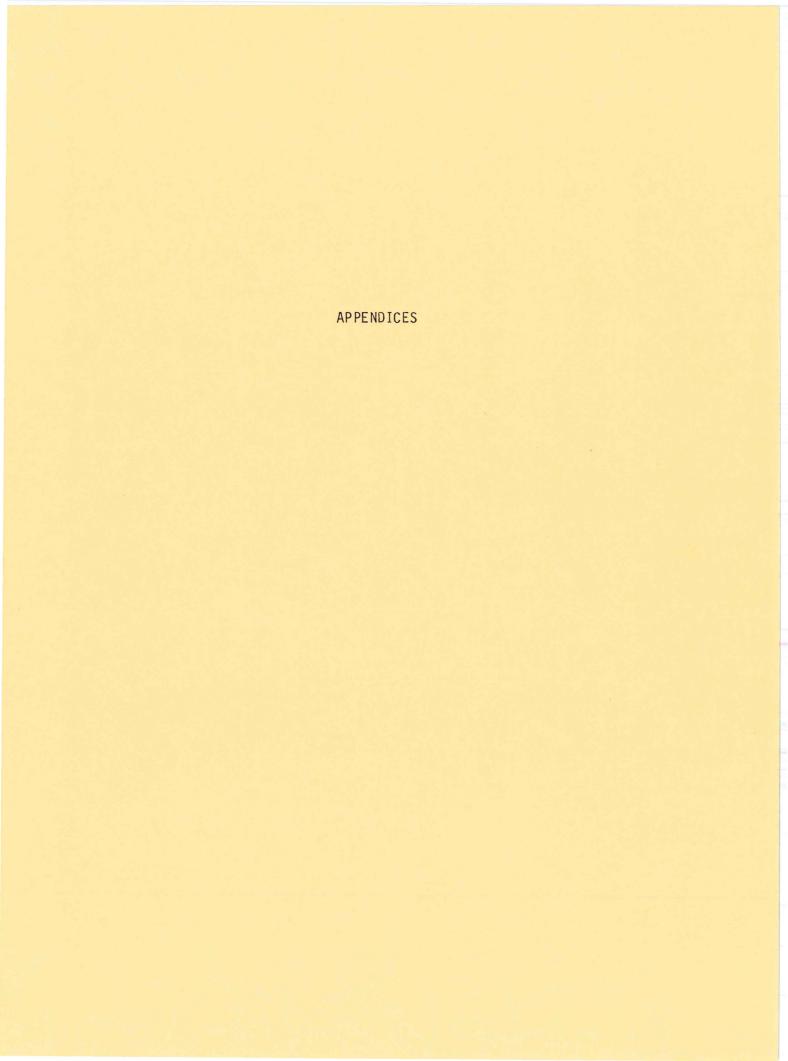
The actuarial present value of accumulated plan benefits as of January 1, 1984 was \$25,531,118. During the year the plan experienced a net increase of \$362,084 in the actuarial present value of accumulated plan benefits due to general plan experience.

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

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

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

D-1



APPENDIX I

FINANCIAL PRINCIPLES AND OPERATIONAL TECHNIQUES

<u>Promises Made, and Eventually Paid</u>. 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, <u>payments</u> 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. <u>Funding Method</u>. 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.

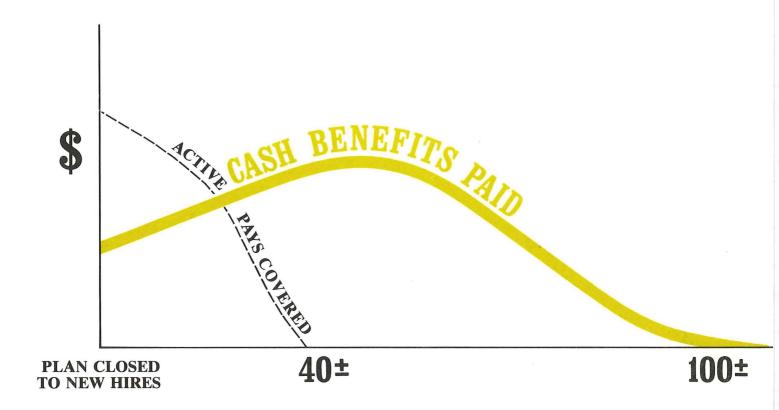
A preferred funding method for a closed plan consists of: level-percent funding for normal cost (the cost of members' service now being rendered); plus a level dollar contribution for unfunded accrued liabilities over a limited period of years. The period of years must be limited so that plan assets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

<u>Computing Contributions to Support Plan Benefits</u>. 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 <u>actuarial valuation and a funding method</u>.

In making an actuarial valuation, <u>assumptions must be made</u> regarding anticipated financial experiences for the next year and for decades in the future. <u>Only the subsequent actual experience of the plan can indicate the degree of accuracy of the assumptions</u>. <u>Reconciling Differences Between Assumed Experience and Actual Experience</u>. 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, <u>except for inflation which seems to defy reliable prediction</u>.

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



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 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.