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**THE REPORT OF THE ANNUAL ACTUARIAL VALUATION**  
**of THE**  
**POLICE RETIREMENT SYSTEM OF KANSAS CITY, MISSOURI**  
**April 30, 2002**  
**FOR THE PLAN YEAR ENDING April 30, 2003**

**Submitted to**  
**THE RETIREMENT BOARD**  
**POLICE RETIREMENT SYSTEM OF**  
**KANSAS CITY, MISSOURI**

**GABRIEL, ROEDER, SMITH & COMPANY**

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August 28, 2002

The Retirement Board  
Police Retirement System of  
Kansas City, Missouri

Dear Board Members:

Submitted in this report are the results of the Annual Actuarial Valuation of the assets, actuarial values, and contribution requirements associated with benefits provided by the Police Retirement System of Kansas City, Missouri.

The date of the valuation was April 30, 2002.

Valuation results, comments and conclusions are contained in Section A.

The valuation was based upon information concerning Retirement System benefits, financial transactions, and individual 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.

Descriptions of the actuarial cost methods and actuarial assumptions are contained in Section C, along with a glossary of technical terms.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board of the American Academy of Actuaries. The actuarial assumptions used for the valuation produce results which we believe are reasonable.

Respectfully submitted,

Brian B. Murphy, F.S.A.

Mita D. Drazilov, A.S.A.

MDD:kmg

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**VALUATION RESULTS, COMMENTS,  
RECOMMENDATIONS, AND CONCLUSIONS**

## **FINANCIAL OBJECTIVE**

The financial objective of the Retirement System is to establish and receive contributions, expressed as percents of active member payroll, which will remain approximately level from year-to-year and will not have to be increased for future generations of citizens.

## **CONTRIBUTION RATES**

The Retirement System is supported by member contributions, City contributions and investment income from Retirement System assets.

Contributions which satisfy the financial objective are determined by an annual actuarial valuation and are sufficient to:

- (1) cover the actuarial present value of benefits assigned to the current year by the actuarial cost methods described in Section C (the normal cost); and
- (2) amortize over a period of future years the actuarial present value of benefits not covered by valuation assets and anticipated future normal costs (unfunded actuarial accrued liability).

Contribution requirements for the fiscal year beginning May 1, 2002 are shown on page A-2.

**CONTRIBUTIONS COMPUTED TO MEET THE FINANCIAL  
OBJECTIVE OF THE RETIREMENT SYSTEM  
FOR THE FISCAL YEAR BEGINNING MAY 1, 2002**

Contributions for	Contributions Expressed as Percents of Payroll
<b>Normal Cost</b>	
Age & service benefits	19.00 %
Death and disability benefits	4.93
Termination benefits	
Deferred age & service benefits	0.38
Refunds of member contributions	1.06
Supplemental retirement benefit	1.01
Assumed rate for administrative expenses	0.40
Total Normal Cost	26.78
 <b>Amortization Payment</b>	
Scheduled amortization of UAAL*	3.32
Additional amortization of UAAL	0.15
Total Amortization Payment	3.47
 <b>Total Contribution Requirement</b>	
Member portion	30.25 %
City portion#	10.55 %
	19.70 %

\* Unfunded Actuarial Accrued Liabilities

# It was reported that the City is contributing 19.70% for the fiscal year beginning May 1, 2002.

Unfunded actuarial accrued liabilities were amortized as a level percent of active member payroll. A description of the method may be found on page C-1.

Procedures for determining dollar contribution amounts are described on page A-3.

Comparative contribution amounts for prior fiscal years are shown on page A-5.

## **DETERMINING DOLLAR CONTRIBUTIONS**

For any period of time, the percent-of-payroll contribution rate needs to be converted to dollar amounts. We recommend one of the following procedures.

- (1) Contribute dollar amounts at the end of each payroll period which are equal to the City's percent-of-payroll contribution requirement shown on page A-2, multiplied by the covered active member payroll for the period. Adjustments should be made as necessary to exclude items of pay that are not covered compensation for Retirement System benefits and to include special payments that are covered compensation.
  
- (2) Contribute \$11,668,083 on October 30, 2002. This dollar amount was derived by multiplying the percent-of-payroll contribution requirement by the April 30, 2002 valuation payroll, projected to the fiscal year beginning May 1, 2002, using a 1.045 projection factor. If contributions are made on a later schedule, interest should be added at the rate of 0.65% per month.

These two methods are essentially equivalent, and will produce the same result in the long term.

## AMORTIZATION SCHEDULE FOR THE UNFUNDED ACCRUED LIABILITY

	Date Created	Balances		24-Year Amortization	
		Initial	Outstanding	Initial	2002/2003 Amortization
05/01/1998 Base	05/01/1998	\$ 60,092,542	\$ 63,058,180	\$ 3,482,213	\$ 4,309,504
05/01/1999 Base	05/01/1999	(23,794,584)	(24,746,450)	(1,378,837)	(1,632,934)
05/01/2000 Base	05/01/2000	(15,860,433)	(16,312,150)	(919,072)	(1,041,572)
05/01/2001 Base	05/01/2001	(6,685,610)	(6,786,306)	(387,414)	(420,145)
05/01/2002 Base	05/01/2002	12,470,529	12,470,529	749,940	749,940
<b>Total</b>			<b>\$ 27,683,803</b>		<b>\$ 1,964,793</b>



## COMPUTED AND ACTUAL CITY CONTRIBUTIONS COMPARATIVE STATEMENT

Fiscal Year Beg. May 1	Valuation Date April 30	Projected Annual Payroll	Fiscal Year Contributions				
			as a % of Projected Pay		\$ Contributions		
			Annual Required Contrib.	Reported FY City Contrib.	Annual Required Contrib.	Projected FY City Contrib.	Actual Dollar Contrib.
1997	1997	\$48,173,740	18.09 %	20.60 %	\$ 8,716,539	\$ 9,923,790	\$ 9,978,462
1998	1998	49,872,090	18.76	20.60	9,355,956	10,273,651	10,318,583
1999	1999	51,963,858	19.01	20.60	9,880,286	10,704,555	10,789,963
2000	2000	57,791,028	18.66	20.60	10,785,784	11,904,952	11,392,871
2001	2001	57,505,238	18.85	19.70	10,837,294	11,328,532	11,312,754
2002	2002	59,228,848	19.55	19.70	11,579,240	11,668,083	

## ACTUARIAL ACCRUED LIABILITIES & VALUATION ASSETS COMPARATIVE STATEMENT

Valuation Date April 30	Actuarial Accrued Liability (AAL)	Valuation Assets	Unfunded Actuarial Accrued Liability (UAAL)	Ratio of Present Assets to AAL	Ratio of UAAL to Annual Payroll
1997	\$ 456,218,854	\$ 388,984,781	\$ 67,234,073	85.3 %	140.0 %
1998	493,183,065	433,090,523	60,092,542	87.8	120.0
1999	521,600,003	484,396,958	37,203,045	92.9	72.0
2000	589,566,248	584,514,972	5,051,276	99.1	9.0
2001	615,291,156	600,051,893	15,239,263	97.5	27.0
2002	648,632,789	620,948,986	27,683,803	95.7	48.8

*The Ratio of Valuation Assets to AAL* is a traditional measure of a system's funding progress. Except in years when the system is amended or actuarial assumptions are revised, this ratio can be expected to move gradually toward 100%.

*The Ratio of UAAL to Valuation Payroll* is another relative index of condition. Actuarial unfunded liabilities represent debt, while active member payroll represents the system's capacity to collect contributions to pay toward debt. The lower the ratio, the greater the financial strength - and vice-versa.

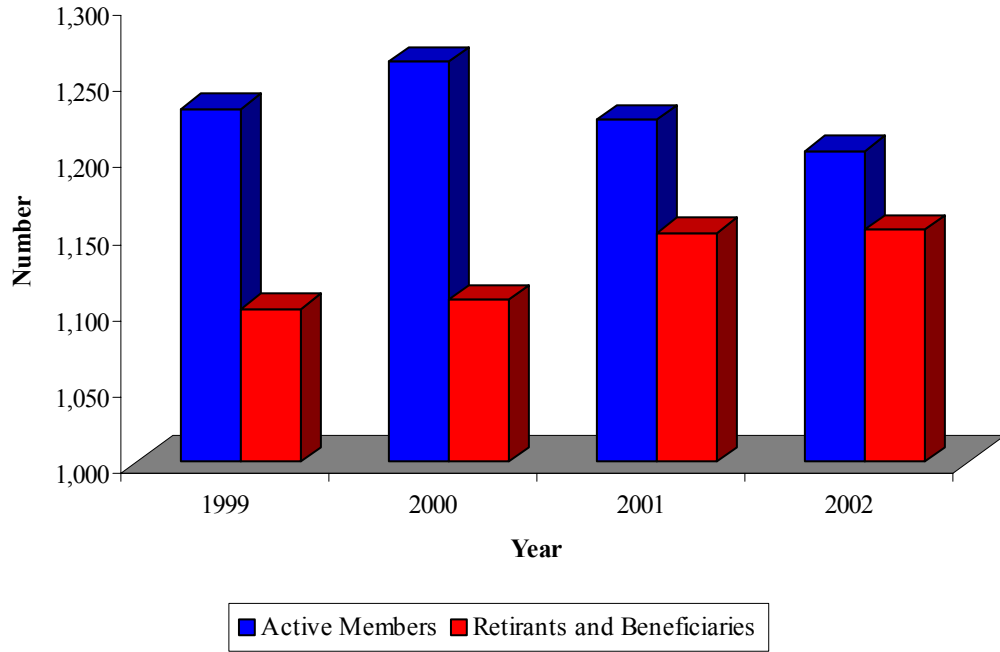
## SHORT CONDITION TEST COMPARATIVE STATEMENT

Valuation Date April 30	Entry Age Accrued Liabilities			Valuation Assets	Portion of Accrued Liabilities Covered by Assets		
	(1) Active Member Contributions	(2) Retirants and Beneficiaries	(3) Active Members (Employer Financed Portion)		(1)	(2)	(3)
2002	\$41,661,164	\$424,565,985	\$182,405,640	\$620,948,986	100 %	100 %	85 %

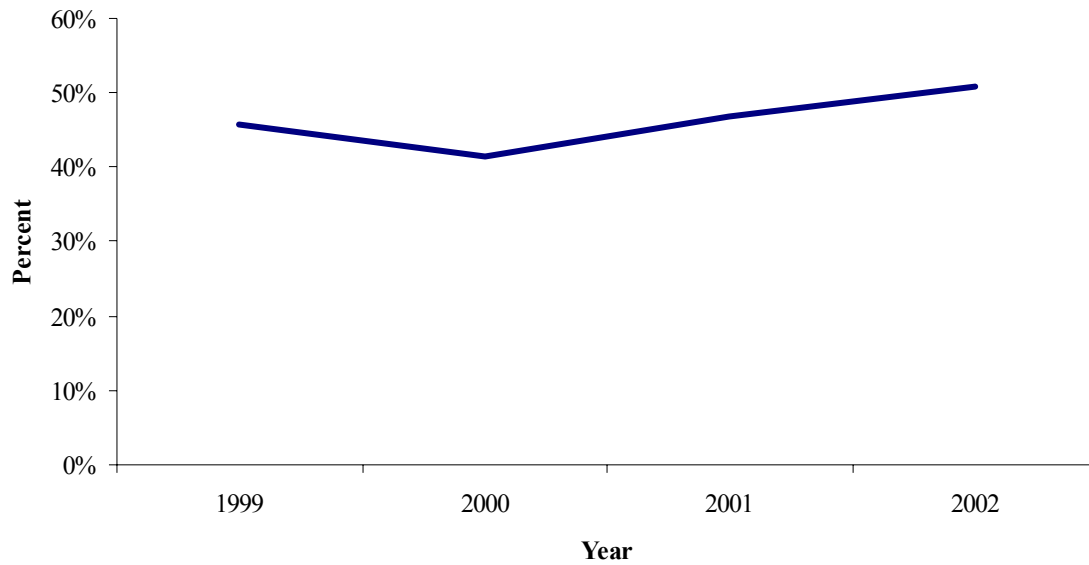
# MEMBERSHIP INFORMATION

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## Active and Retired Members



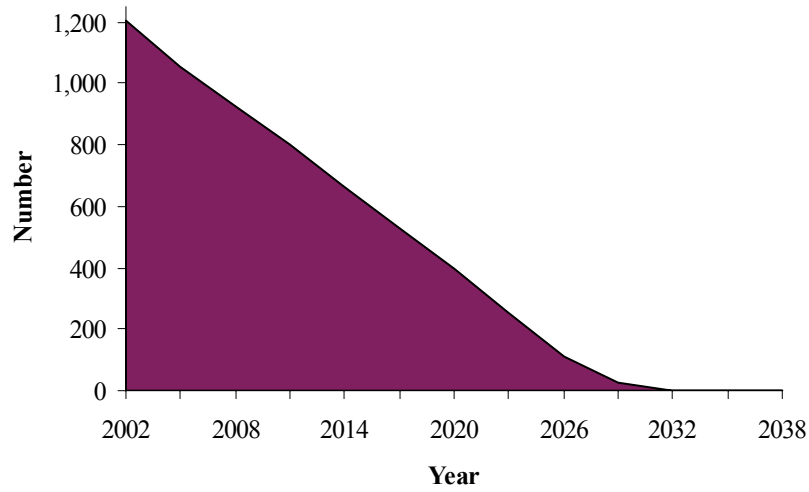
## Benefits as a Percent of Payroll



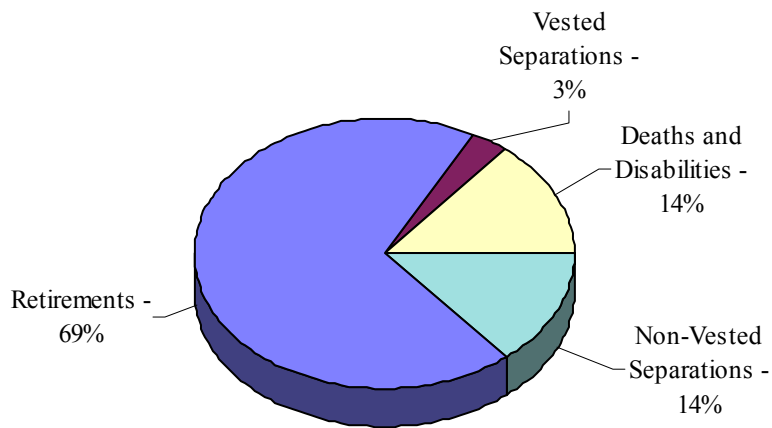
# EXPECTED DEVELOPMENT OF PRESENT POPULATION

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## Closed Group Population Projection



## Expected Terminations from Active Employment for Current Active Members



**Comment A:** For the fiscal year ending April 30, 2003, it was reported to the actuary that the City is contributing 19.70% of payroll. Based on the results of this valuation and the current procedure of amortizing the unfunded actuarial accrued liability, this results in 0.15% of payroll being utilized for additional UAAL contributions.

**Comment B:** As of April 30, 2002, actuarial accrued liabilities were \$648,632,789 while valuation assets were \$620,948,986, resulting in a funded ratio of 95.7%. This represents a strong financial position.

**Comment C:** Based on the funding value of assets the System realized a 6.5% return for the year ended April 30, 2002. Based on a market value basis, the System earned a (2.7)% return. Investment losses are currently scheduled for valuation years 2003, 2004, and 2005. Market rates of return in excess of the actuarial assumed rate is required in these years to offset these scheduled losses.

**Comment D:** The System experienced an actuarial loss this year, primarily from recognized investment return. Most retirement plans have experienced similar losses. A recovery in the investment markets is important if future contribution increases are to be avoided.

**Comment E:** A five year experience study is scheduled to be performed following this valuation to review economic and non-economic assumptions and methodologies. The results of this study will be reviewed with the Board and will affect subsequent valuations.

# ACTUARIAL BALANCE SHEET - APRIL 30, 2002

## Present Resources and Expected Future Resources

A. Valuation assets:	
1. Net assets from system financial statements (market value)	\$ 561,755,162
2. Valuation adjustment	<u>59,193,824</u>
3. Valuation assets	620,948,986
B. Actuarial present value of expected future employer contributions:	
1. For normal costs	95,428,556
2. For unfunded actuarial accrued liabilities	<u>27,683,803</u>
3. Total	123,112,359
C. Actuarial present value of expected future member contributions	<u>66,224,636</u>
D. Total Actuarial Present Value of Present and Expected Future Resources	<u>\$ 810,285,981</u>

## Actuarial Present Value of Expected Future Benefit Payments and Reserves

A. To retirants and beneficiaries	\$ 424,565,985
B. To vested terminated members	1,739,694
C. To present active members:	
1. Allocated to service rendered prior to valuation date	222,327,110
2. Allocated to service likely to be rendered after valuation date	<u>159,142,305</u>
3. Total	<u>381,469,415</u>
D. Total Actuarial Present Value of Expected Future Benefit Payments	807,775,094
E. Present Value of Assumed Future Administrative Expenses	2,510,887
F. Total Actuarial Present Value of Expected	

## ANALYSIS OF FINANCIAL EXPERIENCE YEAR ENDED APRIL 30, 2002

The actuarial gains or losses realized in the operation of the Retirement System provide an experience test. Actual experience will never (except by coincidence) coincide exactly with assumed experience. It is expected that gains and losses will cancel each other over a period of years, but sizable year-to-year fluctuations are common. Detail on the derivation of the actuarial gain (loss) is shown below, along with a year-by-year comparative schedule.

(1) UAAL* at start of year	\$15,239,263
(2) Normal cost from last valuation	15,932,154
(3) Actual contributions	17,470,774
(4) Interest accrual: (1) x 0.0775 + [(2) - (3)] x 0.0	1,181,043
(5) Expected UAAL before changes: (1) + (2) - (3) + (4)	14,881,686
(6) Change from benefit changes	none
(7) Change from revised actuarial assumptions and miscellaneous	331,588
(8) Expected UAAL after changes: (5) + (6) + (7)	15,213,274
(9) Actual UAAL at end of year	27,683,803
(10) Gain (loss) (8) - (9)	(12,470,529)
(11) Gain (loss) as percent of actuarial accrued liabilities at start of year (\$615,291,156)	(2.0%)

\* *Unfunded actuarial accrued liability (UAAL).*

Year Ended April 30	Actuarial Gain (Loss) As % of Beginning Accrued Liabilities
2002	(2.0) %

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**SUMMARY of BENEFIT PROVISIONS AND  
VALUATION DATA SUBMITTED by THE  
RETIREMENT SYSTEM**



# BRIEF SUMMARY OF BENEFIT CONDITIONS EVALUATED (APRIL 30, 2002)

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## Eligibility

## Amount

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### SERVICE RETIREMENT

Age 60 with 10 or more years of service or 25 years of service regardless of age. Members must retire at the completion of 30 years of creditable service, or after attaining age 60, whichever occurs first. The Board of Police Commissioners may, however, with the recommendation of the Chief of Police, permit a member to continue in service until age 65, at which time the member must retire.

For a member retiring prior to August 28, 2000, straight life pension equals 2.0% of Final Compensation times years of service, subject to a maximum benefit of 60% of Final Compensation. For a member retiring on or after August 28, 2000, straight life pension equals 2.5% of Final Compensation times years of service, subject to a maximum benefit of 75% of Final Compensation. Final Compensation is the average annual compensation during the two years of service with the highest salary, whether consecutive or otherwise, or during the entire period of service if less than two years. Pensions are payable monthly at one-twelfth of the annual rate.

### DEFERRED RETIREMENT

A member with at least 10 years of creditable service who is not terminated by death or retirement, but by order of the Board of Police Commissioners for any reason other than dishonesty, intemperate habits or conviction of a felony.

50% of Final Compensation multiplied by the ratio of the number of creditable years of service to 30. Benefit begins at age 60.

15 or more years of creditable service.

Computed as service retirement but based upon service, Final Compensation and benefit in effect at termination. Benefit begins at age 55.

### DEATH AFTER RETIREMENT SURVIVOR'S PENSION

Payable to a surviving spouse, if any, upon the death of a retired member who was receiving a straight life pension. Benefit is payable until death.

Spouse's pension equals 80% of the straight life pension the deceased retiree was receiving. The 80% benefit amount calculated under this provision is in addition to the Supplemental Retirement Benefit.

**BRIEF SUMMARY OF BENEFIT CONDITIONS EVALUATED  
(CONTINUED)  
(APRIL 30, 2002)**

<b>Eligibility</b>	<b>Amount</b>
<b>NON-DUTY DEATH IN SERVICE SURVIVOR'S PENSION</b>	
Payable to a surviving spouse, if any, upon death of a member. Benefit is payable until death.	40% of Final Compensation.
Payable to each child under age 18, if any, until the child attains age 18, or, if mentally or physically incapacitated from wage earnings, until the incapacity no longer exists, or age 21 if a full time student.	\$600 annually.
Payable at death.	A funeral benefit of \$1,000.
<b>DUTY DEATH IN SERVICE SURVIVOR'S PENSION</b>	
Payable to the surviving spouse, or if there is no surviving spouse, to children under age 21 or to children over age 21 if mentally or physically incapacitated, of a member who died in the line of duty.	In addition to the benefits payable under non-duty death, a lump sum of \$50,000.
<b>NON-DUTY DISABILITY</b>	
Payable upon the total and permanent disability of a member with 10 or more years of service.	2.5% of Final Compensation multiplied by years of creditable service payable for the remainder of the officer's life, or as long as the permanent disability continues.
<b>DUTY DISABILITY</b>	
Payable upon the total and permanent disability of a member as a result of an accident or disease occurring in the line of duty.	75% of Final Compensation payable for the remainder of the officer's life, or as long as the permanent disability continues. The pension may be subject to offset or reduction by amounts paid or payable under any Workers' Compensation law.

**BRIEF SUMMARY OF BENEFIT CONDITIONS EVALUATED  
(CONTINUED)  
(APRIL 30, 2002)**

**Eligibility**

**Amount**

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**MINIMUM PENSION BENEFIT**

Any member who retired entitled to a pension benefit and who either has at least 25 years of creditable service or is retire as a result of an injury or illness occurring in the line of duty or course of employment. A surviving spouse qualifies for the minimum monthly benefit if the officer had at least 25 years of creditable service or was retired or died as a result of an injury or illness occurring in the line of duty or course of employment.

Minimum monthly benefit of not less than \$600 in combined pension benefit and cost-of-living adjustments. The minimum monthly pension benefit is in addition to the Supplemental Retirement Benefit.

**POST-RETIREMENT BENEFIT INCREASES**

Any member may receive during each year, in addition to the officer's base pension, a cost of living adjustment in an amount equal to 3% of the officer's base pension. Base pension is the pension computed under the provisions of the law at the date of retirement, without regard to the cost of living adjustment. The cost of living adjustment also applies to benefits being paid to a surviving spouse. The adjustment is made effective May 1 each year.

**MEMBER CONTRIBUTIONS**

10.55% of compensation. No contributions are required for members after they retire or complete 30 years of service.

**SUPPLEMENTAL RETIREMENT BENEFIT**

Current and future retired and disabled members and their surviving spouses are eligible to receive \$420 per month in addition to pension benefits.

## DERIVATION OF FUNDING VALUE OF ASSETS

Valuation Date April 30,	2002	2003	2004	2005
A. Funding Value Beginning of Year	\$600,051,893			
B. Market Value End of Year	561,755,162			
C. Market Value Beginning of Year	594,853,903			
D. Non-Investment Net Cash Flow	(17,500,379)			
E. Investment Return:				
E1. Market Total: B-C-D	(15,598,362)			
E2. Assumed Rate	7.75%			
E3. Amount for Immediate Recognition	45,834,318			
E4. Amount for Phased In Recognition	(61,432,680)			
F. Phased-In Recognition of Investment Return:				
F1. Current Year: 0.25 x E4	(15,358,170)			
F2. First Prior Year	(10,933,294)	(\$15,358,170)		
F3. Second Prior Year	8,747,274	(10,933,294)	(\$15,358,170)	
F4. Third Prior Year	<u>10,107,344</u>	<u>8,747,274</u>	<u>(10,933,294)</u>	<u>(15,358,170)</u>
F5. Total Recognized Investment Gain	(7,436,846)	(17,544,190)	(26,291,464)	(15,358,170)
G. Funding Value End of Year: A+D+E3+F5	620,948,986			
H. Difference Between Funding & Market Values	59,193,824			
I. Recognized Rate of Return	6.5%			
J. Market Rate of Return	(2.7)%			

*The Funding Value of Assets recognizes assumed investment return (line E3) fully each year. Differences between actual and assumed investment return (line E4) are phased in over a closed 4-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. If assumed rates are exactly realized for 3 consecutive years, funding value will become equal to market value.*



**SUMMARY OF CURRENT ASSET INFORMATION  
REPORTED FOR VALUATION**

**Assets**

	<b>Market Value</b>	
	<b>April 30, 2002</b>	<b>April 30, 2001</b>
Cash & Equivalents	\$ 15,493,398	\$ 18,969,398
Receivables	5,324,070	5,159,842
Stocks: Common Corporate	281,722,632	350,830,683
Foreign	65,318,548	
Bonds: U.S Government	83,005,914	207,217,025
Corporate	98,560,691	
Mortgages	12,751,012	13,192,216
Other	22,629	29,491
Building and Other Property		
Used in Plan Operations	0	30,057
Total Assets	\$562,198,894	\$595,428,712
Accounts Payable	(443,732)	(574,809)
Net Assets Available for Benefits	\$561,755,162	\$594,853,903

**Additions and Deductions**

	<b>2002</b>	<b>2001</b>
Market Value - Balance - Beginning of Year	\$594,853,903	\$638,358,684
Additions:		
Employees' Contributions	6,158,020	5,958,321
Employer Contributions	11,312,754	11,392,871
Investment Return	(13,129,283)	(26,895,447)
Miscellaneous	0	0
Deductions:		
Retirement Benefit Payments	33,374,972	30,446,870
Death Benefit Payments	71,000	72,066
Refunds of Member Contributions	1,075,649	514,571
Investment Expenses	2,469,079	2,385,480
Administrative Expenses	449,532	541,539

**ASSET INFORMATION REPORTED FOR VALUATION  
COMPARATIVE STATEMENT**

<b>Year Ended</b>	<b>Assets</b>	<b>Additions</b>				<b>Deductions</b>					<b>Assets Year-End</b>
		<b>Employee Contrib.</b>	<b>Employer Contrib.</b>	<b>Investment Return</b>	<b>Misc. Income</b>	<b>Ret. Benefits</b>	<b>Death Benefits</b>	<b>Contrib. Refunds</b>	<b>Inv. Exp.</b>	<b>Admin. Exp.</b>	
<b>April 30</b>	<b>BOY</b>										
2001	\$638,358,684	\$5,958,321	\$11,392,871	(\$26,895,447)	\$0	\$30,446,870	\$72,066	\$ 514,571	\$2,385,480	\$541,539	\$594,853,903
2002	594,853,903	6,158,020	11,312,754	(13,129,283)	0	33,374,972	71,000	1,075,649	2,469,079	449,532	561,755,162





**RETIRANTS AND BENEFICIARIES ADDED TO AND REMOVED FROM ROLLS  
COMPARATIVE STATEMENT**

Year Ended April 30	Added to Rols		Removed from Rols		Rols End of Year		% Incr. Annual Benefits	Average Annual Benefit	Annual Benefits as a % of Active Payroll	Number of Active Members per Retired Members
	No.	Annual Benefits	Post-Ret. Increases	No.	Annual Benefits	No.*				
2001						1,132	\$26,964,694	\$23,820	50.4 %	1.1
2002	51	\$1,571,767	\$711,249	31	\$ 355,257	1,152	28,892,453	25,080	51.0	1.0

\* The total number does not reflect QDROs receiving benefits. For reporting purposes, the member and respective QDRO have been grouped together as one pension.



**RETIRANTS AND BENEFICIARIES - APRIL 30, 2002**  
**TABULATED BY ATTAINED AGES \***

Attained Ages	Age & Service Retirants		Disability Retirants		Survivor Beneficiaries	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
5-9					6	\$31,313
10-14					8	30,230
15-19					9	26,831
20-24					1	600
25-29			1	\$19,714		
30-34					1	6,171
35-39			6	158,173	1	21,638
40-44			5	107,897	3	43,920
45-49	5	\$192,091	12	330,506	9	163,655
50-54	144	4,931,797	34	900,088	10	193,615
55-59	198	6,328,385	35	828,726	12	202,603
60-64	159	4,852,580	24	528,238	23	395,508
65-69	129	3,478,954	14	306,953	27	405,674
70-74	80	1,846,888	12	211,647	34	462,231
75-79	46	877,358	3	59,066	32	338,362
80-84	16	221,321			21	161,749
85-89	3	23,468			22	154,753
90 & Over	1	9,692			6	40,058
<b>Totals</b>	<b>781</b>	<b>\$22,762,534</b>	<b>146</b>	<b>\$3,451,008</b>	<b>225</b>	<b>\$2,678,911</b>

\* Benefit amounts do not include supplemental retirement benefits.  
Number counts do not reflect 20 QDROs receiving benefits. For reporting purposes, the member and respective QDRO have been grouped together as one pension.

**VESTED TERMINATED MEMBERS - APRIL 30, 2002  
TABULATED BY ATTAINED AGES**

<b>Attained Ages</b>	<b>No.</b>	<b>Annual Benefits *</b>
40-44	1	\$20,003
45-49	4	71,657
50-54	5	82,556
<b>Totals</b>	<b>10</b>	<b>\$174,216</b>

*\* Benefit amounts do not include supplemental retirement benefits.*

**ACTIVE MEMBERS INCLUDED IN APRIL 30, 2002 VALUATION  
COMPARATIVE SCHEDULE**

<b>Valuation Date April 30</b>	<b>Active Members</b>	<b>Annual Payroll</b>	<b>Average</b>			<b>% Inc.</b>
			<b>Age</b>	<b>Service</b>	<b>Pay</b>	<b>Avg. Pay</b>
1999	1,231	\$51,963,858	35.6 yrs.	9.6 yrs.	\$42,213	
2000	1,262	57,791,028	35.9	9.8	45,793	8.5 %
2001	1,224	57,505,238	36.0	9.8	46,981	2.6
2001 *	1,224	53,489,585	36.0	9.8	43,701	
2002	1,204	56,678,323	36.1	9.9	47,075	7.7

\* Payroll reported in data. For valuation years 2001 and prior, valuation payroll includes projected salary increases for year following valuation. For valuation years 2002 and greater, valuation payroll is payroll reported in data.

**ADDITIONS TO AND REMOVALS FROM ACTIVE MEMBERSHIP  
ACTUAL AND EXPECTED NUMBERS**

Year Ended April 30	Number Added During Year		Terminations During Year								Active Members End of Year	
	A	E	Normal Retirement		Disability Retirement		Died-In Service		Other Terminations			
			A	E	A	E	A	E	A	E		
2001												1,224
2002	72	92	36	29.9	3	5.0	2	1.2	51	31.9		1,204
5 yr. Totals	72	92	36	29.9	3	5.0	2	1.2	51	31.9		

*A represents actual number.*

*E represents number based on assumptions outlined in Section C.*

**ACTIVE MEMBERS – APRIL 30, 2002**  
**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.	Annual Payroll
Under 20									
20-24	33							33	\$ 1,105,142
25-29	165	33						198	7,001,361
30-34	128	199	21					348	14,520,634
35-39	37	73	117	33				260	12,869,437
40-44	5	11	56	79	7			158	8,923,851
45-49	2	4	24	38	53	12		133	7,822,100
50-54		1	8	10	23	20		62	3,750,522
55-59		1			4	6		11	632,670
60-64			1					1	52,606
<b>Totals</b>	<b>370</b>	<b>322</b>	<b>227</b>	<b>160</b>	<b>87</b>	<b>38</b>		<b>1,204</b>	<b>\$ 56,678,323</b>

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

Age: 36.1 years

Service: 9.9 years

Annual Pay: \$47,075

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**FINANCIAL PRINCIPLES, ACTUARIAL  
VALUATION PROCESS, ACTUARIAL COST  
METHODS, ACTUARIAL ASSUMPTIONS AND  
DEFINITIONS OF TECHNICAL TERMS**



## **BASIC FINANCIAL PRINCIPLES AND OPERATION OF THE RETIREMENT SYSTEM**

***Benefit Promises Made Which Must Be Paid For.*** A retirement program is an orderly means of handing out, keeping track of, and financing pension promises to a group of employees. As each member of the retirement program acquires a unit of service credit the member is, in effect, handed an "IOU" which reads: "The Police Retirement System of Kansas City, Missouri promises to pay you one unit of retirement benefits, payments in cash commencing when you retire."

The principal related financial question is: When shall the money required to cover the "IOU" be contributed? This year, when the benefit of the member's service is received? Or, some future year when the "IOU" becomes a cash demand?

A Retirement System meets this requirement by having as its ***financial objective the establishment and receipt of contributions, expressed as percents of active member payroll, which will remain approximately level*** from year-to-year and will not have to be increased for future generations of taxpayers.

Translated into actuarial terminology, a level percent-of-payroll contribution objective means that the contribution rate must be at least:

***Normal Cost*** (the present value of future benefits assigned to members' service being rendered in the current year)

... plus ...

***Interest on the Unfunded Actuarial Accrued Liability*** (the difference between the actuarial accrued liability and current system assets).

The accumulation of invested assets *is a by-product of level percent-of-payroll contributions, not the objective*. Investment income becomes the 3rd major contributor to the retirement program, and the amount is directly related to the amount of contributions and investment performance.

If contributions to the retirement program are less than the preceding amount, the difference, *plus investment earnings not realized thereon*, will have to be contributed at some later time (or benefits will have to be reduced) to satisfy the fundamental fiscal equation under which all retirement programs must operate:

$$B = C + I - E$$

The aggregate amount of **B**enefit payments to any group of members and their beneficiaries cannot exceed the sum of:

The aggregate amount of **C**ontributions received on behalf of the group

. . . plus . . .

**I**nvestment earnings on contributions received and not required for immediate cash payments of benefits

. . . minus . . .

The **E**xpenses of operating the program.

There are retirement programs designed to defer the bulk of contributions far into the future. The present contribution rate for such systems is *artificially low*. The fact that the contribution rate is destined to increase relentlessly to a much higher level, is often ignored.

**Computed Contribution Rate Needed to Finance Benefits.** From a given schedule of benefits and from the data furnished, the actuary calculates the contribution rate *by means of an actuarial valuation* - the technique of assigning monetary values to the risks assumed in operating a retirement program.



## THE ACTUARIAL VALUATION PROCESS

*The financing diagram* on the previous page shows the relationship between the two fundamentally different philosophies of paying for retirement benefits: the method where contributions match cash benefit payments (or barely exceed cash benefit payments, as in the Federal Social Security program) which is an *increasing contribution method*; and the *level contribution method* which equalizes contributions between the generations.

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*The actuarial valuation* is the mathematical process by which the level contribution rate is determined, and the flow of activity constituting the valuation may be summarized as follows:

- A. ***Covered Person Data***, furnished by plan administrator.
  - Retired lives now receiving benefits
  - Former employees with vested benefits not yet payable
  - Active employees
  
- B. + ***Asset data*** (cash & investments), furnished by plan administrator
  
- C. + ***Assumptions concerning future financial experience in various risk areas***, which assumptions are established by the Retirement Board after consulting with the actuary
  
- D. + ***The funding method*** for employer contributions (the long-term, planned pattern for employer contributions)
  
- E. + ***Mathematically combining the assumptions, the funding method, and the data***
  
- F. = Determination of:
  - Plan financial position
  
  - and/or New Employer Contribution Rate

## ACTUARIAL COST METHODS USED FOR THE VALUATION

*Age and Service Benefits, Death and Disability Benefits.* Normal cost and the allocation of actuarial present values between service rendered before and after the valuation date were determined using an individual entry-age actuarial cost method having the following characteristics:

- (i) the annual normal costs for each individual active member, payable from the member's date of employment to the member's projected date of retirement, are sufficient to accumulate the actuarial present value of the member's future service benefit at time of retirement;
- (ii) each annual normal cost is a constant percentage of the member's year-by-year projected covered pay.

*Amortization of Unfunded Actuarial Accrued Liabilities.* Unfunded actuarial accrued liabilities were amortized by level percent-of-payroll contributions (principal and interest combined) over a closed initial period of 24 years. Beginning in 1998, a new basis is created as of each valuation date.

Active member payroll was assumed to increase 4.5% a year for the purpose of determining the level percent contributions.

## ACTUARIAL ASSUMPTIONS IN THE VALUATION PROCESS

The actuary calculates contribution requirements and actuarial present values for a retirement system by applying actuarial assumptions to the benefit provisions and people information of the system, using the actuarial cost methods described on page C-5.

The principal areas of risk which require assumptions about future experience are:

- (i) long-term rates of investment return to be generated by the assets of the system
- (ii) patterns of pay increases to members
- (iii) rates of mortality among members, retirants and beneficiaries
- (iv) rates of withdrawal of active members
- (v) rates of disability among active members
- (vi) the age patterns of actual retirements

In making a valuation, the actuary calculates the monetary effect of each assumption for as long as a present covered person survives - - - a period of time which can be as long as a century.

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The employer contribution rate has been computed to remain level from year-to-year so long as benefits and the basic experience and make-up of members do not change. Examples of favorable experience, which would tend to reduce the employer contribution rate are:

- (1) Investment returns in excess of 7.75 percent per year.
- (2) Member non-vested terminations at a higher rate than outlined on page C-11.
- (3) Mortality among retirants and beneficiaries at a higher rate than indicated by the 1983 Group Annuity Mortality Table.

Examples of unfavorable experience, which would tend to increase the employer contribution rate are:

- (1) Pay increases in excess of the rates outlined on page C-9.
- (2) An acceleration in the rate of retirement from the rates outlined on page C-12.
- (3) A pattern of hiring employees at older ages than in the past.

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Actual experience of the system will not coincide exactly with assumed experience, regardless of the choice of the assumptions, or the skill of the actuary or the precision of the calculations. Each valuation provides a complete recalculation of assumed future experience and takes into account all past differences between assumed and actual experience. The result is a continual series of adjustments (usually small) to the computed contribution rate.

From time to time one or more of the assumptions is modified to reflect experience trends (but not random or temporary year-to-year fluctuations).





## ACTUARIAL ASSUMPTIONS USED FOR THE VALUATION

*The actuarial assumptions used* in the valuation are shown in this Section of the report. The assumptions are consistent with those used in the April 30, 2001 valuation by the prior actuary. An experience study to review economic and non-economic assumptions is to be performed following this valuation.

### Economic Assumptions

*The investment return rate* used in making the valuations was 7.75% per year, compounded annually. The real rate of return is the portion of total investment return, which is more than the wage inflation rate. Considering other financial assumptions, the 7.75% investment return rate translates to an assumed real rate of return of 3.25%. In order to assume a 3.25% real return over wage growth, it would be necessary to realize about a 4.25% real return over price inflation, after accounting for difference between wage increases and price increases.

*Pay increase assumptions* for individual active members are shown below. Part of the assumed increase at each age is for merit and/or seniority, and the other 4.5% recognizes changes in wage levels due to broad economic effects, including inflation and real wage growth.

Sample Ages	Annual Rate of Pay Increase for Sample Ages		
	Base (Economic)	Merit and Longevity	Total
20	4.5%	2.5%	7.0%
25	4.5%	2.5%	7.0%
30	4.5%	2.4%	6.9%
35	4.5%	1.9%	6.4%
40	4.5%	1.3%	5.8%
45	4.5%	0.5%	5.0%
50	4.5%	0.5%	5.0%
55	4.5%	0.5%	5.0%
60	4.5%	0.5%	5.0%

*Price inflation* of 3.5% per year would be consistent with the above assumptions. (This assumption is not utilized in the valuation process.)

*The active member payroll* is assumed to increase 4.5% annually, which is the portion of the individual pay increase assumptions attributable to broad economic effects.

*The number of active members* is assumed to continue at the present number.

## Non-Economic Assumptions

**Mortality Tables.** For healthy lives, the 1983 Group Annuity Mortality Table, set back 0 years for men and 0 years for women. Male and female officers still in employment have a 0.03% mortality rate added to the table to reflect duty-related deaths. Sample values follow:

Sample Ages	Actuarial Present Value of \$1 Monthly for Life		Future Life Expectancy (years)	
	Men	Women	Men	Women
50	\$135.06	\$143.84	29.18	34.92
55	127.14	137.81	24.82	30.24
60	117.18	129.90	20.64	25.67
65	104.97	119.83	16.69	21.29
70	91.48	107.29	13.18	17.13
75	77.33	92.89	10.15	13.37
80	63.28	78.10	7.64	10.20

For disabled lives, the mortality tables used by the Pension Benefit Guaranty Corporation for disabled lives were used. Sample values follow:

Sample Ages	Actuarial Present Value of \$1 Monthly for Life		Future Life Expectancy (years)	
	Men	Women	Men	Women
50	\$93.93	\$110.91	15.35	21.40
55	87.02	106.33	13.43	19.18
60	81.16	101.30	11.87	17.01
65	76.49	95.34	10.56	14.82
70	70.59	87.51	9.13	12.50
75	62.33	76.44	7.49	10.00
80	50.81	63.30	5.66	7.62

These assumptions are used to measure the probabilities of members dying before retirement and the probabilities of each benefit payment being made after retirement.

It was assumed that 20% of deaths-in-service would be duty related.

**Rates of separation from active membership.** The rates do not apply to members eligible to retire and do not include separation on account of death or disability. This assumption measures the probabilities of members remaining in employment.

Sample Ages	% of Active Members Separating within Next Year	
	Male	Female
25	4.1%	6.7%
30	3.4%	5.6%
35	2.6%	4.2%
40	1.2%	2.0%
45	0.5%	0.5%
50	0.0%	0.0%

Members in the first year of employment were assumed to terminate at the rate of 10%.

**Rates of Disability.** These assumptions represent the probabilities of active members becoming disabled.

Sample Ages	Percent Becoming Disabled within Next Year
30	0.000%
35	0.480%
40	0.640%
45	0.672%
50	1.168%
55	2.240%
60	3.968%

It was assumed that 55% of disabilities would be duty related.

**Rates of Retirement.** These rates are used to measure the probabilities of an eligible member retiring during the next year.

<b>Active Members Retiring Within Next Year</b>	
<b>Years of Service</b>	<b>Percent Retiring</b>
25	30%
26	30%
27	15%
28	30%
29	65%
30	100%

A member was assumed to be eligible for retirement after attaining 25 years of service, or, after attaining age 65 with 10 years of service. For members who qualify under the age 65 with 10 years of service condition, 100% are assumed to retire.

**Present assets (cash & investments)** were used with a market value adjustment that spreads differences between actual and assumed return over a closed four-year period. Details of the method may be found in the body of the report on page D-3. Assets may be used in the valuation prior to the final audit.

**The data about persons now covered and about present assets** were furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary.

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The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (M.A.A.A.) who has experience performing public plan valuations.

**SUMMARY OF ASSUMPTIONS USED  
APRIL 30, 2002**

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*Pensions in an Inflationary Environment*

**Value of \$1,000/month Retirement Benefit  
To an Individual Who Retires at Age 50  
In an Environment of 3.5% Inflation**

Age	Value
50	\$1,000
51	966
52	934
53	902
54	871
55	842
60	709
65	597
70	503
75	423
80	356
85	300

The life expectancy of a 50 year old male retiree is age 79. The life expectancy for a 50 year old female retiree is age 85. Approximately half of the people will outlive their life expectancy. The effects of even moderate amounts of inflation can be significant for those who live to an advanced age.

**SUMMARY OF ASSUMPTIONS USED**  
**APRIL 30, 2002**  
**MISCELLANEOUS AND TECHNICAL ASSUMPTIONS**

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<b>Marriage Assumption.</b>	65% of males and 62% of females are assumed to be married for purposes of death-in-service benefits. 80% of both males and females are assumed to be married for purposes of death-after-retirement benefits. Males are assumed to be 3 years older than their spouses. Actual reported data is utilized for retirees and beneficiaries.
<b>Pay Increase Timing.</b>	Beginning of (Fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
<b>Decrement Timing.</b>	Decrements of all types are assumed to occur mid-year.
<b>Eligibility Testing.</b>	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date of decrement.
<b>Benefit Service.</b>	Exact fractional service is used to determine the amount of benefit payable.
<b>Decrement Relativity.</b>	Decrement rates are used without adjustment for multiple decrement table effects.
<b>Decrement Operation.</b>	Withdrawal does not operate during retirement eligibility. Death-in-service and disability rates do not apply during the first year of employment.
<b>Normal Form of Benefit.</b>	The assumed normal form of benefit is 80% joint and survivor.
<b>Cost of Living.</b>	It was assumed that the Retirement Board will grant the full 3.0% cost of living adjustment each year as allowed by the plan.
<b>Loads.</b>	0.4% of payroll each year for administrative expenses.
<b>Incidence of Contributions.</b>	Contributions are assumed to be received continuously throughout the year based upon the computed percent-of-payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
<b>Pay Annualization.</b>	Reported pays for members with less than 1 year of service were annualized for valuation purposes.

## DEFINITIONS OF TECHNICAL TERMS

**Accrued Service.** Service credited under the system, which was rendered before the date of the actuarial valuation.

**Actuarial Accrued Liability.** The difference between the actuarial present value of system benefits and the actuarial present value of future normal costs. Also referred to as "past service liability."

**Actuarial Assumptions.** Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

**Actuarial Cost Method.** A mathematical budgeting procedure for allocating the dollar amount of the "actuarial present value of future benefits" between future normal costs and actuarial accrued liability. Sometimes referred to as the "actuarial funding method."

**Actuarial Equivalent.** One series of payments is said to be actuarially equivalent to another series of payments if the two series have the same actuarial present value.

**Actuarial Gain (Loss).** The difference between actual unfunded actuarial accrued liabilities and anticipated unfunded actuarial accrued liabilities -- during the period between two valuation dates. It is a measurement of the difference between actual and expected experience.

**Actuarial Present Value.** The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest, and by probabilities of payments.

**Amortization.** Paying off an interest-discounted amount with periodic payments of interest and (generally) principal -- as opposed to paying off with a lump sum payment.

**Normal Cost.** The portion of the actuarial present value of future benefits that is assigned to the current year by actuarial cost method. Sometimes referred to as "current service cost."

**Unfunded Actuarial Accrued Liabilities.** The difference between actuarial accrued liabilities and valuation assets. Sometimes referred to as "unfunded past service liability" or "unfunded supplemental present value."

Most retirement systems have unfunded actuarial accrued liabilities. They arise each time new benefits are added and each time an actuarial loss occurs.

The existence of unfunded actuarial accrued liabilities is not in itself bad, any more than a mortgage on a house is bad. Unfunded actuarial accrued liabilities do not represent a debt that is payable today. What is important is the ability to amortize the unfunded actuarial accrued liabilities and the trend in their amount (after due allowance for devaluation of the dollar).



**Valuation Assets.** Also referred to as actuarial value of assets, funding value of assets, or smoothed market value of assets.

Valuation assets recognize assumed investment return fully each year. Differences between actual and assumed investment return are phased in over a closed 4-year period. During periods when investment performance exceeds the assumed rate, valuation assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, valuation assets will tend to be greater than market value. If assumed rates are exactly realized for 3 consecutive years, valuation assets will become equal to market value.

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**GOVERNMENTAL ACCOUNTING STANDARDS  
BOARD STATEMENTS No. 25 AND No. 27**

**GASB STATEMENTS NO. 25 AND NO. 27 REQUIRED  
ACTUARIAL INFORMATION  
SCHEDULE OF FUNDING PROGRESS**

# For valuation years 2001 and prior, valuation payroll includes projected salary increases for year following valuation.

<b>Actuarial Valuation Date</b>	<b>(a) Actuarial Value of Assets</b>	<b>(b) Entry Age Actuarial Accrued Liability</b>	<b>(b-a) Unfunded Accrued Liability (UAL)</b>	<b>(a/b) Funded Ratio</b>	<b>(c) Annual Payroll#</b>	<b>[(b-a)/c] UAL as a Percentage of Annual Payroll</b>
4/30/1997	\$388,984,781	\$456,218,854	\$67,234,073	85	\$48,173,740	140 %
4/30/1998	433,090,523	493,183,065	60,092,542	88	49,872,090	120
4/30/1999	484,396,958	521,600,003	37,203,045	93	51,963,858	72
4/30/2000	584,514,972	589,566,248	5,051,276	99	57,791,028	9
4/30/2001	600,051,893	615,291,156	15,239,263	98	57,505,238	27
4/30/2002	620,948,986	648,632,789	27,683,803	96	56,678,323	49

For valuation years 2002 and greater, valuation payroll is payroll reported in data.

**GASB STATEMENTS NO. 25 AND NO. 27 REQUIRED  
ACTUARIAL INFORMATION  
SCHEDULE OF EMPLOYER CONTRIBUTIONS**

<b>Fiscal Year Ending April 30</b>	<b>Annual Required Contribution</b>	<b>Percent Contributed</b>
1996	\$ 8,346,925	111 %
1997	8,587,324	110
1998	8,716,539	112
1999	9,355,956	107
2000	9,880,286	104
2001	10,785,784	100
2002	10,837,294	104
2003	11,579,240	

## DEVELOPMENT OF ANNUAL PENSION COST AND NET PENSION OBLIGATION

Fiscal Year	(a) Annual Required Contribution (ARC)	(b) Interest on Net Pension Obligation (Asset) (NPO (NPA))	(c) ARC Adjustment	(d) = (a) + (b) – (c) Annual Pension Cost	(e) Actual Contribution	(f) = (d) – (e) Change in NPO (NPA)	(g) = sum of (f) Net Pension Obligation (Asset) at End of Year
1998	\$8,716,539	\$ (759,648)	\$ (1,131,332)	\$9,088,223	\$9,978,462	\$ (890,239)	\$ (10,692,143)
1999	9,355,956	(828,641)	(1,143,913)	9,671,228	10,318,583	(647,355)	(11,339,498)
2000	9,880,286	(878,811)	(735,927)	9,737,402	10,789,963	(1,052,561)	(12,392,059)
2001	10,785,784	(960,385)	(718,089)	10,543,488	11,392,871	(849,383)	(13,241,442)
2002	10,837,294	(1,026,212)	(767,308)	10,578,390	11,312,754	(734,364)	(13,975,806)



## GASB STATEMENTS 25 AND 27 REQUIRED SUPPLEMENTARY INFORMATION

The information presented in the required supplementary schedules was determined as part of the actuarial valuations at the dates indicated. Additional information as of the latest valuation date follows:

Valuation date	April 30, 2002
Actuarial cost method	Individual entry age
Amortization method for unfunded actuarial accrued liabilities	Level percent closed
Remaining amortization periods	20 - 24 years
Asset valuation method	4 year smoothed market
Actuarial assumptions:	
Investment rate of return	7.75%
Projected salary increases including wage inflation at 4.5%	4.5% - 7.0%
Cost-of-living adjustments	3.0% simple

Membership of the plan consisted of the following at April 30, 2002, the date of the latest actuarial valuation:

Retirees and beneficiaries receiving benefits	1,152
Terminated plan members entitled to but not yet receiving benefits	10
Active plan members	<u>1,204</u>
Total	2,366

August 28, 2002

Mr. James J. Pyle  
Pension Systems Manager  
Kansas City Police Employees'  
Retirement Systems  
1328 Agnes  
Kansas City, Missouri 64127

Dear Jim:

Enclosed are twenty report copies of the Annual Actuarial Valuation of the Police Retirement System of Kansas City, Missouri. A copy will be forwarded to your auditor.

Please call if you have any questions or comments.

Sincerely,

Mita D. Drazilov

MDD:kmg

CC: McGladrey & Pullen