

The Report of the
GAIN/LOSS ANALYSIS OF FINANCIAL EXPERIENCE
During calendar 1982
City of Duluth
Firemen's Relief Association
Duluth, Minnesota

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February 23, 1983

Board of Trustees
City of Duluth Firemen's Relief Association
Duluth, Minnesota

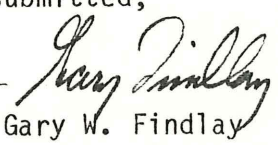
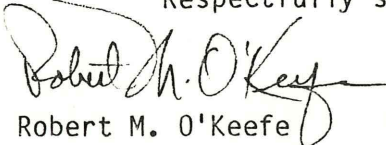
Submitted in this report are the results of the 1982 gain/loss analysis of the financial experiences of the Duluth Firemen's Relief Association.

The composite results of this study are reported on Schedule 1, and comments regarding the results are on page 12.

The gain/loss analysis was based upon statistical data furnished by the Association regarding active and retired member changes and related financial transactions.

The actuarial assumptions used for regular valuation purposes and which produce "expected" experience data are shown in the appendix of this report. A brief summary of the Association's benefits is also included in the appendix.

Respectfully submitted,


Robert M. O'Keefe Gary W. Findlay

PURPOSE OF GAIN/LOSS ANALYSIS

Actual financial experience will not coincide exactly with assumed financial experience--differences are to be expected since the future cannot be predicted with absolute precision. The changes in computed liabilities resulting from differences between actual and assumed experiences are called actuarial gains, if the experience was financially favorable and actuarial losses, if the experience was financially unfavorable. Actuarial gains result in decreases in contribution rates and actuarial losses result in increases.

Regular actuarial valuations provide information about aggregate computed liabilities. However, regular valuations do not develop the information needed to explain the year to year changes in computed liabilities attributable to each activity within the retirement system financial mechanism. The purpose of a gain/loss analysis is to determine the change in computed liabilities and contribution rates attributable to variations between actual and assumed experience.

Once a difference between actual and assumed experience in a risk area has been observed to be sizeable and persistent, the assumed experience should be changed to reflect the observed reality. However, gains and losses over a relatively short period of time may not be indicative of long term trends which provide the basis for selection of actuarial assumptions.

ACTIVITY WHICH RESULTS IN GAINS OR LOSSES

Age & Service Retirement.

If members retire at older ages than assumed, there is a gain. If retirements occur at younger ages than assumed there is a loss.

Disability & Death-in-Service.

If casualty claims are less than assumed, there is a gain. If there are more casualty losses than assumed, there is a loss.

Withdrawal.

If more liabilities are released by withdrawal than assumed, there is a gain. If there are fewer withdrawals than assumed, there is a loss.

Salary Increases.

If there are smaller salary increases than assumed, there is a gain. If salary increases are greater than assumed, there is a loss.

Investment Income.

If there is greater investment income than assumed, there is a gain. If investment income is less than assumed, there is a loss.

Post Retirement Mortality.

If benefit recipients die at younger ages than assumed, there is a gain. If they live longer than assumed, there is a loss.

Contribution.

Gains or losses arise due to the delay in implementing changes in the recommended contribution.

Miscellaneous.

Miscellaneous gains and losses include changes due to data adjustments, rounding and changes in the average age and service characteristics of the group.

Duluth Firemen's Relief Association

Schedule 1.

Gains & Losses in Accrued Liabilities
and Changes in Contribution Requirements
During Calendar 1982

Type of Activity	Accrued Liabilities (Gain) or Loss *		Contribution Requirements (Gain) or Loss *	
	Active	Retirants &	Normal Cost	\$ Payment
	Members	Beneficiaries	% of Payroll	on UAL
	(\$ in 1,000)		(\$ in 1,000)	
<u>Age & Service Retirements</u>	\$ (5.7)	\$ N/A	(0.07)%	\$ (0.4)
<u>Disability & Death-in-Service</u>				
a. <u>Disability</u>	(43.4)	N/A	(0.01)	(2.9)
b. <u>Death-in Service</u>	(134.1)	N/A	(0.01)	(8.9)
<u>Withdrawal</u>	86.1	N/A	0.00	5.7
<u>Salary Increases</u>	376.3	405.3	N/A	52.1
<u>Investment Income</u>	0.0	(613.1)	N/A	(40.9)
<u>Post Retirement Mortality</u>	N/A	352.2	N/A	23.5
<u>Contribution</u>	0.0	323.4	N/A	21.6
<u>Miscellaneous</u>	3.7	6.1	0.00	0.7
EXPERIENCE RELATED (GAIN)/LOSS & CORRESPONDING CHANGE IN CONTRIBUTION REQUIREMENTS	\$ 282.9	\$ 473.9	(0.09)%	\$ 50.5
<u>Changes due to plan amendments</u>	0.0	0.0	0.00	0.0
TOTAL (GAIN)/LOSS DURING YEAR	\$ <u>282.9</u>	\$ <u>473.9</u>	<u>(0.09)%</u>	\$ <u>50.5</u>

* Accrued liabilities and contribution requirements are affected by gains and losses.
Gains result in reductions in both and losses result in increases in both.

Duluth Firemen's Relief Association

Schedule 2.

Gains & Losses in Accrued Liabilities
From January 1, 1979 thru December 31, 1981

Type of Activity	<u>1/1/79 - 12/31/79</u>		<u>1/1/80 - 12/31/80</u>		<u>1/1/81 - 12/31/81</u>	
	Accrued Liabilities (Gain) or Loss		Accrued Liabilities (Gain) or Loss		Accrued Liabilities (Gain) or Loss	
	Active Members	Retirants & Beneficiaries	Active Members	Retirants & Beneficiaries	Active Members	Retirants & Beneficiaries
	(\$ in 1,000)		(\$ in 1,000)		(\$ in 1,000)	
<u>Age & Service Retirements</u>	\$ 114	\$ N/A	\$ (49)	\$N/A	\$206	\$ N/A
<u>Disability & Death-in-Service</u>						
a. <u>Disability</u>	115	N/A	(47)	N/A	(41)	N/A
b. <u>Death-in Service</u>	(123)	N/A	(95)	N/A	(55)	N/A
<u>Withdrawal</u>	59	N/A	(36)	N/A	83	N/A
<u>Salary Increases</u>	634	690	695	790	780	882
<u>Investment Income</u>	0	(35)	0	(70)	0	(60)
<u>Post Retirement Mortality</u>	N/A	312	N/A	(450)	N/A	1
<u>Contribution</u>	26	48	76	147	0	303
<u>Miscellaneous</u>	38	384	8	6	7	968
EXPERIENCE RELATED (GAIN)/LOSS	\$ 863	\$1,399	\$ 552	\$423	\$980	\$2,094
Method Change for Casualty Cost		0	713	0		
<u>Changes Due to Plan Amendments</u>	344	0	0	0	0	0
TOTAL (GAIN)/LOSS DURING PREVIOUS 3 YEAR PERIOD	<u>\$1,207</u>	<u>\$1,399</u>	<u>\$1,265</u>	<u>\$423</u>	<u>\$980</u>	<u>\$2,094</u>

Duluth Firemen's Relief Association

Schedule 3.

Employees Active at Both Beginning & End of 1982

<u>Age Group Beg. Year</u>	<u>No.</u>	<u>Beginning Salary</u>	<u>Ending Salary</u>	<u>% Increase In Salary</u>
25-29	15	367,020	388,980	6.0
30-34	26	636,168	674,232	6.0
35-39	38	929,784	985,416	6.0
40-44	22	538,296	570,504	6.0
45-49	22	538,296	570,504	6.0
50-54	10	244,680	259,320	6.0
55-59	13	318,084	337,116	6.0
60-64	<u>1</u>	<u>24,468</u>	<u>25,932</u>	6.0
TOTALS	147	\$3,596,796	\$3,812,004	6.0

Employees Active at Either Beginning or End of 1982

<u>Years Service</u>	<u>Beginning of Year</u>	<u>End of Year</u>
0	0	0
1	7	0
2	8	7
3	6	8
4	0	6
5 or more	<u>129</u>	<u>126</u>
Totals	150	147

Average Age: 41.5 years.

Average Service: 15.2 years.

Duluth Firemen's Relief Association

Schedule 4.

Comparative Schedule

Of Active Members

Valuation Date December 31	Active Members	Valuation Payroll	Average			
			Age	Service	Pay	% Incr.
1978	153	\$2,882,520	41.1 yrs.	14.7 yrs.	\$18,840	- %
1979	153	3,143,232	40.7	14.3	20,544	9.0
1980	153	3,425,976	40.2	13.7	22,392	9.0
1981	150	3,670,200	40.9	14.5	24,468	9.3
1982	147	3,812,004	41.5	15.2	25,932	6.0

Duluth Firemen's Relief Association

Schedule 5.

Separations From Active Service Due to Withdrawal
During Four Year Period Ended December 31, 1982

Age at Termination	1979		1980		1981		1982	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
20-24				0.1		0.1		*
25-29		0.3		0.2		0.3		0.3
30-34		0.6		0.6		0.5		0.4
35-39		0.4		0.4		0.5		0.5
40-44		0.2		0.2		0.2		0.2
45-49	—	<u>0.1</u>	—	<u>0.1</u>	—	<u>*</u>	—	<u>*</u>
TOTALS	-0-	1.6	-0-	1.6	-0-	1.6	-0-	1.6

Total actual during four year period 1
Total expected during four year period 4.8

Years Service at Termination	1979		1980		1981		1982	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
0		0.1		0.2		0.2		*
1				0.1		0.2		0.1
2		0.3				0.1		0.2
3				0.2				0.1
4						0.2		*
5 or more	—	<u>1.1</u>	<u>1</u>	<u>1.0</u>	—	<u>0.9</u>	—	<u>1.0</u>
Totals	0	1.5	1	1.5	0	1.6	0	1.5

* Less than 0.1%

Duluth Firemen's Relief Association

Schedule 6.

Separations From Active Service Due to Death and Disability

During Four Year Ended December 31, 1982

Death Separations

Age at Time of Death	1979		1980		1981		1982	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
25-29		*		*		*		*
30-34		0.1		0.1		0.1		*
35-39		0.1		0.1		0.1		0.1
40-44		0.1		0.1		0.1		0.1
45-49		0.1		0.1		0.2		0.2
50-54		0.1		0.1		0.1		0.1
55-59		0.2		0.3		0.3	1	0.3
60-64		0.1		0.1				
65-69				0.1				
TOTALS	1	0.9	0	1.0	0	0.8	1	0.8

Total actual during four year period 2
Total expected during four year period 3.5

Disability Separations

Age at Time of Disability	1979		1980		1981		1982	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
25-29		*		*		*		*
30-34		*		*		0.1		*
35-39		*		0.1		0.1		0.1
40-44	1	0.1		0.1		0.1		0.1
45-49	1	0.1		0.1		0.1		0.1
50-54		0.1		0.1		*		*
55-59		0.1		*		*		*
Totals	2	0.4	0	0.4	0	0.4	0	0.4

Total actual during four year period 2
Total expected during four year period 1.6

Duluth Firemen's Relief Association

Schedule 7.

Separations From Active Service

For Age & Service Retirement

Age at Termination	1979		1980		1981		1982	
	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected</u>
50					1			
53					1			
55	1							
56	1						1	
58	1	2.0				2.0		1.0
59		1.0	1	3.0		1.0		3.0
60	1					2.0		1.0
61		1.0				1.0	1	2.0
62			1	1.0				
63		2.0						
64		2.0	2	1.0				
65 & Over	<u>1</u>	<u>1.0</u>	<u>2</u>	<u>4.0</u>	—	—	—	—
TOTALS	5	9.0	6	9.0	2	6.0	2	7.0

Average age at retirement during period examined was 59.5 years.

Average service at retirement during period examined was 32.7 years.

Duluth Firemen's Relief Association

Schedule 8.

Death After Retirement
(Disability and Service Retirants)

Age at Death	1979		1980		1981		1982	
	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected</u>
35-39		0.0026		0.0028				
40-44		0.0035		0.0039		0.0075		0.0083
45-49		0.0081						
50-54		0.0222		0.0191		0.0423		0.0465
55-59		0.0998	1	0.1012		0.0667		0.0880
60-64		0.7644	1	0.5460		0.4621		0.3280
65-69		1.1280	2	1.3295	4	1.2390	1	1.2584
70-74		0.3741	1	0.5279	1	0.6167		0.8304
75-79		0.3952		0.3265		0.3882		0.4891
80-84		1.4587	1	1.2543	1	1.0288		0.8019
85-89	1	0.7374	4	0.3771		0.4888	1	0.6822
90-94	<u>1</u>	<u>0.2274</u>	<u>—</u>	<u>0.2444</u>	<u>—</u>	<u>0.4887</u>	<u>—</u>	<u>0.5224</u>
TOTALS	2	5.2214	10	4.7327	6	4.8288	2	5.0552

Total actual during four year period 20

Total expected during four year period 19.8

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.

Miscellaneous, Retirants & Beneficiaries

The loss caused by the change in reporting of assets (a change from Book Value to Market Value) as of December 31, 1981, was \$952,285. This was reflected as a loss under Retirants & Beneficiaries and included as part of "Miscellaneous".

APPENDICES

Duluth Firemen's 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 United States Life Table, 1959-61, White Males and White Females.

Sample Ages	Single Life Values: Present Value of \$1 Monthly				Future Life Expectancy (Years)	
	Level		Increasing			
	For Life		3.5% Yearly			
	Men	Women	Men	Women	Men	Women
45	\$169.61	\$186.84	\$263.23	\$304.86	27.33	32.52
50	154.85	174.20	229.51	270.80	23.22	28.08
55	139.29	159.62	197.24	236.11	19.45	23.81
60	122.79	142.73	166.26	200.76	16.01	19.69
65	106.31	124.22	137.82	166.16	12.97	15.88
70	89.86	104.31	111.71	132.82	10.29	12.38
75	73.39	83.92	87.66	101.94	7.92	9.28
80	57.54	64.24	66.29	74.77	5.89	6.67

Age & service retirement was assumed to occur at age 58, or attained age if older.

Sample Rates of Separation From Active Employment Before Retirement, Death or Disability

Sample Ages	% of Active Members Separating Within Next Year
20	3.00%
25	2.50
30	2.00
35	1.50
40	1.00
45	0.50
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>Percent Increase in Pay During Next Year</u>
20	\$ 253	3.5%
25	300	3.5
30	356	3.5
35	423	3.5
40	503	3.5
45	597	3.5
50	709	3.5
55	842	3.5
60	1,000	3.5

Use of the pay adjustment factor illustrated above is required by state law.

Disability retirements were assumed to occur as indicated below:

<u>Sample Ages</u>	<u>% of Active Members Becoming Disabled Within Next Year</u>
20	0.08%
25	0.08
30	0.08
35	0.08
40	0.20
45	0.26
50	0.49
55	0.89

Duluth Firemen's Relief Association

Brief Summary (12/31/82) of Benefit Provisions Evaluated and/or Considered

Age & Service Retirement

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

Amount. For first 20 years of service, 32.25/80 of base pay. For the 21st year 1/80 is added. For years in excess of 21 an additional 2/80 is added up to a maximum of 41.25/80 of base pay for 25 or more years of service.

Pay Used For Plan Purposes. "Base pay" means the maximum pay of a firefighter on which benefits are based.

Disability. Disabled to the extent that unable to perform the duties of a firefighter.

Amount.

Duty Disability. 40/80 of base pay.

Non-Duty Disability. From 31/80 to 40/80 of base pay. (Determined by Board.)

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 but may be reinstated if marriage terminates.

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

Amount.

Spouse. 20/80 of base pay.

Child. 8/80 of base pay per child.

Maximum Family Benefit. 40/80 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 simultaneously changed by the same percent that base pay changed.

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