Report of
AN ACTUARIAL VALUATION
December 31, 1984 of the
City of St. Paul Fire Department
Relief Association
St. Paul, Minnesota

GABRIEL, ROEDER, SMITH & COMPANY

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GABRIEL, ROEDER, SMITH & COMPANY
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April 26, 1985

Board of Trustees
City of St. Paul Fire Department Relief Association
St. Paul, 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 City of St. Paul Fire Department Relief Association.

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

Section C contains a description of the actuarial funding methods and the risk experience assumptions used. 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 J. W. Smith

Ronald J. W. Smith

Gary W. Findlay

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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. However, the bulk of the assets of the St. Paul Fire Department Relief Association are invested with the State Board of Investments. The book value reported by the State Board of Investments does not include reinvested ordinary income or realized gains and losses. From a traditional accounting standpoint, the State Board's procedure results in a substantial understatement of book value. Because of the absence of reasonable data to which the new formula could be applied, the market value of assets was used as the actuarial value of assets in preparing this report.

St. Paul Fire Department Relief Association

CONTRIBUTION RATE TO PROVIDE BENEFITS

Member Portion & Employer Portion

Effective January 1, 1986

Contributions for	If Paid Equally Throughout Year Normal Cost % of Active Payroll for 1986	+	UAL Dollars
Normal cost of annuities:			
Age & service: to members	13.67%		
Age & service: to survivors	3.53		
Disability	3.38		
Death before retirement	2.55		
Refunds of member contributions	0.00		
Total Normal Cost	23.13%		
Amortization of unfunded accrued liabilities (UAL) (25 year level dollar payment)			
Retired lives			$2,236,215
Active members			3,290,193
Total			5,526,408
Total Cost of Benefits	23.13%	+	$5,526,408
Member contributions	8.00		
COMPUTED EMPLOYER RATE:			
(a) If Paid Equally Throughout Year	15.13%	+	$5,526,408
(b) IF PAID AT CALENDAR YEAR END	15.50%	+	$5,662,883

St. Paul Fire Department Relief Association

Present Actuarial Condition

The Association accrued actuarial assets were in excess of $41.5 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 $41.5 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 (262)		$ 60,803,646		
Surviving Spouses (144)		12,809,614		
Surviving Children (17)		249,850		
Total (423)	$41,564,501	$ 73,863,110	$32,298,609	56.3%
Deferred Members (0)	0	0	0	
Active Members (370)	0	47,521,665	47,521,665	0.0
Total	$41,564,501	$121,384,775	$79,820,274	34.2%

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

(i) retirement allowances likely to be paid the 423 retirants and beneficiaries; and

(ii) the contributions assumed to have been made for the 370 active members from their entry into the plan until December 31, 1984.

To illustrate, the value of retirement allowances likely to be paid the 370 retirants and beneficiaries, discounted for investment earnings and mortality, was computed to be $73,863,110 as of December 31, 1984. This means that if the 423 retirants and beneficiaries live and die according to the assumed mortality and if the $73,863,110 can be invested to yield an average annual return of 5.0% over the remaining lifetimes of the 423 retirants and beneficiaries, then the $73,863,110 together with investment earnings thereon will just be sufficient to pay the 423 retirants and beneficiaries their allowances for their remaining lifetimes.

With respect to active members, the accrued liability of $47,521,665 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 370 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	$ 60,961	$14,017	23.0%
1979	70,403	16,750	23.8
1980	80,231	20,509	25.6
1981	92,361	24,160	26.2
1982	102,403	30,910	30.2
1983	109,210	36,667	33.6
1983*	117,358	36,667	31.2
1984	121,385	41,565	34.2

* After change in assumptions.

St. Paul Fire Department Relief Association

Computed Employer Contributions - Comparative Schedule

Year Ended December 31 Valuation	Fiscal	Total Normal Cost as a Percent of Valuation Payroll*	Contribution for Unfunded Accrued Liabilities - $ or %
1978	1980	20.19%	$2,268,807
1979	1981	20.45	3,405,893
1980	1982	21.32	3,848,957
1981	1983	21.24	4,467,051
1982	1984	21.23	4,764,259
1983	1985	21.19	4,924,334
1983	1985**	23.23	5,477,390
1984	1986	23.13	5,526,408

* Includes employee contributions.

** After change in assumptions.

St. Paul Fire Department Relief 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		23.13%	
(3)	Total normal cost (Line 1 times line 2)			$_______
(4)	Amortization payment on UAL from page A-2			5,526,408
(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 $48,634,846(a)	$731,954		
	(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 OBLIGATION IF PAYMENT IS MADE AT YEAR END (Line 10 times 1.0247)			$_______

SECTION B

VALUATION DATA

AND

SUMMARY OF BENEFIT PROVISIONS

St. Paul Fire Department Relief 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	261	$331,969.77	$60,480,699
Disability	1	863.19	322,947
Totals	262	332,832.96	60,803,646
Beneficiaries receiving:			
Spouse	144	100,820.27	12,809,614
Child	17	4,293.57	249,850
Totals	161	105,113.84	13,059,464
Totals	423	$437,946.80	$73,863,110

Inactive Members Eligible for Deferred Benefits

December 31, 1984

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

St. Paul Fire Department Relief Association

Retirants and Beneficiaries December 31, 1984

By Attained Ages

Attained Ages	Number: Age & Service	Number: Disability	Number: Death Before Retirement
Under 20		1	11
20-24		1	4
30-34			1
35-39		1	1
45-49			
50-54	16		6
55-59	76	2	5
60-64	51	1	6
65-69	74	5	5
70-74	47	1	5
75-79	29		4
80-84	24	2	
85-89	23	1	1
90-94	16		
95-99	3		
Totals	359	15	49

St. Paul Fire Department Relief Association

Retirants and Beneficiaries Added to and Removed from Rolls

Comparative Statement

Valuation Date December 31	No. Added to Rolls	No. Removed from Rolls	Rolls End of Year		% Incr. in Annual Allowances	Average Allowances	Discounted Value of Allowances	
			No.	Annual Allowances			Total	Average
1978			322	$2,494,828*	- %	$ 7,296	$29,002,617*	$ 90,070
1979	38	17	343	2,933,412	17.6	8,552	34,042,700	99,250
1980	32	15	360	3,337,819	13.8	9,272	39,667,992	110,189
1981	28	13	375	3,772,754	13.0	10,061	50,215,217	133,907
1982	56	12	419	4,622,269	22.5	11,032	62,491,453	149,144
1983	24	32	411	4,838,229	4.7	11,772	70,136,883	170,649
1984	28	16	423	5,255,362	8.6	12,424	73,863,110	174,617

* Adjusted August 1980.

St. Paul Fire Department Relief Association

Active Members December 31, 1984

By Attained Age and Years of Service

Attained Age	Years of Service to Valuation Date 0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	Totals No.	Valuation Payroll
25-29	2	19						21	$ 644,511
30-34	8	61	3					72	2,209,752
35-39	4	40	30	9				83	2,547,353
40-44		6	15	17	3			41	1,258,331
45-49		2	2	18	23	1		46	1,411,786
50-54		1		3	16	26	1	47	1,442,477
55-59					6	16	17	39	1,196,949
60							6	6	184,146
61						2	1	3	92,073
62							2	2	61,382
63							4	4	122,764
64							3	3	92,073
65							1	1	30,691
66							1	1	30,691
69							1	1	30,691
Totals	14	129	50	47	48	45	37	370	$11,355,670

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

Age: 42.7 years.

Service: 16.3 years.

Annual Pay: $30,691.

St. Paul Fire Department Relief Association

Comparative Schedule

Of Active Members

Valuation Date December 31	Active Members	Valuation Payroll	Average			
			Age	Service	Pay	% Incr.
1978	445	$ 9,227,520	43.4 yrs.	16.3 yrs.	$20,736	- %
1979	478	10,684,734	41.2	15.0	22,353	7.8
1980	465	11,121,870	41.6	14.9	23,918	7.0
1981	440	11,313,280	41.9	15.3	25,712	7.5
1982	396	10,996,524	41.4	14.9	27,769	8.0
1983	390	11,426,610	42.5	16.0	29,299	5.5
1984	370	11,355,670	42.7	16.3	30,691	4.8

St. Paul Fire Department Relief Association

Brief Summary (12/31/84) 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, 30.9/80 of base pay. For each year in excess of 20 an additional 1.8/80 is added to a maximum of 39.9/80 of base pay for 25 or more years of service. In addition, and not subject to the maximum above, 1/2% of base pay is added for each year of service over 25. (The latter additional benefit is not subject to post-retirement adjustments.)

Pay Used for Plan Purposes. "Base pay" means the salary of a first grade firefighter.

Disability Retirement

Eligibility. Disabled to the extent that unable to perform the duties of a firefighter before being eligible for age & service retirement.

Amount.

(1) If not able to perform other work, 39.9/80 of base pay.

(2) If able to perform only light manual labor or office work, 31.5/80 of base pay.

(3) If able to perform other manual labor, 27/80 of base pay.

Member's Death While Active, or in Deferred Status, or Retired

Eligibility.

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

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

Amount.

Spouse. 21.9/80 of base pay.

Child. 7.9/80 of base pay.

Maximum Family Benefit. 46/80 of base pay.

Vested Deferred. 20 years of service and separated before age 50. Payment beginning is deferred to attainment of age 50.

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

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

SECTION C

VALUATION METHODS AND ASSUMPTIONS

St. Paul Fire Department Relief Association

Valuation Methods and Assumptions

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

The rate of investment return (interest) 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: Present Value of $1 Monthly					
	Level For Life		Increasing 3.5% Yearly		Future Life Expectancy (Years)	
Sample Ages	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

Age & service retirement was assumed to occur at age 60, 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

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.

Disability retirements were assumed to occur as indicated below:

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

ACCUMULATED PLAN BENEFITS

St. Paul Fire Department Relief 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	$ 73,079,983
Other participants	21,391,829
Total Vested Benefits	94,471,812
Non-Vested Benefits	10,989,596
Total Actuarial Present Value of Accumulated Plan Benefits	$105,461,408

The actuarial present value of accumulated plan benefits as of January 1, 1984 was $103,106,267. During the year, the plan experienced a net increase of $2,355,141 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.

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.

<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 covered active members is decreasing.

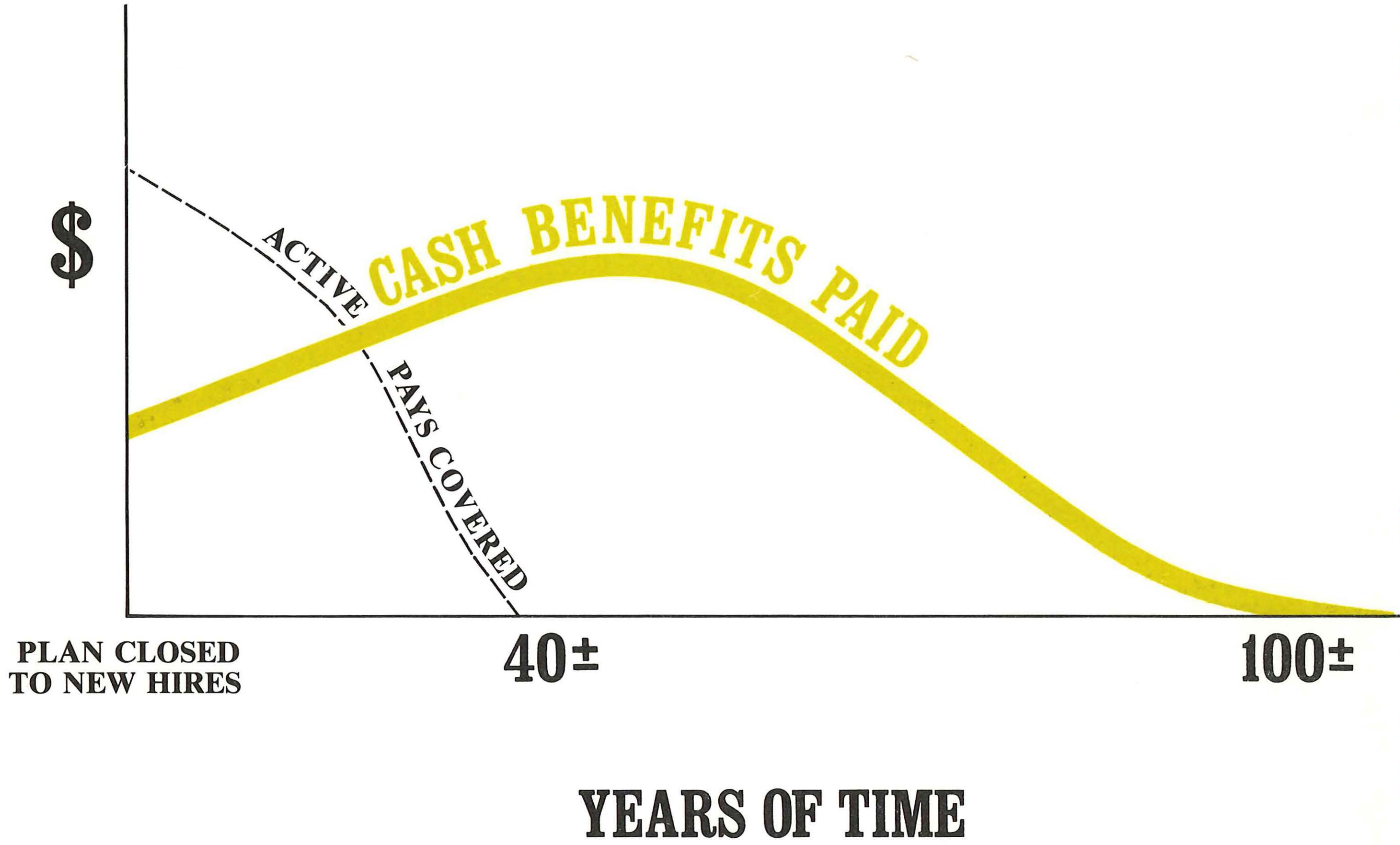
A preferred funding method for a closed plan consists of: level-percent funding for normal cost (the cost of member's service now being rendered); plus a level dollar contribution for unfunded accrued liabilities over a limited period of years. The period of years must be limited so that plan assets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

<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 <u>continuing adjustment in financial position</u>.

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: Ff 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.