

The Report of the  
GAIN/LOSS ANALYSIS OF FINANCIAL EXPERIENCE  
During calendar 1979 and 1980  
CITY OF DULUTH  
FIREMEN'S RELIEF ASSOCIATION  
Duluth, Minnesota

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April 2, 1981

City of Duluth

Firemen's Relief Association

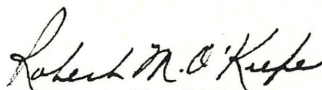
Submitted in this report are the results of the 1979-80 gain/loss analysis of the financial experiences of the City of Duluth Firemen's Relief Association.

The composite results of this study are reported on Schedules 1(A) and 1(B) 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.

Respectfully submitted,

  
Robert M. O'Keefe

  
Gary W. Findlay

RMO:mh

## PURPOSE OF GAIN/LOSS ANALYSIS

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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.

CITY OF DULUTH FIREMEN'S RELIEF ASSOCIATION

Schedule 1(A)

Gains & Losses in Accrued Liabilities  
and Changes in Contribution Requirements  
During Calendar 1979

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 &amp; Service Retirements</u>	\$ 114	\$ N/A	(0.27)%	\$ 5.6
<u>Disability &amp; Death-in-Service</u>				
a. <u>Disability</u>	115	N/A	(0.02)	5.6
b. <u>Death-in Service</u>	(123)	N/A	0.12	(6.0)
<u>Withdrawal</u>	59	N/A	0	2.9
<u>Salary Increases</u>	634	690	0	64.6
<u>Investment Income</u>	0	(35)	0	(1.7)
<u>Post Retirement Mortality</u>	N/A	312	N/A	15.2
<u>Contribution</u>	26	48	0	3.6
<u>Miscellaneous</u>	38	384	0	20.6
EXPERIENCE RELATED (GAIN)/LOSS & CORRESPONDING CHANGE IN CONTRIBUTION REQUIREMENTS	\$ 863	\$1,399	0.17%	\$110.4
<u>Changes due to plan amendments</u>	344	0	0.51	16.8
<u>TOTAL (GAIN)/LOSS DURING YEAR</u>	<u>\$1,207</u>	<u>\$1,399</u>	<u>0.34%</u>	<u>\$127.2</u>

## CITY OF DULUTH FIREMEN'S RELIEF ASSOCIATION

Schedule 1(B)

Gains & Losses in Accrued Liabilities  
and Changes in Contribution Requirements  
During Calendar 1980

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 &amp; Service Retirements</u>	\$ (49)	\$N/A	0.16%	\$ (2.4)
<u>Disability &amp; Death-in-Service</u>				
a. <u>Disability</u>	(47)	N/A	(0.14)	(2.3)
b. <u>Death-in Service</u>	(95)	N/A	0.34	(4.6)
<u>Withdrawal</u>	(36)	N/A	0.10	(1.8)
<u>Salary Increases</u>	695	790	0	72.5
<u>Investment Income</u>	0	(70)	0	(3.4)
<u>Post Retirement Mortality</u>	N/A	(450)	N/A	(22.0)
<u>Contribution</u>	76	147		10.9
<u>Miscellaneous</u>	8	6	0	0.7
EXPERIENCE RELATED (GAIN)/LOSS & CORRESPONDING CHANGE IN CONTRIBUTION REQUIREMENTS	\$ 552	\$423	0.46%	\$ 47.6
<u>Conversion to UAL Amortization</u>	N/A	N/A	N/A	385.0
<u>Change in Funding Method For Death &amp; Disability</u>	713	N/A	1.22	45.9
<u>Changes due to plan amendments</u>	0	0		
TOTAL (GAIN)/LOSS DURING YEAR	<u>\$1,265</u>	<u>\$423</u>	<u>1.68%</u>	<u>\$478.5</u>

CITY OF DULUTH FIREMEN'S RELIEF ASSOCIATION

Schedule 2(A)

Employees Active at Both Beginning & End of 1979

<u>Age Group Beg. Year</u>	<u>No.</u>	<u>Beginning Salary</u>	<u>Ending Salary</u>	<u>% Increase In Salary</u>
20-24	3	\$ 56,520	\$ 61,632	9.0%
25-29	13	244,920	267,072	9.0
30-34	32	602,880	657,408	9.0
35-39	26	489,840	534,144	9.0
40-44	23	433,320	472,512	9.0
45-49	17	320,280	349,248	9.0
50-54	17	320,280	349,248	9.0
55-59	9	169,560	184,896	9.0
60-64	<u>5</u>	<u>94,200</u>	<u>102,720</u>	9.0
TOTALS	145	\$2,731,800	\$2,978,880	9.0%

Employees Active at Either Beginning or End of 1979

<u>Years Service</u>	<u>Beginning of Year</u>	<u>End of Year</u>
0		
1	6	8
2	4	6
3	8	4
4		8
5 or more	135	127

Average Age: 40.7 years.

Average Service: 14.3 years.



CITY OF DULUTH FIREMEN'S RELIEF ASSOCIATION

Schedule 2(B)

Employees Active at Both Beginning & End of 1980

<u>Age Group Beg. Year</u>	<u>No.</u>	<u>Beginning Salary</u>	<u>Ending Salary</u>	<u>% Increase In Salary</u>
20-24	2	\$ 41,088	\$ 44,784	9.0%
25-29	12	246,528	268,704	9.0
30-34	35	719,040	783,720	9.0
35-39	30	616,320	671,760	9.0
40-44	21	431,424	470,232	9.0
45-49	20	410,880	447,840	9.0
50-54	14	287,616	313,488	9.0
55-59	11	225,984	246,312	9.0
60-64	<u>1</u>	<u>20,544</u>	<u>22,392</u>	9.0
TOTALS	146	\$2,999,424	\$3,269,232	9.0%

Employees Active at Either Beginning or End of 1980

<u>Years Service</u>	<u>Beginning of Year</u>	<u>End of Year</u>
0		
1	8	7
2	6	8
3	4	6
4	8	4
5 or more	127	128

Average Age: 40.2 years.

Average Service: 13.7 years.

CITY OF DULUTH FIREMEN'S RELIEF ASSOCIATION

Schedule 3(A)

Separations From Active Service (Other Than Age & Service Retirement)  
During 1979

<u>Age at Termination</u>	<u>Withdrawal</u>		<u>Disability</u>		<u>Death</u>	
	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected</u>
20-24	0	0.0				*
25-29	0	0.3		*		*
30-34	0	0.6		*		0.1
35-39	0	0.4		*		0.1
40-44	0	0.2	1	0.1		0.1
45-49	0	0.1	1	0.1		0.1
50-54	0	0.0	1	0.1	1	0.1
55-59	0	0.0	2	0.1		0.2
60-64	<u>0</u>	<u>0.0</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>0.2</u>
TOTALS	0	1.6	5	0.4	1	0.9

\* Less than 0.1%

<u>Years Service at Termination</u>	<u>Actual</u>	<u>Expected</u>
0		0.1
1		
2		0.3
3		
4		
5 of more		<u>1.1</u>
TOTALS		1.5

Average age at separation: N/A

Average service at separation: N/A

CITY OF DULUTH FIREMEN'S RELIEF ASSOCIATION

Schedule 3(B)

Separations From Active Service (Other Than Age & Service Retirement)  
During 1980

Age at Termination	Withdrawal		Disability		Death	
	Actual	Expected	Actual	Expected	Actual	Expected
20-24		0.1		*		
25-29		0.2		*		
30-34		0.6		*		0.1
35-39		0.4		0.1		0.1
40-44		0.2		0.1		0.1
45-49	1	0.1		0.1		0.1
50-54				0.1		0.1
55-59						0.3
60-64						0.1
65-69	—	—	<u>1</u>	—	—	<u>0.1</u>
TOTALS	1	1.6	1	0.4	0	1.0

\* Less than 0.1%

Years Service at Termination	Actual	Expected
0		0.2
1		0.1
2		
3		0.2
4		
5 or more	<u>1</u>	<u>1.0</u>
TOTALS	1	1.5

Average age at separation: 46.0 years.

Average service at separation: 17.2 years.

CITY OF DULUTH FIREMEN'S RELIEF ASSOCIATION

Schedule 4

Separations From Active Service  
For Age & Service Retirement

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<u>Age at Termination</u>	<u>1979</u>		<u>1980</u>	
	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected</u>
56	1			
58		2.0		
59		1.0	1	3.0
61		1.0		
62			1	1.0
63		2.0		
64		2.0	2	1.0
65 & Over	<u>1</u>	<u>1.0</u>	<u>1</u>	<u>4.0</u>
TOTALS	2	9.0	5	9.0

Average age at retirement during period examined: 62.0 years.

Average service at retirement during period examined: 35.7 years.



CITY OF DULUTH FIREMEN'S RELIEF ASSOCIATION

Schedule 5

Death After Retirement  
(Disability and Service Retirants)

Age at Death	1979		1980	
	<u>Actual</u>	<u>Expected</u>	<u>Actual</u>	<u>Expected</u>
35-39		0.0026		0.0028
40-44		0.0035		0.0039
45-49		0.0081		
50-54		0.0222		0.0191
55-59		0.0998	1	0.1012
60-64		0.7644	1	0.5460
65-69		1.1280	2	1.3295
70-74		0.3741	1	0.5279
75-79		0.3952		0.3265
80-84		1.4587	1	1.2543
85-89	1	0.7374	4	0.3771
90-94	<u>1</u>	<u>0.2274</u>	<u>—</u>	<u>0.2444</u>
TOTALS	2	5.2214	10	4.7327

Average age at death: 78.6 years.

### Comments

The loss of \$384,000 for calendar year 1979 shown under Retirants and Beneficiaries is composed of two known elements. \$238,000 is attributable to a refinement in the method of calculating survivors benefits on retired and disabled members. \$83,000 is attributable to the establishment of a liability for a disabled member (who died in January of 1980) and his spouse. On December 31, 1979 only the member was eligible to receive benefits. However, a liability was established for the member and a liability was established for his spouse.

Members who become disabled after they are eligible for age and service benefits were treated as age and service retirements for purposes of computing gains or losses on retirement.

## 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. Disability and death before retirement benefits were valued in previous valuations on a terminal funding basis (one year term cost).

The rate of investment return (interest) used in making the valuation was 5.0 percent per annum, compounded annually.

The mortality table used was the United States Life Table, 1959-61, White Males and White Females.

Sample Ages	Single Life Values:				Future Life Expectancy (Years)	
	Present Value of \$1 Monthly					
	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



Sample Pay Adjustment Factors used to Project Current Pays

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<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

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 (12/31/80) 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.