

**Crookston
Fire Department Relief Association
Annual Actuarial Valuation
December 31, 1986**

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June 29, 1987

Board of Trustees
Crookston Fire Department Relief Association
Crookston, 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 Crookston 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, 1988. Section A also contains comments regarding the valuation results.

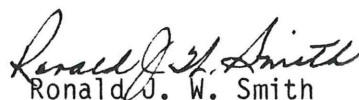
The valuation was based upon information furnished by the Association concerning benefits, financial transactions, active members, terminated members, retirants and beneficiaries. Data was checked for year to year consistency but was not otherwise audited by us. This information is summarized in Section B.

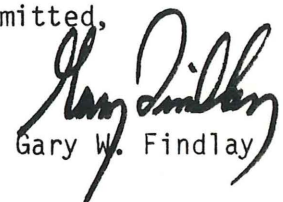
A description of the actuarial funding method and the risk experience assumptions used is contained in Section C. The economic risk experience assumptions, as well as the actuarial funding method to be used, are established by state law.

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

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.

Status of Plan

The City Council of Crookston, Minnesota passed a resolution to retain the Crookston Fire Department Relief Association as an open plan. An open plan continues to admit new-hires to its membership.

Crookston Fire Department 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	12.24%		
Age & service: to survivors	1.77		
Disability	2.79		
Death before retirement	1.95		
Refunds of member contributions	0.18		
Total Normal Cost	18.93%		
Amortization of unfunded actuarial accrued liabilities (UAAL) (23 year level dollar payment)			
Retired lives			\$ 0
Active members			12,932
Total			12,932
Total Cost of Benefits	18.93%	+	\$12,932
Member contributions	8.00%		
COMPUTED EMPLOYER RATE:			
(a) If Paid Equally Throughout Year	10.93%	+	\$12,932
(b) IF PAID AT CALENDAR YEAR END	11.20%	+	\$13,251

Crookston Fire Department Relief Association
 Present Actuarial Condition

The Association's accrued actuarial assets were in excess of \$633 thousand 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 \$633 thousand 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.

	<u>Accrued Actuarial Assets</u>	<u>Actuarial Accrued Liabilities</u>	<u>Unfunded Actuarial Accrued Liabilities</u>	<u>% Funded</u>
Retirants and Beneficiaries				
Retired Members (12)		\$328,572		
Surviving Spouses (3)		86,148		
Surviving Children (0)		<u>0</u>		
Total (15)	\$414,720	\$414,720	\$ 0	100.0%
Deferred Members (0)	0	0	0	
Active Members (35)	<u>218,688</u>	<u>397,443</u>	<u>178,755</u>	55.0
Total	\$633,408	\$812,163	\$178,755	78.0%

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

- (i) retirement allowances likely to be paid the 15 retirants and beneficiaries; and
- (ii) the contributions assumed to have been made for the 35 active members from entry into the plan until December 31, 1986.

The value of retirement allowances likely to be paid the 15 retirants and beneficiaries, discounted for investment earnings and mortality, was computed to be \$414,720 as of December 31, 1986. To put this amount in perspective, the \$414,720, together with investment earnings, will just be sufficient to pay the 15 retirants and beneficiaries their allowances for their remaining lifetimes. This assumes the 15 retirants and beneficiaries live and die according to the assumed mortality and the \$414,720 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 \$397,443 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 35 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	\$322	\$313	97.2%
1979	N/A	N/A	N/A
1980	416	363	87.3
1981	450	403	89.6
1982	475	474	99.9
1983*	879	512	58.2
1983*#	953	512	53.7
1984	958	557	58.1
1985	774	602	77.7
1986	812	633	78.0

* After plan amendments.

After change in assumptions.

Crookston Fire Department 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
Valuation	Fiscal		\$ or %
1978	1980	20.41%	\$ 435
1979	1981	N/A	N/A
1980	1982	18.32	3,390
1981	1983	N/A	N/A
1982	1984	18.33	32
1983	1985#	24.70	24,934
1983	1985**#	26.75	29,912
1984	1986	26.14	27,791
1985	1987	18.93	12,207
1986	1988	18.93	12,932

* Includes employee contributions.

** After change in assumptions.

After plan amendments.

Crookston Fire Department Relief Association
 CONTRIBUTION FOR CALENDAR YEAR EFFECTIVE JANUARY 1, 1988

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 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 1988	\$ _____	
(2) Total normal cost % from page A-2	18.93%	
(3) Total normal cost (Line 1 times line 2)		\$ _____
(4) Amortization payment on UAAL from page A-2		12,932
(5) Total contributions required (Line 3 plus line 4)		_____
(6) Employee contributions (Line 1 times 8%)	\$ _____	
(7) State amortization aid	_____ 0*	
(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)		\$ _____

* See Comment on page A-1 "Status of Plan".

Section B

**Valuation Data
and
Summary of Benefit Provisions**

Crookston Fire Department Relief Association

Full-Time Firemen

Retirants and Beneficiaries December 31, 1986

By Type of Annuity Being Paid

<u>Type of Annuity Being Paid</u>	<u>No.</u>	<u>Monthly Amounts</u>	<u>Computed Actuarial Accrued Liabilities</u>
Retirants receiving:			
Age & Service	3	\$2,335.38	\$267,780
Disability	<u>0</u>	<u>0.00</u>	<u>0</u>
Totals	3	2,335.38	267,780
Beneficiaries receiving:			
Spouse	3	900.00	86,148
Child	<u>0</u>	<u>0.00</u>	<u>0</u>
Totals	3	900.00	86,148
Totals	<u>6</u>	<u>\$3,235.38</u>	<u>\$353,928</u>

Crookston Fire Department Relief Association

Volunteers

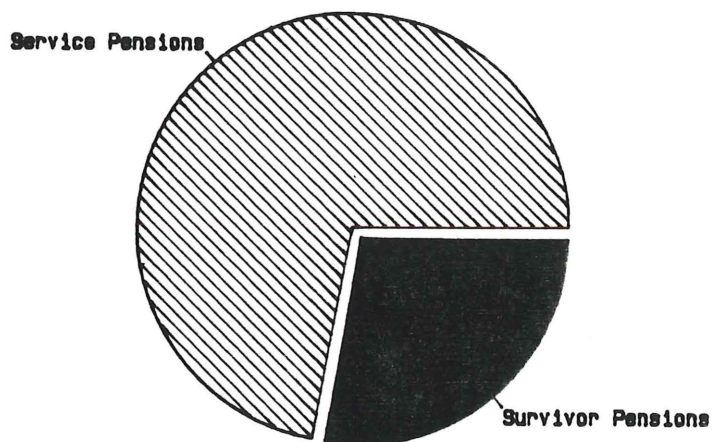
Retirants and Beneficiaries December 31, 1986

By Type of Annuity Being Paid

<u>Type of Annuity Being Paid</u>	<u>No.</u>	<u>Monthly Amounts</u>	<u>Computed Actuarial Accrued Liabilities</u>
Retirants receiving:			
Age & Service	9	\$600.00	\$60,792
Disability	<u>0</u>	<u>0.00</u>	<u>0</u>
Totals	9	600.00	60,792
Beneficiaries receiving:			
Spouse	0	0.00	0
Child	<u>0</u>	<u>0.00</u>	<u>0</u>
Totals	0	0.00	0
Totals	<u>9</u>	<u>\$600.00</u>	<u>\$60,792</u>

Crookston Fire Department Relief Association
 Retirants and Beneficiaries December 31, 1986
 By Attained Ages

<u>Attained Ages</u>	<u>Number</u>		
	<u>Age & Service</u>	<u>Disability</u>	<u>Death Before Retirement</u>
60-64	3		
65-69	5		
70-74	5		
75-79	1		
80-84	<u>1</u>	<u>—</u>	<u>—</u>
Totals	15	0	0



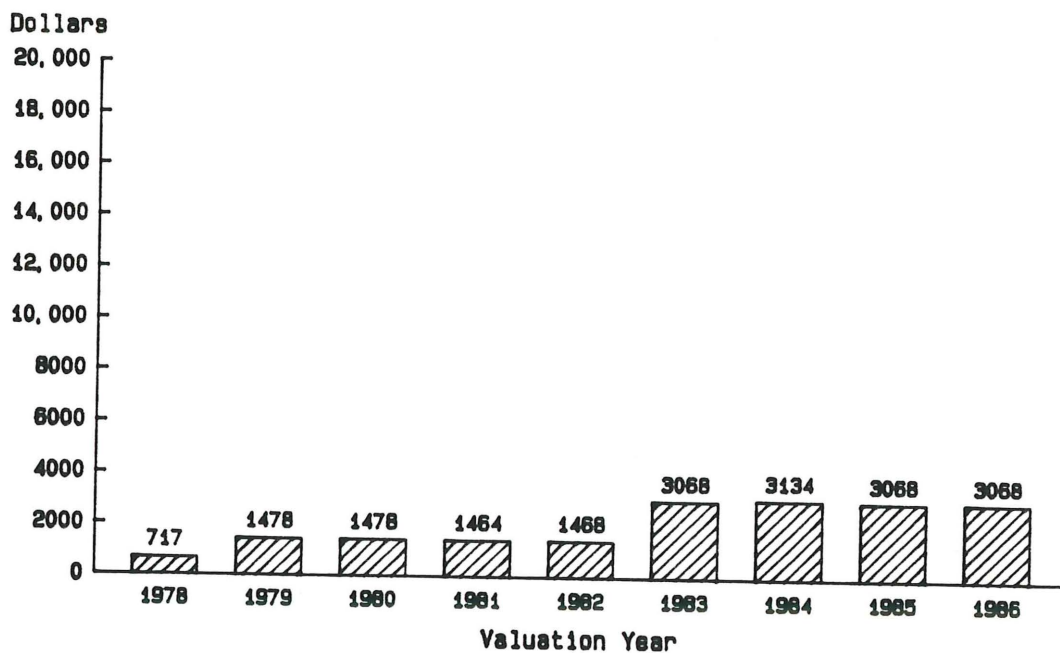
Monthly Amount Paid by Benefit

Crookston 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		Discounted Value of Total Allowances
			No.	Annual Allowances	
1978			16	\$11,466	\$104,892
1979	2	1	17	25,128	246,398
1980			17	25,128	238,943
1981	1	1	17	24,888	229,541
1982	1	1	17	24,948	223,791
1983	2	4	15	46,025*	589,907*
1984			15	47,005	544,560
1985			15	46,025	428,376
1986			15	46,025	414,720

* Includes benefit increases.

Average Annual Allowances



Crookston Fire Department Relief Association

Full-Time Firemen

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
30-34		2						2	\$ 46,459
40-44		2	1					3	71,833
45-49		1	1					2	47,671
50-54			1					1	27,821
Totals		5	3					8	\$193,784

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: 9.9 years.

Annual Pay: \$24,223.

Crookston Fire Department Relief Association

Volunteer Firemen

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	
25-29	1	3	1				5
30-34	5	2	1				8
35-39	1	2					3
40-44	1		2	2			5
45-49				1			1
50-54				2	1		3
55-59					1		1
60					1		1
Totals	8	7	4	5	3		27

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

Age: 38.2 years.

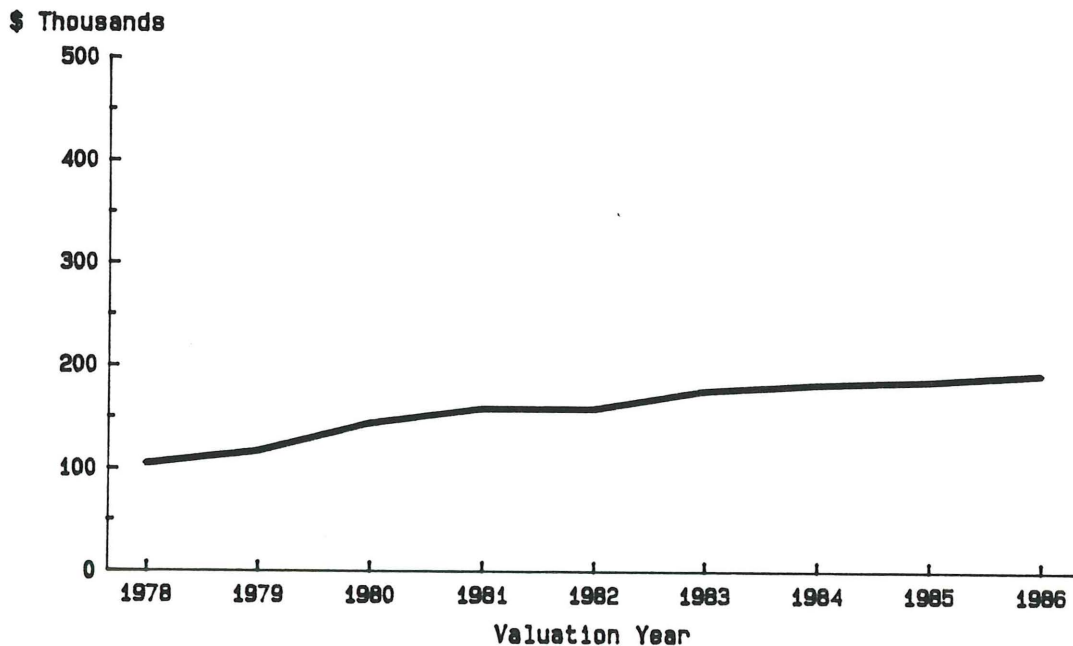
Service: 10.1 years.

Crookston Fire Department Relief Association
 Comparative Schedule
 Of Active Members

Full-Time Firemen

Valuation Date December 31	Active Members	Valuation Payroll	Average			
			Age	Service	Pay	% Incr.
1978	8	\$105,984	45.1 yrs.	9.0 yrs.	\$13,248	- %
1979	8	118,194	38.3	4.5	14,774	11.5
1980	8	145,186	39.3	5.5	18,148	22.8
1981	8	159,438	40.3	6.5	19,930	9.8
1982	8	159,492	41.3	7.5	19,937	-
1983	8	177,258	38.0	6.9	22,157	11.1
1984	8	183,638	39.0	7.9	22,955	3.6
1985	8	187,231	40.0	8.9	23,404	2.0
1986	8	193,784	41.0	9.9	24,223	3.5

Valuation Payroll



Crookston Fire Department Relief Association
 Comparative Schedule
 Of Active Members

Volunteers

<u>Valuation Date December 31</u>	<u>Active Members</u>	<u>Valuation Payroll</u>	<u>Average</u>			
			<u>Age</u>	<u>Service</u>	<u>Pay</u>	<u>% Incr.</u>
1978	26	\$N/A	35.3 yrs.	6.5 yrs.	\$N/A	- %
1979	24	N/A	36.4	7.3	N/A	N/A
1980	25	N/A	36.4	7.8	N/A	N/A
1981	24	N/A	35.6	8.0	N/A	N/A
1982	27	N/A	34.3	7.3	N/A	N/A
1983	27	N/A	35.2	8.1	N/A	N/A
1984	27	N/A	36.3	8.7	N/A	N/A
1985	27	N/A	37.1	9.2	N/A	N/A
1986	27	N/A	38.2	10.1	N/A	N/A

Crookston Fire Department Relief Association
Brief Summary (12/31/86) of Benefit Provisions Evaluated and/or Considered

Full-Time

Age & Service Retirement

Eligibility. 20 years of service and 60 years of age.

Amount. 50% of final salary. In addition, 1.5% of final salary is paid for each year of service after age 60.

Disability Retirement

Eligibility. Disabled as a result of duty to the extent that unable to perform duties of firefighter prior to eligibility for age & service retirement.

Amount. 50% of final salary offset by the amount of worker's compensation being received.

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

Eligibility.

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

Child. Younger than age 18.

Survivor benefits are offset by the amount of worker's compensation being received.

Amount.

Spouse. The greater of \$3,600 per year or 50% of earned retirement benefit at date of death.

Child. \$180 per child per year subject to a maximum of \$1,260 per year if spouse is living or \$1,080 per year if spouse is deceased.

Death Benefit. \$1,000 lump sum payment for duty related death or a \$500 lump sum payment for non-duty related death.

Vested Deferred. 20 years of service and separated before age 60. Payment beginning is deferred to attainment of age 60.

Member Contributions. 8% of salary. Total member contributions are refundable, without interest, if no monthly benefit is payable upon separation from service.

Volunteers

Age & Service Retirement

Eligibility. 20 years of service and 60 years of age.

Amount. For first 20 years of service \$600 per year. For each year in excess of 20 an additional \$60 per year is added up to a maximum of \$1,800 per year.

Disability Retirement

Eligibility. Same as full time.

Amount. (1) Total Disability. \$25 per week for 12 weeks and \$15 per month thereafter.

(2) Partial Disability. \$15 per week for 12 weeks.

Disability benefits are offset by the amount of worker's compensation being received.

Death Benefits

(1) Duty Related. Lump sum payment of \$1,000.

(2) Non-Duty Related. Lump sum payment of \$100 plus \$100 for each year of service over 20 years up to a maximum of \$600.

Vested Deferred. 20 years of service and separated before age 55. Payment beginning is deferred to attainment of age 55.

Member Contributions. None.

Section C

Valuation Methods and Assumptions

Crookston 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) 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 62, or attained age if older.

Mortality Table*

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	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

<u>Sample Ages</u>	<u>Present Pay Resulting in Pay of \$1,000 at Age 60</u>	<u>Present 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.

Anticipated Disability Retirements

<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

**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 not increase after retirement.

At December 31, 1986, the unfunded pension benefit obligation was \$142,792, determined as follows:

Pension Benefit Obligation:

Retirees and beneficiaries currently receiving benefits and terminated employees not yet receiving benefits	\$414,720
Current employees --	
Accumulated employee contributions including allocated investment income	99,485
Employer financed	<u>261,995</u>
Total Pension Benefit Obligation	\$776,200
Net assets available for benefits, at cost	<u>633,408</u>
Unfunded Pension Benefit Obligation	\$142,792

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.

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.

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.