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Barry S.

CONNECTICUT STATE EMPLOYEES
RETIREMENT SYSTEM

December 31, 1984
ACTUARIAL VALUATION

MILLIMAN & ROBERTSON, INC.

CONSULTING ACTUARIES

THREE CORPORATE PLACE

BLOOMFIELD, CONNECTICUT 06002

203/243-1136

March 27, 1985

State of Connecticut
State Employees Retirement Commission
30 Trinity Street
Hartford, CT 06106

Ladies and Gentlemen:

We are pleased to provide this actuarial report for the Connecticut State Employees Retirement System. The report shows the financial status of the system as of December 31, 1984 and presents cost figures for the fiscal year beginning July 1, 1985.

As summarized in Section I, the recommended contribution for the fiscal year beginning July 1, 1985 is \$286,616,065. Since the State contribution will be based on 100% of Tier II costs and 95% of Tier O and Tier I costs, the actual State contribution, including Federal reimbursements, will be \$272,909,531.

This valuation was done using actuarial methods and assumptions which are the same as those used in the December 31, 1984 valuation except that both interest and salary scale assumptions have been increased by 1%. The method and assumptions are described in Section II of the report. The change in assumptions had the impact of reducing annual costs by approximately \$14,000,000.

The membership data provided to us was as of September 30, 1984; therefore salaries were increased by 1% to project them to December 30. This data is summarized in Section III and a detailed analysis of the membership by age and service is attached as Exhibit B. Although we did not audit this data (or the financial data referred to below), they are reasonably consistent with comparable data from the previous valuation. However, subsequent comparisons with actual payment records indicated that the salary rates understated actual compensation by 5.7%; therefore all active payroll figures and costs were adjusted by this percentage.

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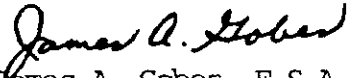
March 27, 1985

Section IV outlines the status of the retirement fund as reported to us by the Retirement Division and describes the adjustment used to spread unrealized gains and losses.

The final section of the report outlines our understanding of the benefit provisions embodied in the Connecticut statutes, as amended through 1984.

In our opinion this report fairly presents the financial and actuarial position of the Connecticut State Employees Retirement System as of December 31, 1984, in accordance with generally accepted actuarial principles. We also certify that, to the best of our knowledge and belief, this report is both complete and accurate; a copy of our separate certification is attached to the report as Exhibit A.

Respectfully submitted,



James A. Gobes, F.S.A.
Consulting Actuary

JAG/sf

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SECTION I
SUMMARY OF VALUATION
A. Actuarial Balance Sheet

Based on the membership and asset information provided to us (and summarized in Sections III and IV), the actuarial method and assumptions described in Section II, and our understanding of the benefit provisions embodied in Connecticut statutes as summarized in Section VI, we have prepared the following valuation of assets and liabilities as of December 31, 1984:

<u>ASSETS</u>	<u>Tier 0 and Tier I</u>	<u>Tier II</u>	<u>Total</u>
Retirement Fund (Adjusted basis)	\$ 952,746,185	\$ 4,433,769	\$ 957,179,954
Present value of future Normal Cost contributions	1,145,401,492	92,719,234	1,238,120,726
Unfunded Accrued Liability <i>ACCRUED LIABILITY LOSS</i> <i>CURRENT ASSETS</i>	<u>2,378,956,608</u>	<u>13,029,205</u>	<u>2,391,985,813</u>
TOTAL ASSETS	\$4,477,104,285	\$110,182,208	\$4,587,286,493

LIABILITIES

Present value of benefits

Active Members	\$3,161,241,505	\$110,182,208	\$3,271,423,713
Retired Members	1,308,926,160	0	1,308,926,160
Terminated Vested Members	<u>6,936,620</u>	<u>0</u>	<u>6,936,620</u>
TOTAL LIABILITIES	\$4,477,104,285	\$110,182,208	\$4,587,286,493

SECTION I

B. Projection of Normal Costs

The valuation calculated Normal Costs as of January 1, 1985 based on the payroll as of that date. Payroll was projected to July 1, 1985 by assuming that 5% of the Tier 0 and Tier I payroll will terminate during the six month period and be replaced by Tier II employees at the same salary level; remaining Tier 0 and Tier I employees and all Tier II employees (including replacements of Tier II terminations) are assumed to receive pay increases by July 1 equal to 5%. This produced the following projected Normal Costs:

<u>Tier</u>	<u>Plan</u>	<u>Estimated Payroll 1/1/85</u>	<u>Normal Cost Percentage</u>	<u>Projected Payroll 7/1/85</u>	<u>Normal Cost 7/1/85</u>
I	HD	\$ 83,347,902	12.2955%	\$ 83,139,532	\$10,222,421
I	B*	805,273,188	8.9285	803,260,005	71,719,070
I	C*	<u>141,841,073</u>	<u>6.4392</u>	<u>141,486,470</u>	<u>9,110,597</u>
Total Tier 0, plus Tier I		\$1,030,462,163		\$1,027,886,007	\$91,052,088
II	HD	\$ 7,319,303	10.2710%	\$ 11,852,663	\$ 1,217,387
	Other	<u>98,715,984</u>	<u>6.8074</u>	<u>151,007,496</u>	<u>10,279,684</u>
Total Tier II		\$106,035,287		\$ 162,860,159	\$11,497,071
Grand Total		\$1,136,497,450		\$1,190,746,166	\$102,549,159

* Includes approximately \$2,000,000 of Tier 0 salaries.

SECTION I

C. Projection of Total Cost

The Unfunded Liability as of December 31, 1984 was brought forward to June 30, 1985 by adding interest and adding (six months of) the January 1, 1985 Normal Cost, with interest, and subtracting expected contributions, also with interest:

	<u>Tier 0 & Tier I</u>	<u>Tier II</u>	<u>Total</u>
Unfunded Accrued Liability, 12-31-84	\$2,378,956,608	\$13,029,205	\$2,391,985,813
+ Interest	87,598,102	479,762	88,077,864
+ 6 months Normal Cost	43,896,476	3,593,123	47,489,599
+ Interest	668,763	54,741	723,504
- State Payments	96,582,162	3,603,416	100,185,578
- Federal Payments	16,608,431	619,649	17,228,080
- Employee Contributions	12,028,941	0	12,028,941
- Interest	<u>1,907,720</u>	<u>64,338</u>	<u>1,972,058</u>
Unfunded Accrued Liability, 6-30-85	\$2,383,992,695	\$12,869,428	\$2,296,862,123

Normal Cost	\$ 91,052,088	\$11,497,071	\$ 102,549,159
Amortization of Unfunded (over 40 years)	<u>183,078,599</u>	<u>988,307</u>	<u>184,066,906</u>
Total	\$ 274,130,687	\$12,485,378	\$ 286,616,065
Cost Percentage	95%	100%	
Adjusted Cost	\$ 260,424,153	\$12,485,378	\$ 272,909,531

SECTION II

ACTUARIAL METHOD AND ASSUMPTIONS

A. Funding Method

1. The actuarial valuation method used in the cost calculations is the Entry Age Normal Cost Method. Recommended annual contributions until the accrued liability is completely funded will consist of two pieces: Normal Cost plus a payment towards the Unfunded Accrued Liability.
2. The Normal Cost is determined by calculating the present value of future benefits for present active Members that will become payable as the result of death, disability, retirement or termination. This cost is then spread as a level percentage of pay from entry age to termination as an Active Member.
3. If Normal Costs had been paid at this level for all prior years, a fund would have been accumulated. Because this fund represents the portion of benefits that would have been funded to date, it is termed the Accrued Liability. In fact, it is calculated by adding the present value of benefits for retired Members and Terminated Vested Members to the present value of benefits for active Members and subtracting the present value of future contributions.
4. The Unfunded Accrued Liability is the Accrued Liability less Current Assets.
5. Since the valuation was done as of January 1, costs have been projected to July 1 in order to correspond to the fiscal year as follows:
 - A. Normal costs were determined as a percentage of pay, by Tier, as of January 1. Payroll was projected to July 1, separately for each Tier because of the shifting Tier populations, and these were multiplied by the normal cost factors by Tier.

- B. The Unfunded Accrued Liability was determined as of January 1, and brought forward to July 1 by adding one-half of the January 1 Normal Cost plus interest and subtracting expected employee and State contributions, also with interest. This amount was amortized over 40 years.
- C. Normal Cost and Past Service Amortization payments were adjusted to reflect payment in twelve equal installments at the end of each month.

SECTION II

B. Actuarial Assumptions

Mortality 1971 Group Annuity Mortality Table with ages set back 6 years for females.

Investment Return 7½% compounded annually.

Salary Scale	<u>Age</u>	<u>Annual Rate of Increase</u>
	20	6.34%
	25	6.26
	30	6.10
	35	5.90
	40	5.58
	45	5.22
	50	4.95
	55	4.83
	60	4.66

Turnover Estimated by excluding participants with less than one year of service and assuming that all other employees terminate at the following rates.

<u>Age</u>	<u>Annual Rate of Withdrawal</u>
20	5.44%
25	5.29
30	5.07
35	4.70
40	4.19
45	3.54
50	2.47
55	.94
60	--

Retirement Ages

Hazardous Duty, Age 53 and 25 years of service.

All other, Tier 0 and Tier I: Age 61 and 10 years of service.

Tier II: Age 65 and 10 years of service or age 70 and 5 years of service, or for Hazardous Duty Members, 25 years of service.

Social Security Wage Base

Increases

3½% compounded annually.

Disability

Annual Rate
of Disability
(Per 1000 lives)

<u>Age</u>	<u>(Per 1000 lives)</u>
20	.06
25	.09
30	.11
35	.15
40	.22
45	.36
50	.61
55	1.01
60	--

Service-connected are assumed to comprise 50% of total disabilities for Hazardous Duty and 20% for others.

Cost-of-Living Increases

3% per year for retirees on or after 1-1-80. 4½% per year for retirees prior to 1-1-80.

Asset Valuation

Adjusted cost value: assets are written up (or down) by 20% of the difference between market value and adjusted cost value, plus an additional write-up (or write-down) as necessary so that the resulting adjusted cost value is within 20% of market value.

SECTION III

MEMBERSHIP DATA

A. Active Members

We received data on 46,661 State employees plus 1,263 employees of State aided institutions, for a total of 47,924 Members. The following analysis compares the current distribution with the December 31, 1983 data (see Exhibit B for distribution by age and service).

	<u>12-31-83</u>	<u>12-31-84</u>	<u>Change</u>	<u>Per Cent</u> <u>Change</u>
Total Employees	47,295	47,924	+ 629	+ 1.3%
Total Salary (millions)* \$	977.8	\$ 1,136.5	+\$ 158.7	+16.2%
Average Salary	20,674	23,725	+\$3,041	+14.7%
Average Age**	42.3	42.4	+ 0.1	N/A
Average Service**	9.9	9.7	- 0.2	N/A

* Salaries increased 1% to project from 10-1 to 12-31.

** Based on Members included in valuation.

Of the active records submitted to us, 1,036 were rejected due to missing or invalid dates of birth and/or hire. Cost calculations were done using the valid records and then adjusted proportionately for the rejected records, and for the higher salary reported on actual payment records.

For valuation purposes, an additional 1,024 Members were excluded because they had less than one year of service; thus the valuation was based on 45,864 Members.

Salary figures as of December 31, 1983 were based on the annualized September payroll figures projected to year-end. Salary figures as of December 31, 1984 were derived in the same way but were then increased by 5.7% to bring them up to the total actual payroll for July 1 to December 31, annualized and projected to December 31.

SECTION III

B. Actives By Plan

The following analysis is based on the total of 47,924 active Members including employees not in the valuation because they had less than one year of service or had incorrect birth and/or hire dates. Hazardous Duty Members include 346 Tier II Members

	<u>12-31-83</u>	<u>12-31-84</u>	<u>Change</u>	<u>Per Cent Change</u>
<u>Number of Members</u>				
Hazardous Duty	3,192	3,270	+ 78	+ 2.4%
Plan B	31,601	32,567	+ 966	+ 3.1
Plan C	8,065	6,148	-1,917	-23.8
Tier II	4,437	5,939	+1,502	+33.9
<u>Total Annual Salary (millions)</u>				
Hazardous Duty	\$ 70.1	\$ 90.7	+\$ 20.6	+ 29.4%
Plan B	685.4	805.3	+ 119.9	+ 17.5
Plan C	164.1	141.8	- 22.3	- 13.6
Tier II	58.2	98.7	+ 40.5	+ 69.6
<u>Average Salary</u>				
Hazardous Duty	\$ 21,957	\$27,727	+\$5,770	+ 26.3%
Plan B	21,699	24,727	+ 3,028	+ 14.0
Plan C	20,350	23,071	+ 2,721	+ 13.4
Tier II	13,130	16,622	+ 3,492	+ 26.6

This analysis of age and service is based on Active Members included in the valuation. Therefore it excludes 1,024 employees with less than one year of service and the 1,036 records with incorrect birth dates or hire dates.

	<u>12-31-83</u>	<u>12-31-84</u>	<u>Change</u>
<u>Average Age</u>			
Hazardous Duty	38.9	38.7	- 0.2
Plan B	41.3	41.9	+ 0.6
Plan C	51.0	52.8	+ 1.8
Tier II	32.7	34.7	+ 2.0

Average Years of Service

Hazardous Duty	11.0	10.4	- 0.6
Plan B	9.8	10.0	+ 0.2
Plan C	12.6	12.7	+ 0.1
Tier II	2.4	3.6	+ 1.2

SECTION III

C. Retired and Terminated Vested Members

The following compares the current retired data with the December 31, 1983 data. [See Exhibit C for analysis of retirees by age, year of retirement and type of retirement].

	<u>12-31-83</u>	<u>12-31-84</u>	<u>Change</u>	<u>Per Cent Change</u>
<u>Pensioners</u>				
Number	16,376	16,930	+ 554	+ 3.4%
Total Annual Benefit*	\$ 110.6	\$ 121.1	+\$ 10.5	+ 9.5
Average Monthly Benefit	\$ 563	\$ 596	+\$ 33	+ 5.9
 <u>Beneficiaries</u>				
Number	504	607	+ 103	+20.4%
Total Annual Benefit*	\$ 2.6	\$ 3.5	+\$ 0.9	+34.6
Average Monthly Benefit	\$ 428	\$ 481	+\$ 53	+12.4
 <u>Terminated Vested</u>				
Number	495	476	- 19	- 3.8%

* Millions

SECTION IV

A. 1984 Summary of Fund

Market Value, January 1 \$801,667,094.88

Contributions

State	\$174,976,157.00	
Federal	37,102,079.96	
Employee	30,556,473.44	
		\$242,634,710.40

Investment Income

Interest and Dividends	\$ 72,207,782.93	
Realized Gains	1,612,918.96	
Change in Unrealized Gains	<u>9,721,096.05</u>	
		\$ 83,541,797.94

Disbursements

Benefit payments	\$120,284,134.09	
Employee refunds	15,579,972.86	
Expenses (Net)	<u>76,384.00</u>	
		\$135,940,490.95

Market Value, December 31 \$991,903,114.27

SECTION IV

B. December 31, 1984 Assets
(Market Value Basis)

Cash		\$(12,621,953.54)
Accrued Interest		4,767,405.16
Investments		
Short Term	\$ 61,301,154.00	
Fixed Income	332,703,395.57	
Equity	361,934,890.00	
Contract	11,297,520.00	
Mortgage	131,015,803.08	
Real Estate	<u>101,504,900.00</u>	
		999,757,662.65
Total Market Value of Assets 12/31/84		\$991,903,114.27

SECTION IV

C. Adjusted Cost Value

	<u>Book Value</u>	<u>Market Value</u>	<u>Adjusted Cost Value</u>
12-31-78	\$199,937,761	NA	\$200,036,795
12-31-79	271,219,899	\$260,210,421	269,097,231
12-31-80	363,951,995	362,983,337	362,060,129
12-31-81*	475,679,076	445,754,990	468,180,766
12-31-82	612,960,709	644,650,823	613,300,084
12-31-83	759,544,293	801,667,095	767,984,244
12-31-84	940,059,215	991,903,114	957,179,954

* Including \$2,000,000 estimated interest accrued.

The derivation of the 1984 Adjusted Cost Value is shown below.

1.	Adjusted cost value, 12-31-83	\$767,984,244
2.	Net new money, all sources	180,514,920
3.	Preliminary value, 12-31-84, [(1) + (2)]	948,499,164
4.	Market value, 12-31-84	991,903,114
5.	Current adjustment, 20% [(4) - (3)]	8,680,790
6.	Adjusted Cost Value, 12-31-84, [(3) + (5)] [Must be within <u>±</u> 20% of (4)]	\$957,179,954

SECTION V

Summary of Plan Provisions

Effective Date

September 1, 1939

System Eligibility

Tier 0 and Tier I
[Sec. 5-160]

Each state employee appointed to classified service shall become a member on the first day of the pay period following permanent appointment.

Each officer elected by the people and each appointee of such officer exempt from classified service may elect to become a member, effective on the first day of the pay period following receipt of such election.

Each other state employee exempt from classified service shall become a member on the first day of the pay period following six months of employment.

Tier II [Sec. 23]

Each state employee becomes a member on the first day of employment.

Plan Eligibility

Tier I [Sec. 6]

Except as noted below employees hired prior to January 1, 1984 may elect (no later than January 2, 1984) to be covered under either Plan B or Plan C. Employees under contracts with Union Independent and CSEA unions hired prior to October 1, 1982 have until October 1, 1984 to make such election.

Tier II [Sec. 23]

Employees hired on or after July 1, 1982 (or October 1, 1982 for Union Independent and CSE union members who are not in any other plan, and any other employees who have not previously been covered under any plan.

Normal Retirement Date

State Police [Sec. 5-173 as amended by Sec. 17]

Age 47 and 20 years of service.

Tier 0 and Tier I
[Sec. 5-162]

Age 55 and 25 years of service, age 60 and 10 years of service, or age 70.

Tier II [Sec. 28 & 30]

Age 65 and 10 years of service or age 70 and 5 years of service, except hazardous duty members may retire after 25 years.

Normal Retirement Benefit

State Police [Sec. 5-173 as amended by Sec. 17]	50% of Final Average Earnings plus 2% for each year in excess of 20.
Tier 0 and Tier I, Plan B Benefit [Sec. 5-162] Minimum [Sec. 10]	Same as Plan C up to age 65; thereafter 1% of Final Average Earnings up to \$4,800 plus 2% of Final Average Earnings in excess of \$4,800 times years, reduced for retirement prior to age 65 with less than 25 years. Minimum benefit with 25 years, \$300 per month.
Tier 0 and Tier I, Plan C Benefit [Sec. 5-162] Minimum [Sec. 10]	2% of Final Average Earnings times years of service, reduced for retirement prior to age 65 with less than 25 years. Minimum with 25 years, \$300 per month.
Tier II Hazardous Duty Members [Sec. 30]	2% of Final Average Earnings times years of service. Minimum with 25 years, \$300 per month (or less if retirement before 7-1-87).
All Other [Sec. 28]	1 1/3% of Final Average Earnings plus 1/2% of Final Average Earnings in excess of the year's breakpoint*, times years of service from 10-1-82. Minimum with 25 years, \$300 per month (or less if retirement before 7-1-87).

* \$10,700 increased by 6% each year after 1982, rounded to the nearest \$100.

Early Retirement

State Police

None.

Tier 0 and Tier I
[Sec. 5-162]

Age 55 and 10 years of service; Normal Retirement Benefit reduced additionally for retirement prior to age 60.

Tier II [Sec. 29]

Age 55 and 10 years of service; Normal Retirement Benefit reduced $\frac{1}{2}\%$ for each month prior to age 65; Minimum benefit with 25 years, \$300 per month (or less if retirement prior to 7-1-87).

Deferred Retirement

Tier 0 and Tier I
[Sec. 5-162]

May be deferred but not beyond age 70.

Tier II [Sec. 28 (b) and (e)]

May be deferred but not beyond age 70.

Benefit is based on salary and service to actual retirement.

Vesting

Tier 0 and Tier I
[Sec. 5-166 as amended in part by Sec. 13]

Ten years of service; actuarially reduced benefit payable at age 55; in addition employees are always fully vested in their own contributions (after 1-1-83, Tier I, contributions with 5% interest from 1-1-82).

Tier I, Hazardous Duty
[Sec. 17]

As above, but may receive full benefits at age 47 if 20 years of service at termination.

Tier II [Sec. 31]

Ten years of service or age 70 and 5 years; benefit payable at age 65 or early retirement benefit payable at age 55; minimum benefit with 25 years, payable after age 55, \$300 per month (or less if retirement before 7-1-87).

Employee Contributions

State Police, Hazardous Duty
[Sec. 5-161]

5% of salary.

Plan C [Sec. 5-161]

5% of salary.

Plan B [Sec. 5-161]

2% of salary up to Social Security Taxable Wage Base plus 5% above that level.

Tier II [Sec. 37]

None.

Cost of Living

[Sec. 5-162b, 5-162d,
Sec. 9 & Sec. 35]

Annual adjustment each July 1 of up to 5% for retirements prior to 7-1-80; 3% for retirements after 7-1-80. For members (or beneficiaries) not covered by Social Security and age 62 and over, the maximum increase is 6%.

If an actuarial surplus (as defined in the law) exists, the commission may further increase retired benefits.

Death Benefits

State Police

[Sec. 5-146]

Survivor benefits to spouse of \$550 per month plus \$250 to a surviving dependent child (or \$575 to surviving dependent children).

Tier 0 and Tier I

[Sec. 5-165a as amended
by Sec. 12]

If eligible for early or normal retirement, spouse benefit equal to 50% of average of Life Benefit and 50% J&S benefit member would have received. If not eligible to retire but 25 years, same benefit calculated as though age 55 using service and earnings at death.

[Sec. 5-168 as amended
by Sec. 13]

If not eligible for retirement, return of contributions (after 10-1-82, Tier I, with interest from 1-1-82 at 5%).

Tier II [Sec. 34]

If eligible for early or normal retirement, spouse benefit equal to 50% of member's benefit under a 50% J&S. If not eligible to retire but 25 years, same benefit calculated as though age 55 using service and earnings at death.

[Sec. 36]

If death is due to employment, a spouse with dependent child(ren) under 18 will be paid \$7,500 in not less than 60 installments while living and not remarried; also \$20 per month per child under 18. If no children under 18, spouse [or dependent parent(s), if no spouse] will be paid \$4,000 in not less than 60 installments.

Disability Benefits

Tier 0, [Sec. 5-169]

For disabilities occurring prior to age 60 and after 5 years of service (or regardless of years, if disability is due to service); benefit is the same as Tier 1 below except maximum benefit is based on service to age 60.

Tier I [Sec. 16]

For non-service disabilities occurring prior to age 60 and after 5 years of service, benefit equals 3% times base salary times years of service (Maximum $1 \frac{2}{3}\%$ times service to 65). If disability occurs prior to age 60 and is due to service, benefit equals $1 \frac{2}{3}\%$ of salary times service projected to 65 (maximum 30 years) and is payable regardless of length of service. Exception: State Police benefit is accrued benefit.

Maximum disability benefit is lesser of: 100% of salary less Workers Compensation and Social Security and less non-rehabilitation earnings or 80% of salary less Workers Compensation and Social Security. Social Security is primary plus family.

Tier II [Sec. 32]

Prior to age 65 and due to service or after 10 years of service, benefit is $1 \frac{1}{3}\%$ of final average earnings, plus $\frac{1}{2}\%$ of excess earnings times service projected to 65 (maximum 30 years or service to Date of Disability if greater than 30 years). Same maximum as Tier I.

Options

Tier 0 [Sec. 5-165]

Life [Normal Form]

Husband and Wife.

Tier I [Sec. 11]

50% Qualified Joint and Survivor (CA)¹.

Tier II [Sec. 33]

50% or 100% Joint and Survivor (CA).

Ten years certain and life.

Twenty years certain and life.

Life².

¹ Normal Form if married at least 12 months.

² Normal Form if not married at least 12 months.

Part-Time Employment

[Sec. 5-162g & Sec. 27]

Service treated as if full-time for eligibility. If consistent part-time for all periods, treat as full-time. If varying schedule or some part-time, some full-time, service and salary proportionately adjusted.

EXHIBIT A

CERTIFICATION

MILLIMAN & ROBERTSON, INC.

CONSULTING ACTUARIES

THREE CORPORATE PLACE
BLOOMFIELD, CONNECTICUT 06002

203/243-1138

March 26, 1985

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

Actuarial Valuation

This is to certify that we have prepared an actuarial valuation of the Connecticut State Employees Retirement System as of December 31, 1984.

The valuation was made with respect to the following Members:

- a. 17,537 pensioners (including 607 beneficiaries of deceased Members).
- b. 47,924 active Members with total annual salaries of \$1,136,497,450.
- c. 476 inactive employees with vested rights.

Based on the above data and the attached actuarial method and assumptions, we determined cost factors as of the valuation date as follows:

1. Accrued liability—	
a. Active Members	\$2,033,302,987
b. Retired Members and Beneficiaries	1,308,926,160
c. Vested former Members	6,936,620
d. Total	\$3,349,165,767
2. Assets in fund (at adjusted cost value)	\$ 957,179,954
3. Unfunded liability (Item 1d less Item 2)	\$2,391,985,813
4. Present Value of Vested Benefits	\$2,336,431,955

Based on the valuation as of December 30, 1984, projected costs were developed for the fiscal year beginning July 1, 1985, as follows:

1. Employer Normal Cost	
Tier 0 and Tier I	\$ 91,052,088
Tier II	11,497,071
Total	\$ 102,549,159

ALLAN D. AFFLECK, F.S.A.
DAVID V. AXENE, F.S.A.
LARRY O. BABER, F.S.A.
JAMES R. BERQUIST, F.C.A.S.
GEORGE L. BERRY, F.S.A.
DAVID R. BICKERSTAFF, F.C.A.S.
JANET F. BLEAKNEY, F.S.A.
THOMAS P. BLEAKNEY, F.S.A.
WILLIAM F. BLUHM, F.S.A.
BRUNO V. BOIN, F.S.A.
PETER J. BONDY, F.S.A.
STEPHEN D. BRINK, F.S.A.
ROBERT C. CAMPBELL, F.S.A.
ROBERT M. CHANDLER, F.S.A.
MILTON E. CHAUNER, F.S.A.
MARK A. CHESNER, F.S.A.
BARTON H. CLENNON, F.S.A.
ROBERT L. COLLETT, F.S.A.
JOHN P. COOKSON, F.S.A.
JAMES A. CURTIS, F.S.A.
THOMAS K. CUSTIS, F.S.A.
GARY E. DAHLMAN, F.S.A.
DREW S. DAVIDOFF, F.S.A.
CHRISTIAN J. DESROCHERS, F.S.A.
PHYLLIS A. DORAN, F.S.A.
ROBERT H. DREYER, F.S.A.
JEFFERY T. DUKES, F.S.A.
ROBERT J. DYMONSKI, F.S.A.
JOHN S. ECKERT, F.S.A.
JOHN S. EDWARDS, F.C.A.
CARY B. EKLOF, F.S.A.
DANIEL J. FLAHERTY, F.C.A.S.
JOHN E. FOLEY, F.S.A.
CARY D. FRANKLIN, F.S.A.
JAMES A. GOBES, F.S.A.
DENNIS J. GRAF, F.S.A.
PATRICK J. GRANNAN, F.C.A.S.
DENNIS L. GRAVES, F.S.A.
JANET S. GRAVES, F.C.A.S.
CHARLES W. HABECK, F.S.A.
DALE S. HASTRUM, F.S.A.
WILLIAM A. HAYLORSON, F.S.A.
RONALD G. HARRIS, F.S.A.
REX D. HEMME, F.S.A.
J. ALAN HERRINGTON, F.S.A.
DOUGLAS C. HOLDEN, F.S.A.
SILVIO INGUI, F.S.A.
FENTON R. ISAACSON, F.S.A.
HOWARD M. ITO, F.C.A.
GREGORY D. JACOBS, F.S.A.
MARK O. JOHNSON, F.S.A.
EUGENE M. KALWARSKI, F.S.A.
JACQUELINE J. KEATING, F.S.A.
DOUGLAS F. KLINE, F.C.A.S.
GERALD T. KOSEK, F.C.A.
DAVID W. KRUEGER, F.S.A.
TIMOTHY D. LEE, F.S.A.
JOHN M. LENSER, F.S.A.
LEONARD P. J. LEONG, F.S.A.
FREDERIC T. LHAMON, F.S.A.
MARK E. LITOW, F.S.A.
D. ALAN LITTLE, F.S.A.
MICHAEL J. MAHONEY, F.S.A.
BRIAN J. MATTSO, F.S.A.
ROBERT G. MAULE, F.S.A.
DANIEL J. MCCARTHY, F.S.A.
MICHAEL A. MCGRATH, F.S.A.
MICHAEL A. MCMURRAY, F.C.A.S.
DOUGLAS MENKES, F.S.A.
STEVEN J. MIKKALO, F.S.A.
EDWARD P. MOHORIC, F.S.A.
DANIEL P. NICHOLS, F.S.A.
DAVID F. OGDEN, F.S.A.
BRUCE T. OGG, F.S.A.
ROBERT W. ONDAL, F.S.A.
RICHARD E. OSTUM, F.S.A.
GREGORY W. PARKER, F.S.A.
PAUL J. PATTERSON, F.S.A.
J. LYNN PEABODY, F.S.A.
MARGARET E. PEARSON, F.S.A.
KRIS E. PETERSON, F.S.A.
RAYMOND E. PINCZKOWSKI, F.S.A.
ROBERT A. PRYOR, F.S.A.
DONALD A. RHOLL, F.C.A.
STANLEY A. ROBERTS, F.S.A.
STUART A. ROBERTSON, F.S.A.
WALTER S. RUGLAND, F.S.A.
JOHN P. SCHREINER, F.S.A.
PAULA S. SEDLACEK, F.S.A.
DONALD J. SEGAL, F.S.A.
T. THOMAS SIMESTER, F.S.A.
JOSEPH D. SINTOV, F.S.A.
WILLIAM D. SMITH, F.S.A.
JOHN B. SNYDER, II, F.S.A.
STEVEN D. SOMMER, F.S.A.
DENNIS L. STANLEY, F.S.A.
KAREN I. STEFFEN, F.S.A.
DENIS J. SULLIVAN, F.S.A.
DOUGLAS G. TAYLOR, F.S.A.
WILLIAM S. THOMAS, F.S.A.
GERALD G. TOY, F.S.A.
MARK A. TRIEB, F.S.A.
STANLEY B. TULIN, F.S.A.
JAMES R. TYLER, F.S.A.
BRUCE N. VANDER ELS, F.S.A.
ANDREW B. WANG, F.S.A.
RONALD R. WEGNER, F.S.A.
RICHARD E. WHITE, F.S.A.
RICHARD WINKENWERDER, F.S.A.
BRUCE W. WINTERHOF, F.S.A.
BRUCE L. WORKMAN, F.C.A.

WENDELL MILLIMAN, F.S.A. (1976)
JAMES H. RIGGS, F.S.A. (1978)

ALBANY - ATLANTA - CHICAGO - DALLAS - DENVER - HARTFORD - HOUSTON - INDIANAPOLIS - LOS ANGELES - MILWAUKEE - MINNEAPOLIS
NEW YORK - OMAHA - PHILADELPHIA - PHOENIX - PORTLAND - SAN FRANCISCO - SEATTLE - WASHINGTON, D.C.

ASSOCIATED IN CANADA WITH ECKLER, BROWN, SEGAL & CO. LTD.

2. Payment on Unfunded Liability*

Tier 0 and Tier I	\$183,078,599
Tier II	988,307
Total	<u>\$184,066,906</u>

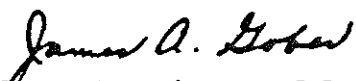
3. Total Employer Cost

Tier 0 and Tier I	\$274,130,687
Tier II	12,485,378
Total	<u>\$286,616,065</u>

* Based on forty year amortization of the Unfunded Accrued Liability as of June 30, 1985.

In accordance with Connecticut statutes, the actual contribution for the fiscal year 1985-86 will be 95% of Tier 0 and Tier I costs and 100% of Tier II costs; the 95% will be increased to 100% for fiscal year 1986-87 and thereafter.

MILLIMAN & ROBERTSON, INC.


James A. Gobes, F.S.A.
Consulting Actuary

Disability

<u>Age</u>	<u>Annual Rate of Disability (Per 1000)</u>
20	.06
25	.09
30	.11
35	.15
40	.22
45	.36
50	.61
55	1.01
60	--

Service-connected are assumed to comprise 50% of total disabilities for Hazardous Duty and 20% for others.

Cost-of-Living Increases

3% per year for retirees on or after 1-1-80. 4½% per year for retirees prior to 1-1-80.

Asset Valuation

Adjusted cost value: assets are written up (or down) by 20% of the difference between market value and adjusted cost value, plus an additional write-up (or write-down) as necessary so that the resulting adjusted cost value is within 20% of market value.

EXHIBIT B

ANALYSIS BY AGE AND SERVICE

ANALYSIS BY AGE AND SERVICE - HAZARDOUS DUTY - TIER 0 & TIER I
ACTIVE MEMBERS*

AGE	<u>YEARS OF SERVICE</u>									ALL YEARS
	<u>UNDER 5</u>	<u>5 to 10</u>	<u>10 to 15</u>	<u>15 to 20</u>	<u>20 to 25</u>	<u>25 to 30</u>	<u>30 to 35</u>	<u>35 to 40</u>	<u>40 & Up</u>	
Under 20										
0 to 24	92	3								95
5 to 29	305	100	4							409
0 to 34	165	240	124	2						531
5 to 39	94	126	271	68	8					567
0 to 44	53	60	111	161	75	6				466
5 to 49	33	40	39	105	110	32	3			362
0 to 54	17	33	32	54	55	33	15			239
5 to 59	5	23	17	32	44	19	15		2	157
0 to 64	6	4	12	21	15	12	4	5	1	80
5 & Up	3	3	1	1	1	3		2	1	15
TOTALS	773	632	611	444	308	105	37	7	4	2,921

AVERAGE SALARIES*

Under 20										
0 to 24	\$22,296	\$23,765								\$22,342
5 to 29	23,807	26,741	\$20,625							24,490
0 to 34	24,234	26,800	26,543	\$26,013						25,940
5 to 39	23,110	25,519	27,560	28,991	\$28,757					26,557
0 to 44	23,389	25,803	27,615	29,157	30,810	\$27,923				27,952
5 to 49	24,611	27,883	28,112	29,999	32,396	28,089	30,752			29,636
0 to 54	24,793	25,373	29,048	28,155	31,188	32,443	32,885			29,236
5 to 59	27,620	27,377	25,296	27,894	29,149	27,190	37,244		\$28,929	28,701
0 to 64	22,921	26,873	28,183	24,764	25,854	29,547	32,914	\$25,407	28,892	26,665
5 & Up	23,761	21,763	24,692	23,100	38,682	29,657		29,394	37,490	27,220
TOTALS	\$23,679	\$26,418	\$27,373	\$28,882	\$30,938	\$29,497	\$34,470	\$26,546	\$31,060	\$26,963

* Based on Members included in Valuation.

ANALYSIS BY AGE AND SERVICE - HAZARDOUS DUTY - TIER II
ACTIVE MEMBERS*

AGE	YEARS OF SERVICE									ALL YEARS
	UNDER 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 & Up	
Under 20	1									1
0 to 24	85	2								87
5 to 29	94	6								100
0 to 34	57	9	5							71
5 to 39	26	5	2	2						35
0 to 44	12	2	3	5	1	1				24
5 to 49	4	1		2	2					9
0 to 54	6	1		1	1					9
5 to 59	2	3			1	1				7
0 to 64										
5 & Up	2				1					3
TOTALS	289	29	10	10	6	2				346

AVERAGE SALARIES*

Under 20	\$21,620									\$21,620
0 to 24	18,545	\$25,352								18,701
5 to 29	20,050	20,671								20,087
0 to 34	20,061	22,757	\$20,888							20,461
5 to 39	20,022	19,084	21,366	\$28,110						20,427
0 to 44	20,418	21,350	23,403	23,200	\$23,338	\$23,338	\$21,366			21,610
5 to 49	20,245	34,330		19,486	22,799	22,799				22,209
0 to 54	21,141	21,366		23,354	23,354	23,354				21,658
5 to 59	14,754	19,775			21,366	21,366	21,366			18,795
0 to 64										
5 & Up	15,315				23,354	23,354				\$17,995
TOTALS	\$19,583	\$21,817	\$21,738	\$23,454	\$22,835	\$22,835	\$21,366			\$20,011

* Based on Members included in valuation.

ANALYSIS BY AGE AND SERVICE - PLAN B
ACTIVE MEMBERS*

AGE	<u>YEARS OF SERVICE</u>									
	<u>UNDER 5</u>	<u>5 to 10</u>	<u>10 to 15</u>	<u>15 to 20</u>	<u>20 to 25</u>	<u>25 to 30</u>	<u>30 to 35</u>	<u>35 to 40</u>	<u>40 & Up</u>	<u>ALL YEARS</u>
Under 20	20									20
20 to 24	1,049	168								1,217
25 to 29	1,862	1,969	73							3,904
30 to 34	1,367	2,721	849	64						5,001
35 to 39	1,013	2,053	1,154	662	80					4,962
40 to 44	765	1,509	739	826	441	58				4,338
45 to 49	525	1,189	559	619	425	335	67			3,719
50 to 54	422	1,053	490	611	372	314	212	43		3,517
55 to 59	313	859	473	602	355	255	163	67	18	3,105
60 to 64	145	460	278	386	274	160	70	66	25	1,864
65 & Up	71	165	88	120	87	41	25	14	8	619
TOTALS	7,552	12,146	4,703	3,890	2,034	1,163	537	190	51	32,266

AGE	<u>AVERAGE SALARIES*</u>									
	<u>UNDER 5</u>	<u>5 to 10</u>	<u>10 to 15</u>	<u>15 to 20</u>	<u>20 to 25</u>	<u>25 to 30</u>	<u>30 to 35</u>	<u>35 to 40</u>	<u>40 & Up</u>	<u>ALL YEARS</u>
Under 20	\$13,086									\$3,086
20 to 24	15,167	\$15,635								15,232
25 to 29	17,741	18,825	\$19,532							18,321
30 to 34	19,182	22,192	23,083	\$22,515						21,524
35 to 39	19,736	23,974	26,138	25,967	\$25,024					23,895
40 to 44	19,712	24,222	26,259	27,426	27,589	\$27,099				24,764
45 to 49	20,329	25,116	25,585	27,373	28,450	28,246	\$29,564			25,629
50 to 54	19,236	25,523	25,145	26,889	27,876	28,472	27,922	\$30,186		25,667
55 to 59	20,207	26,489	25,253	24,942	26,497	29,614	30,542	29,228	\$33,268	25,936
60 to 64	20,181	27,265	24,902	24,171	27,755	27,129	30,942	34,911	34,321	26,285
65 & Up	21,574	28,795	26,674	26,408	26,249	27,452	30,618	32,241	29,409	26,915
TOTALS	\$18,548	\$23,269	\$25,182	\$26,265	\$27,495	\$28,368	\$29,441	\$31,641	\$33,179	\$23,422

Based on Members included in valuation.

ANALYSIS BY AGE AND SERVICE - PLAN C
ACTIVE MEMBERS*

AGE	YEARS OF SERVICE									
	UNDER 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 & Up	ALL YEARS
Under 20	1									1
20 to 24	32	20								52
25 to 29	71	149	10							230
30 to 34	58	181	179	11						329
35 to 39	74	135	86	62	5					362
40 to 44	58	159	78	71	19	2				387
45 to 49	87	193	108	68	24	31	9			520
50 to 54	107	303	186	136	51	52	53	16		904
55 to 59	105	379	264	248	84	49	44	30	8	1,211
60 to 64	64	352	324	327	142	67	55	42	27	1,400
65 & Up	22	145	147	172	74	29	28	16	34	667
TOTALS	679	2,016	1,282	1,095	399	230	189	104	69	6,063

AGE	AVERAGE SALARIES*									
	UNDER 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 & Up	ALL YEARS
Under 20	\$12,772									\$12,772
20 to 24	15,761	\$17,528								16,441
25 to 29	18,057	18,785	\$20,617							18,640
30 to 34	18,295	20,327	20,812	\$20,341						20,086
35 to 39	18,166	22,389	23,505	21,158	\$19,466					21,540
40 to 44	18,218	21,481	23,344	22,875	22,171	\$14,942				21,623
45 to 49	18,562	19,579	21,740	23,569	24,306	24,928	\$21,158			20,944
50 to 54	19,186	20,399	21,507	22,191	24,123	25,276	24,081	\$21,611		21,481
55 to 59	18,282	20,277	20,868	22,354	23,137	24,757	27,250	25,762	\$27,716	21,476
60 to 64	19,381	21,912	21,136	21,669	23,580	24,966	29,766	26,765	27,789	22,443
65 & Up	22,633	22,253	22,415	26,915	23,910	37,602	27,236	28,945	27,259	24,979
TOTALS	\$18,537	\$20,759	\$21,601	\$22,867	\$23,542	\$26,492	\$26,801	\$26,018	\$27,519	\$21,825

* Based on Members included in valuation.

ANALYSIS BY AGE AND SERVICE - TIER II - ALL OTHERS
ACTIVE MEMBERS*

AGE	YEARS OF SERVICE									ALL YEARS
	UNDER 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 & Up	
Under 20	56									56
20 to 24	864	21								885
25 to 29	946	168	4							1,118
30 to 34	935	175	49	11						1,170
35 to 39	457	97	66	29						649
40 to 44	325	80	35	19	7					466
45 to 49	227	45	25	16	1	3				317
50 to 54	165	30	26	20	6	3	2			252
55 to 59	120	23	15	12	4	1		1		176
60 to 64	76	24	18	9	4	3		1		135
65 & Up	35	18	5	6	3					67
TOTALS	4,206	681	243	122	25	10	2	2		5,291

AGE	AVERAGE SALARIES*									
	UNDER 5	5 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 & Up	
Under 20	\$11,434									\$11,434
20 to 24	13,562	\$12,401								13,534
25 to 29	16,047	16,105	\$15,247							16,053
30 to 34	15,594	17,236	\$17,314	\$16,661						15,922
35 to 39	17,618	17,986	23,509	20,367						18,395
40 to 44	16,960	17,941	24,021	25,020	\$13,742					17,939
45 to 49	17,352	17,498	20,440	23,729	17,432	\$18,917				17,953
50 to 54	17,603	20,982	18,340	22,827	15,765	14,955	\$15,567			18,404
55 to 59	17,684	17,411	18,482	16,615	16,043	17,432		\$21,356		17,625
60 to 64	16,219	19,310	18,877	18,098	17,833	20,694		16,040		17,394
65 & Up	12,585	15,098	18,910	15,964	14,753					14,132
TOTALS	\$15,768	\$17,202	\$20,581	\$20,849	\$15,519	\$18,113	\$15,567	\$18,698		\$16,295

* Based on Members included in valuation.

EXHIBIT C
RETIRED BENEFIT ANALYSIS

ANALYSIS OF RETIRED MEMBERS
BY YEAR OF RETIREMENT

YEAR OF RETIREMENT	NUMBER OF RETIREES				AVERAGE BENEFIT			
	SERVICE	DISABILITY ¹	DISABILITY ²	HAZARDOUS DUTY	SERVICE	DISABILITY ¹	DISABILITY ²	HAZARDOUS DUTY
Pre-1955	100	11	33	5	\$5,121	\$3,289	\$3,371	\$5,113
1955	35	2	3	1	5,526	3,113	3,549	4,874
1956	34	1	7	4	4,810	4,679	4,727	5,329
1957	49	5	7	4	5,495	5,140	4,920	5,469
1958	53	5	4	1	4,524	4,357	4,146	6,724
1959	84	4	7	6	4,819	4,210	4,517	7,077
1960	67	7	5	5	4,722	3,430	3,852	7,257
1961	87	3	9	3	5,211	5,218	4,028	6,534
1962	133	11	6	1	5,400	4,198	3,876	6,651
1963	146	8	13	2	5,452	4,577	4,565	6,349
1964	145	13	17	1	4,621	6,019	4,307	6,855
1965	161	7	7	1	5,418	4,873	5,074	9,556
1966	187	10	22	0	5,407	4,604	4,423	0
1967	192	8	29	1	5,147	4,127	4,900	9,470
1968	259	13	34	2	5,888	5,304	4,246	6,268
1969	408	14	35	1	6,575	5,820	5,614	5,943
1970	403	12	63	3	7,067	5,314	5,816	7,063
1971	574	19	86	6	7,406	7,254	5,908	10,011
1972	683	31	90	27	7,678	6,974	6,374	11,556
1973	750	30	94	23	7,883	8,411	6,726	12,435
1974	590	27	67	24	7,191	8,593	6,944	14,086
1975	910	50	87	21	7,919	7,851	7,017	15,161
1976	987	16	64	28	6,972	6,902	6,350	12,940
1977	809	13	32	16	6,720	5,098	5,762	12,193
1978	830	10	47	27	6,631	5,960	4,853	13,954
1979	1,549	14	53	45	6,895	7,330	4,967	13,466
1980	1,026	17	41	35	6,550	5,305	4,893	13,432
1981	819	23	40	53	7,226	6,839	5,140	13,616
1982	709	16	40	37	7,510	7,190	5,988	14,509
1983	727	15	47	48	8,711	9,129	7,158	15,510
1984	929	22	41	63	9,139	12,290	7,465	16,220

¹ Service Connected
² Non-Service Connected

ANALYSIS OF RETIRED MEMBERS
BY CURRENT AGE

<u>AGE</u>	<u>NUMBER OF RETIREES</u>				<u>AVERAGE BENEFIT</u>			
	<u>SERVICE</u>	<u>DISABILITY</u>		<u>HAZARDOUS DUTY</u>	<u>SERVICE</u>	<u>DISABILITY</u>		<u>HAZARDOUS DUTY</u>
		<u>SERVICE CONNECTED</u>	<u>NON-SERVICE CONNECTED</u>			<u>SERVICE CONNECTED</u>	<u>NON-SERVICE CONNECTED</u>	
less than 40		24	8			\$7,437	\$5,437	
40-44		33	21			7,870	6,105	
45-49		41	47	27		10,100	7,008	\$15,349
50-54	15	56	104	92	\$10,251	6,739	7,379	14,820
55-59	1,092	63	160	133	8,774	6,867	5,981	14,091
60-64	2,285	57	219	106	8,343	5,897	5,419	13,916
65-69	3,508	64	153	72	7,038	6,082	5,581	12,254
70-74	3,337	45	171	36	6,963	6,679	6,300	10,196
75-79	2,197	34	142	25	6,780	6,192	5,510	8,725
80-84	1,237	11	77	3	6,218	3,972	4,630	6,236
85-89	551	6	22		4,904	5,181	3,656	
90-94	180	3	3		3,635	1,881	4,738	
95-99	33		3		4,177		4,726	
TOTALS	14,435	437	1,130	494	\$7,122	\$6,817	\$5,833	\$13,387