

CONNECTICUT STATE EMPLOYEES  
RETIREMENT SYSTEM

June 30, 1988  
ACTUARIAL VALUATION

MILLIMAN & ROBERTSON, INC.  
CONSULTING ACTUARIES

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October 25, 1988

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 June 30, 1988 and presents cost figures for the fiscal year beginning July 1, 1989.

As summarized in Section I, the recommended contribution for the fiscal year beginning July 1, 1989, including federal reimbursements, is \$396,368,471. This represents an increase of \$22.1 million over 1988-89 costs.

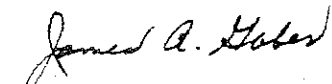
The membership data provided to us was as of June 30, 1988 and included actual compensation paid during fiscal year 1987-1988 (which has been reconciled to total State figures). Compensation figures were brought up to July 1, 1988 payroll levels by adjusting for increases effective as of that date. This data is summarized in Section III and a detailed analysis of the membership by age and service is attached as Exhibit B. We did not audit this data (nor the financial data referred to below); however, they are consistent with comparable data from the previous valuation.

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

The final section of the report outlines our understanding of the benefit provisions embodied in the Connecticut statutes, as amended through 1987.

In our opinion this report fairly presents the financial and actuarial position of the Connecticut State Employees Retirement System as of June 30, 1988, in accordance with generally accepted actuarial principles applied on a basis consistent with the prior valuation. 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/cac CSE1;cse,annrpt

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CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

SECTION I

SUMMARY OF JUNE 30, 1988 VALUATION

A. Highlights

The recommended contribution for Fiscal Year 1989 is \$396,368,471. Compared to the FY 1988 contribution of \$374,314,706 this is an increase of \$22.1 million. As a percent of earnings, costs decreased by 1.09% from 24.16% to 23.07%.

The past service cost increased by almost \$10 million, apparently as a result of Tier I salary increases. Going forward, we expect the Past Service Payment to remain at approximately the same dollar level (and thus become a reducing percentage of pay).

The Normal Cost remained at approximately 8% of covered earnings.

For the year, the fund suffered net market losses of approximately \$56 million. Despite these losses, the total return was 4.6% and the market value of assets increased by \$266 million to now exceed \$2 billion.

On the adjusted basis used for the valuation, the total return was 10.7% - and the "set aside" for market fluctuations was \$83 million, which is sufficient to cover a 4% downturn from 1988 values.

Census data was considerably improved over the prior year: only 242 active records were rejected for bad or missing data compared to 904 last year.

SECTION I

B. 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 June 30:

<u>ASSETS</u>	<u>June 30,</u> <u>1987</u>	<u>June 30,</u> <u>1988</u>
Retirement Fund		
(Adjusted basis)	\$1,812,332,140	\$2,189,510,979
Present value of future Normal		
Cost contributions	1,393,984,826	1,516,952,265
Unfunded Accrued Liability	<u>2,899,625,697</u>	<u>3,038,944,828</u>
 TOTAL ASSETS	 \$6,105,942,663	 \$6,745,408,072
 <u>LIABILITIES</u>		
Present value of benefits		
Active Members		
Tier I	\$4,073,520,034	\$4,330,554,186
Tier II	345,442,987	537,239,069
Retired Members	1,678,583,438	1,867,349,142
Terminated Vested Members	<u>8,396,204</u>	<u>10,265,675</u>
 TOTAL LIABILITIES	 \$6,105,942,663	 \$6,745,408,072

SECTION I

C. Projection of Normal Costs

The valuation calculated Normal Costs as of July 1, 1988 based on earnings as of that date, including adjustments for negotiated settlements and for July 1 increases. Earnings were projected to July 1, 1989 by assuming that 6% of the Tier I employees will terminate during the twelve month period and be replaced by Tier II employees at 75% of the terminated employee's earnings level; remaining Tier I employees and all Tier II employees (including replacements of Tier II terminations) are assumed to receive increases as of July 1, 1989 equal to 10%. This produced the following projected Normal Costs:

<u>Tier</u>	<u>Plan</u>	<u>Estimated Earnings 7/1/88</u>	<u>Normal Cost Percentage</u>	<u>Projected Earnings 7/1/89</u>	<u>Normal Cost 7/1/89</u>
I	HD	\$ 104,987,808	15.5882%	\$ 108,557,394	\$ 16,922,144
I	B	907,187,644	7.2853	938,032,024	68,338,447
I	C	<u>106,122,491</u>	7.1806	<u>109,730,656</u>	<u>7,879,319</u>
Total Tier I		\$1,118,297,943		\$1,156,320,074	\$ 93,139,910
II	HD	\$ 47,204,074	14.9638%	\$ 56,648,933	\$ 8,476,833
	Other	<u>417,472,193</u>	7.1144	<u>504,818,368</u>	<u>35,914,798</u>
Total Tier II		\$ 464,676,267		\$ 561,467,301	\$ 44,391,631
Grand Total		\$1,582,974,210		\$1,717,787,375	\$137,531,541

1989 Normal Cost (as percent of Earnings)

Tier I	8.05%
Tier II	7.91%
Total	8.01%

SECTION I

D. Projection of Total Cost

The Unfunded Liability as of the valuation date (the beginning of the fiscal year) was brought forward to the end of the fiscal year by adding interest and the fiscal year Normal Cost, with interest, and subtracting expected contributions, also with interest:

<u>Development of Unfunded</u>	<u>Fiscal Year</u> <u>1987-88</u>	<u>Fiscal Year</u> <u>1988-89</u>
Unfunded Accrued Liability, 7-1	\$2,899,625,697	\$3,038,944,828
+ Interest	246,468,184	258,310,310
+ Normal Cost	120,804,026	125,118,568
+ Interest	4,637,063	4,802,676
- State Payments	278,643,557	325,062,591
- Federal Payments	42,954,436	49,252,115
- Employee Contributions	29,348,817	29,868,267
- Interest	<u>13,471,093</u>	<u>15,514,563</u>
Unfunded Accrued Liability, 6-30	\$2,907,117,067	\$3,007,478,846
Amortization Period	38 years	37 years
	*****	
<u>Summary of Costs</u>		
Normal Cost	\$ 125,118,568	\$ 137,531,541
Amortization of Unfunded	<u>249,196,138</u>	<u>258,836,930</u>
Total Cost	\$ 374,314,706	\$ 396,368,471
Total Cost (as a percent of payroll)	24.16%	23.07%

34.7  
65.3  
100.0



CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

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 earnings 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 June 30, 1988, costs have been projected to July 1, 1989 in order to correspond to the fiscal year as follows:

SECTION II

A. Funding Method (cont'd)

- A. Normal costs were determined as a percentage of earnings, by Tier, as of July 1, 1988. Earnings were projected to July 1, 1989, separately for each Tier because of the shifting Tier populations, and the projected earnings were then multiplied by the normal cost factors, by Tier.
- B. The Unfunded Accrued Liability was determined as of June 30, 1988, and brought forward to June 30, 1989 by adding the Normal Cost plus interest and subtracting expected employee, State, and Federal contributions, also with interest. This amount was amortized over the 37 years remaining in the original 40 year amortization period.
- 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: 1983 Group Annuity Mortality Table with ages set back 4 years for females.

Investment Return: 8½%.

Salary Scale:	<u>Age</u>	<u>Annual Rate of Increase</u>
	20	10.2%
	25	9.2
	30	8.1
	35	7.1
	40	6.5
	45	6.0
	50	6.0
	55	6.0
	60	6.0

Disability:	<u>Age</u>	<u>Annual Rate of Disability (Per 1000 Lives)</u>
	20	0.75
	25	0.85
	30	0.97
	35	1.21
	40	1.70
	45	2.79
	50	5.09
	55	9.25
	60	14.42

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

SECTION II

B. ACTUARIAL ASSUMPTIONS (cont'd)

Social Security Wage Base

Increases:

3½% compounded annually.

Retirement Ages: Hazardous Duty:

<u>Age</u>	<u>First Year Eligible</u>	<u>Thereafter</u>
47-50	50%	10%
51	48	10
52	46	10
53	44	10
54	42	10
55	40	10
56	38	10
57	36	10
58	34	10
59	30	10
60	50	30
61	50	30
62-70	100	100
All Others:		
55-60	20%	5%
61	40	5
62	40	30
63	40	30
64	60	30
65	80	60
66	80	60
67	80	60
68	80	60
69	80	60
70	100	100

SECTION II

B. ACTUARIAL ASSUMPTIONS (cont'd)

Turnover:

Five year select and ultimate rates as shown in the Turnover Table below for non-hazardous duty males; the same table with rates increased 10% for females; the same table with rates reduced 50% for hazardous duty males.

Turnover Table

Age	Years of Participation					
	0	1	2	3	4	5 & Over
20	50%	45%	30%	25%	20%	15%
25	45	35	30	25	20	10
30	40	30	25	20	15	8
35	35	28	20	15	10	6
40	30	20	10	8	6	4
45	20	10	8	6	4	2
50	10	8	6	4	2	0
55	10	7	5	2	0	0
60	10	0	0	0	0	0

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 market value: assets are written up (or down) by spreading recognition of gains and losses over five years, plus an additional write-up (or write-down) as necessary so that the final adjusted value is within 20% of market value.

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

SECTION III

MEMBERSHIP DATA

A. Active Members

We received data on a total of 55,568 members, including employees of State Aided Institutions. The following analysis compares this data with the July 1, 1987 data (see Exhibit B for distribution by age and service).

	<u>7-1-87</u>	<u>7-1-88</u>	<u>Change</u>	<u>Per Cent Change</u>
Total Employees	52,984	55,568	+2,584	+ 4.9%
Total Earnings (millions)	\$ 1,429.1	\$ 1,583.0	+\$ 153.9	+10.8%
Average Earnings	\$26,972	\$28,487	+1,515	+ 5.6%

Of the active records submitted to us, 242 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.

Earnings figures as of July 1 are actual amounts paid during the previous July 1 to June 30 period, adjusted for negotiated increases and merit adjustments effective through and including July 1; new entrant earnings are annualized.

SECTION III

B. Actives By Plan

<u>Number of Members</u>	<u>7-1-87</u>	<u>7-1-88</u>	<u>Change</u>	<u>Per Cent Change</u>
Hazardous Duty	4,126	4,451	+ 325	+ 7.9%
Plan B	28,468	26,981	-1,487	- 5.2
Plan C	4,083	3,632	- 451	- 11.0
Tier II	16,307	20,504	+4,197	+ 25.7
 <u>Total Annual Compensation (millions)</u>				
Hazardous Duty	\$ 135.9	\$152.2	+\$16.3	+ 12.0%
Plan B	878.5	907.2	+ 28.7	+ 3.3
Plan C	109.7	106.1	- 3.6	- 3.3
Tier II	305.0	417.5	+112.5	+ 36.9
 <u>Average Compensation</u>				
Hazardous Duty	\$ 32,938	\$34,194	+\$1,256	+ 3.8%
Plan B	30,858	33,623	+ 2,765	+ 9.0
Plan C	26,873	29,219	+ 2,346	+ 8.7
Tier II	18,703	20,360	+ 1,657	+ 8.9

Hazardous Duty Members include 1,746 Tier II Members, compared to 1,209 last year. Because of their higher average age, Plan C continues to decrease more rapidly than Plan B.

SECTION III

B. Actives By Plan (cont'd)

This analysis of age and service excludes the 242 records with incorrect birth dates or hire dates and 15 vending stand operators, data for which was received after this analysis was completed.

	<u>7-1-87</u>	<u>7-1-88</u>	<u>Change</u>
<u>Average Age</u>			
Hazardous Duty	37.7	37.3	- 0.4
Plan B	44.0	44.6	+ 0.6
Plan C	54.0	54.2	+ 0.2
Tier II	34.6	35.0	+ 0.4

Average Years of Service

Hazardous Duty	9.0	8.7	- 0.3
Plan B	12.7	13.6	+ 0.9
Plan C	14.3	15.1	+ 0.8
Tier II	1.9	2.3	+ 0.4



SECTION III

C. Retired and Terminated Vested Members

The following compares the current retired data with the June 30, 1987 data. [See Exhibit C for analysis of retirees by age, year of retirement and type of retirement].

<u>Pensioners</u>	<u>6-30-87</u>	<u>6-30-88</u>	<u>Change</u>	<u>Per Cent Change</u>
Number	18,761	19,420	+ 659	+ 3.5%
Total Annual Benefit*	\$158,494	\$176,838	+\$18,344	+11.6
Average Monthly Benefit	\$ 704	\$ 759	+\$ 55	+ 7.8

Beneficiaries

Number	749	845	+ 96	+12.8%
Total Annual Benefit*	\$ 5,259	\$ 6,030	+\$771	+14.7
Average Monthly Benefit	\$ 585	\$ 595	+\$ 10	+ 1.7

Terminated Vested

Number	554	638	+ 84	+15.2%
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\* (000 omitted)

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

SECTION IV

RETIREMENT FUND

A. Summary of Fund

Market Value, July 1, 1987	\$2,006,924,563
Prior Year Adjustment	(3,843,738)

Contributions

State	\$272,297,993	
Federal	49,252,115	
Employee	28,025,025	
		\$ 349,575,133

Investment Income

Interest and Dividends	\$151,410,683	
Realized Gains	205,394,743	
Change in Unrealized Gains	<u>(261,372,286)</u>	
		\$ 95,433,140

Disbursements

Benefit payments	\$172,106,035	
Employee refunds	2,679,972	
Expenses	<u>151,166</u>	
		\$ 174,937,173

Market Value, June 30, 1988	\$2,273,151,925
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SECTION IV

B. June 30, 1988 Assets

The following is the Market Value of the State Employees Retirement Fund assets as reported to us by the Retirement Division:

Cash		\$ 22,418,320.34
Accrued Interest		\$ 6,111,612.32
Investments		
Short Term	\$146,835,725.00	
Fixed Income	742,634,764.06	
Equity	923,486,451.63	
Contract	10,971,998.95	
Mortgage	12,899,202.49	
Real Estate	329,742,458.28	
International Funds	38,227,617.32	
Commercial Mortgage Fund	33,737,527.76	
Venture Capital Fund	<u>6,086,246.68</u>	
		<u>\$2,244,621,992.17</u>
Total Market Value of Assets June 30, 1988		\$2,273,151,924.83

SECTION IV

C. Adjusted Market Value

<u>Year Ending</u>	<u>Realized Gains/Losses</u>	<u>Change in Unrealized Gains/Losses</u>	<u>Total Gains/Losses</u>
6-30-88	\$205,394,743	\$(261,372,286)	\$(55,977,543)
6-30-87	2,414,092	52,019,533	54,433,625
6-30-86	10,589,632	177,973,874	188,563,506
6-30-85	2,560,935	99,126,081	101,687,016
6-30-84	2,357,847	(16,194,782)	(13,836,935)

1988 Adjusted Market Value is derived as follows:

1. Market Value of Assets 6-30-88:	\$2,273,151,925
2. 5-Year Gains and Losses Not Yet Recognized:	
80% of FY 88	(44,782,034)
60% of FY 87	32,660,175
40% of FY 86	75,425,402
20% of FY 85	<u>20,337,403</u>
	\$ 83,640,946
3. 20% of (1)	\$ 454,630,385
4. Adjusted Market Value of Assets 6-30-88:	\$2,189,510,979
(1) - (2), within (1) ± (3)	

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

SECTION V

SUMMARY OF PLAN PROVISIONS

Effective Date

September 1, 1939

System Eligibility

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 could 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 had until October 1, 1984 to make such election.

Tier II [Sec. 23]

Employees first joining the retirement system on or after January 1, 1984 plus employees hired between July 1, 1982 and January 1, 1984 who elected Tier II.

Normal Retirement Date

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

Age 47 and 20 years of service.

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 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 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 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 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 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 earnings.

Plan C [Sec. 5-161]

5% of earnings.

Plan B [Sec. 5-161]

2% of earnings 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 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 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 I [Sec. 11]	50% Qualified Joint and Survivor (CA) <sup>1</sup> .
Tier II [Sec. 33]	50% or 100% Joint and Survivor (CA). Ten years certain and life. Twenty years certain and life. Life <sup>2</sup> .

<sup>1</sup> Normal Form if married at least 12 months.

<sup>2</sup> 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.

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

EXHIBIT A

CERTIFICATION

MILLIMAN & ROBERTSON, INC.  
CONSULTING ACTUARIES

THREE CORPORATE PLACE  
BLOOMFIELD, CONNECTICUT 06002  
203/243-1138

WENDELL MILLIMAN, F.S.A. (1976)  
STUART A. ROBERTSON, F.S.A.  
CHAIRMAN EMERITUS

ARTHUR V. ANDERSON, A.S.A.  
DOUGLAS J. BENNETT, A.S.A.  
AUDREY H. BRISSE, A.S.A.  
DOUGLAS M. GEUDER, F.S.A.  
JAMES A. GOBES, F.S.A.  
LESLIE E. KORPER, II, F.S.A.  
ROBERT A. MILLER, III, F.C.A.S.  
WILLIAM C. PROUTY, F.S.A.  
WALTER S. RUGLAND, F.S.A.  
ALTHEA A. SCHWARTZ, F.S.A.

October 25, 1988

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 June 30, 1988.

The valuation was made with respect to the following Members:

- a. 20,265 pensioners (including 845 beneficiaries of deceased Members).
- b. 55,568 active Members with total annual payroll as of July 1, 1988 of \$1,582,974,210.
- c. 638 inactive employees with vested rights.

Based on the above data and the attached actuarial method and assumptions, we determined the following assets and liabilities as of the valuation date:

1. Accrued liability:	
a. Active Members	\$3,350,840,990
b. Retired Members and Beneficiaries	1,867,349,142
c. Vested former Members	10,265,675
d. Total	\$5,228,455,807
2. Assets in fund (at adjusted cost value)	\$2,189,510,979
3. Unfunded liability (Item 1d less Item 2)	\$3,038,944,828
4. Present Value of Vested Benefits	\$3,278,778,345

Based on the valuation as of June 30, 1988, projected costs were developed for the fiscal year beginning July 1, 1989, as follows:

1. Employer Normal Cost

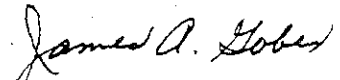
Tier I	\$ 93,139,910
Tier II	44,391,631
Total	<u>\$137,531,541</u>

2. Payment on Unfunded Liability\* \$258,836,930

3. Total Employer Cost \$396,368,471

\* Based on amortization of the Unfunded Accrued Liability to be completed by June 30, 2026.

MILLIMAN & ROBERTSON, INC.



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

Actuarial Method and Assumptions

Funding Method: Entry Age Normal.

Mortality: 1983 Group Annuity Mortality Table with ages set back 4 years for females.

Investment Return: 8½% compounded annually.

Salary Scale	Age	Annual Rate of Increase
	20	10.2%
25	9.2	
30	8.1	
35	7.1	
40	6.5	
45	6.0	
50	6.0	
55	6.0	
60	6.0	

Turnover: Five year select and ultimate rates as shown in the table below for non-hazardous duty males; the same table with rates increased 10% for females; the same table with rates reduced 50% for hazardous-duty males.

Age	Years of Participation					
	0	1	2	3	4	5 & Over
20	50%	45%	30%	25%	20%	15%
25	45	35	30	25	20	10
30	40	30	25	20	15	8
35	35	28	20	15	10	6
40	30	20	10	8	6	4
45	20	10	8	6	4	2
50	10	8	6	4	2	0
55	10	7	5	2	0	0
60	10	0	0	0	0	0



Retirement Ages

Hazardous Duty:	<u>Age</u>	<u>First Year Eligible</u>	<u>Thereafter</u>
	47-50	50%	10%
	51	48	10
	52	46	10
	53	44	10
	54	42	10
	55	40	10
	56	38	10
	57	36	10
	58	34	10
	59	30	10
	60	50	30
	61	50	30
	62-70	100	100
All Others:	55-60	20	5
	61	40	5
	62	40	30
	63	40	30
	64	60	30
	65	80	60
	66	80	60
	67	80	60
	68	80	60
	69	80	60
	70	100	100

Disability

<u>Age</u>	<u>Annual Rate of Disability (Per 1000)</u>
20	0.75
25	0.85
30	0.97
35	1.21
40	1.70
45	2.79
50	5.09
55	9.25
60	14.42

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

Social Security Wage Base  
Increases

3½% compounded annually.

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 market value: assets are  
written up (or down) by spreading  
recognition of gains and losses over  
five years, plus an additional write-  
up (or write-down) as necessary so  
that the final adjusted value is  
within 20% of market value.

CONNECTICUT STATE EMPLOYEES RETIREMENT SYSTEM

EXHIBIT B

ANALYSIS BY AGE AND SERVICE

ANALYSIS BY AGE AND SERVICE - HAZARDOUS DUTY - TIER I

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 TO 45	45 TO 50	50 & UP		
UNDER 20	0	0	0	0	0	0	0	0	0	0	0	0	0
20 TO 24	3	1	0	0	0	0	0	0	0	0	0	0	4
25 TO 29	54	129	3	0	0	0	0	0	0	0	0	0	186
30 TO 34	79	277	126	6	0	0	0	0	0	0	0	0	488
35 TO 39	45	142	239	133	4	0	0	0	0	0	0	0	563
40 TO 44	39	82	94	224	115	4	0	0	0	0	0	0	558
45 TO 49	22	65	42	102	138	75	1	0	0	0	0	0	445
50 TO 54	16	39	27	40	55	38	11	0	0	0	0	0	226
55 TO 59	9	20	22	17	38	16	20	2	0	0	0	0	144
60 TO 64	2	11	12	11	14	5	7	3	0	1	0	0	66
65 & UP	1	2	4	6	2	1	1	1	1	0	0	0	19
TOTAL	270	768	569	539	366	139	40	6	1	1	0	0	2,699

AVERAGE SALARIES \*

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 TO 45	45 TO 50	50 & UP		
UNDER 20	0	0	0	0	0	0	0	0	0	0	0	0	0
20 TO 24	24,775	28,273	0	0	0	0	0	0	0	0	0	0	25,650
25 TO 29	32,598	34,150	35,203	0	0	0	0	0	0	0	0	0	33,716
30 TO 34	32,472	35,507	37,823	41,369	0	0	0	0	0	0	0	0	35,686
35 TO 39	36,058	36,296	38,886	40,992	38,955	0	0	0	0	0	0	0	38,505
40 TO 44	34,941	34,243	38,440	42,002	42,847	50,377	0	0	0	0	0	0	40,002
45 TO 49	34,493	35,732	37,810	41,349	44,603	45,507	44,789	0	0	0	0	0	41,573
50 TO 54	34,640	37,535	37,131	43,088	40,352	47,632	49,645	0	0	0	0	0	41,237
55 TO 59	35,673	37,735	36,160	36,007	40,608	41,726	50,906	53,303	0	0	0	0	40,409
60 TO 64	44,943	37,448	37,995	35,664	39,451	36,872	50,529	43,570	0	32,072	0	0	39,443
65 & UP	49,626	38,790	35,170	43,430	35,322	40,378	46,613	57,497	40,378	0	0	0	41,262
TOTAL	33,922	35,497	38,244	41,400	42,688	45,445	50,233	49,135	40,378	32,072	0	0	38,834

\* Based on Members and Salaries Input to Valuation.

ANALYSIS BY AGE AND SERVICE - HAZARDOUS DUTY - TIER II

ACTIVE MEMBERS \*

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-----YEARS OF SERVICE-----

AGE	UNDER 5	5 TO 10	10 TO 15	15 TO 20	20 TO 25	25 TO 30	30 TO 35	35 TO 40	40 TO 45	45 TO 50	50 & UP	ALL YEARS
UNDER 20	4	0	0	0	0	0	0	0	0	0	0	4
20 TO 24	298	1	0	0	0	0	0	0	0	0	0	299
25 TO 29	589	24	0	0	0	0	0	0	0	0	0	613
30 TO 34	333	17	0	0	0	0	0	0	0	0	0	350
35 TO 39	190	5	0	1	0	0	0	0	0	0	0	196
40 TO 44	135	5	0	2	0	0	0	0	0	0	0	142
45 TO 49	53	6	1	1	0	0	0	0	0	0	0	61
50 TO 54	31	2	0	0	0	0	0	0	0	0	0	33
55 TO 59	25	2	0	0	0	1	0	0	0	0	0	28
60 TO 64	3	0	0	0	0	0	0	0	0	0	0	3
65 & UP	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1,661	62	1	4	0	1	0	0	0	0	0	1,729

AVERAGE SALARIES \*

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	UNDER 5	5 TO 10	10 TO 15	15 TO 20	20 TO 25	25 TO 30	30 TO 35	35 TO 40	40 TO 45	45 TO 50	50 & UP	ALL YEARS
UNDER 20	0	0	0	0	0	0	0	0	0	0	0	18,381
20 TO 24	23,406	21,335	0	0	0	0	0	0	0	0	0	23,399
25 TO 29	27,778	31,277	0	0	0	0	0	0	0	0	0	27,915
30 TO 34	28,138	30,104	0	0	0	0	0	0	0	0	0	28,233
35 TO 39	27,570	33,688	0	28,765	0	0	0	0	0	0	0	27,732
40 TO 44	28,408	33,905	0	44,529	0	0	0	0	0	0	0	28,828
45 TO 49	27,039	25,549	41,069	33,707	0	0	0	0	0	0	0	27,232
50 TO 54	27,556	32,813	0	0	0	0	0	0	0	0	0	27,874
55 TO 59	26,946	36,041	0	0	0	27,338	0	0	0	0	0	27,610
60 TO 64	24,204	0	0	0	0	0	0	0	0	0	0	24,204
65 & UP	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	27,024	30,850	41,069	37,883	0	27,338	0	0	0	0	0	27,194

\* Based on Members and Salaries Input to Valuation.

ANALYSIS BY AGE AND SERVICE - PLAN B

ACTIVE MEMBERS \*

-----YEARS OF SERVICE-----

AGE	UNDER 5	5 TO 10	10 TO 15	15 TO 20	20 TO 25	25 TO 30	30 TO 35	35 TO 40	40 TO 45	45 TO 50	50 & UP	ALL YEARS
UNDER 20	0	0	0	0	0	0	0	0	0	0	0	0
20 TO 24	46	62	0	0	0	0	0	0	0	0	0	108
25 TO 29	238	1,114	117	0	0	0	0	0	0	0	0	1,469
30 TO 34	299	1,985	1,213	70	0	0	0	0	0	0	0	3,567
35 TO 39	278	1,425	1,915	724	71	0	0	0	0	0	0	4,413
40 TO 44	203	1,141	1,264	1,103	658	44	0	0	0	0	0	4,413
45 TO 49	144	875	880	780	797	406	50	0	0	0	0	3,932
50 TO 54	92	640	732	566	635	482	343	39	0	0	0	3,529
55 TO 59	66	521	640	475	524	317	297	87	11	0	0	2,938
60 TO 64	40	311	386	349	405	210	143	64	28	0	0	1,936
65 & UP	14	93	113	106	131	73	47	19	17	2	0	615
TOTAL	1,420	8,167	7,260	4,173	3,221	1,532	880	209	56	2	0	26,920

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 TO 45	45 TO 50	50 & UP	ALL YEARS
UNDER 20	0	0	0	0	0	0	0	0	0	0	0	0
20 TO 24	21,377	21,614	0	0	0	0	0	0	0	0	0	21,513
25 TO 29	24,140	24,544	23,872	0	0	0	0	0	0	0	0	24,425
30 TO 34	27,077	27,436	29,212	30,580	0	0	0	0	0	0	0	28,072
35 TO 39	28,940	30,173	33,452	33,849	34,656	0	0	0	0	0	0	32,193
40 TO 44	29,782	30,720	35,633	38,541	36,725	38,254	0	0	0	0	0	35,009
45 TO 49	29,320	29,828	32,962	39,370	41,145	38,639	39,697	0	0	0	0	35,733
50 TO 54	31,321	30,834	32,195	38,759	41,123	42,755	41,477	0	0	0	0	36,968
55 TO 59	28,442	29,106	32,114	36,091	40,146	42,591	44,703	43,069	0	0	0	36,302
60 TO 64	29,012	28,365	33,184	35,022	38,439	43,295	46,300	46,450	0	0	0	36,466
65 & UP	34,504	29,338	31,779	34,625	38,721	40,722	42,673	53,825	47,882	0	0	36,530
TOTAL	27,845	28,620	32,624	37,105	39,493	41,478	43,312	43,705	44,672	52,908	0	33,640

\* Based on Members and Salaries Input to Valuation.

ANALYSIS BY AGE AND SERVICE - PLAN C

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 TO 45	45 TO 50	50 & UP	
UNDER 20	0	0	0	0	0	0	0	0	0	0	0	0
20 TO 24	0	7	0	0	0	0	0	0	0	0	0	7
25 TO 29	8	31	3	0	0	0	0	0	0	0	0	42
30 TO 34	12	84	72	8	0	0	0	0	0	0	0	176
35 TO 39	16	71	80	49	3	0	0	0	0	0	0	219
40 TO 44	15	68	66	68	28	0	0	0	0	0	0	245
45 TO 49	15	94	83	82	43	12	3	0	0	0	0	332
50 TO 54	28	117	135	87	53	23	44	3	0	0	0	490
55 TO 59	20	144	206	171	86	32	49	30	4	0	0	742
60 TO 64	16	136	234	223	126	48	32	28	19	3	0	865
65 & UP	12	61	121	126	78	32	15	17	16	9	2	489
TOTAL	142	813	1,000	814	417	147	143	78	39	12	2	3,607
			581	570	290	112	92	75	57	12	2	1707

AVERAGE SALARIES \*

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 TO 45	45 TO 50	50 & UP	
UNDER 20	0	0	0	0	0	0	0	0	0	0	0	0
20 TO 24	0	25,128	0	0	0	0	0	0	0	0	0	25,128
25 TO 29	22,569	24,199	25,167	0	0	0	0	0	0	0	0	23,958
30 TO 34	24,481	25,691	25,924	28,051	0	0	0	0	0	0	0	25,811
35 TO 39	22,700	28,299	29,881	28,823	26,597	0	0	0	0	0	0	28,562
40 TO 44	28,368	27,071	30,449	29,231	30,999	0	0	0	0	0	0	29,109
45 TO 49	25,696	26,991	29,138	31,802	30,909	30,401	35,429	0	0	0	0	29,365
50 TO 54	26,040	26,753	27,548	32,447	32,872	38,149	32,316	0	0	0	0	29,706
55 TO 59	23,054	26,051	26,116	31,286	32,251	32,223	37,110	35,439	0	0	0	29,303
60 TO 64	26,782	26,522	27,063	28,882	30,339	35,970	40,748	39,283	0	41,679	0	29,509
65 & UP	39,316	28,099	27,196	30,859	28,669	33,969	30,861	48,264	34,728	0	0	30,583
TOTAL	26,331	26,659	27,483	30,386	30,819	34,605	35,758	39,704	33,534	41,207	0	29,287

\* Based on Members and Salaries Input to 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 TO 45	45 TO 50	50 & UP	
UNDER 20	133	0	0	0	0	0	0	0	0	0	0	133
20 TO 24	2,756	52	0	0	0	0	0	0	0	0	0	2,808
25 TO 29	4,182	294	1	0	0	0	0	0	0	0	0	4,477
30 TO 34	3,134	288	8	0	0	0	0	0	0	0	0	3,430
35 TO 39	2,432	237	21	40	2	0	0	0	0	0	0	2,732
40 TO 44	2,042	179	17	54	10	0	0	0	0	0	0	2,302
45 TO 49	1,353	136	7	25	5	2	0	0	0	0	0	1,528
50 TO 54	967	90	5	18	4	0	0	0	0	0	0	1,084
55 TO 59	635	71	2	14	8	0	0	1	0	0	0	731
60 TO 64	367	53	0	7	2	0	1	0	0	0	0	430
65 & UP	158	55	6	4	3	0	1	0	0	0	0	227
<b>TOTAL</b>	<b>18,159</b>	<b>1,455</b>	<b>67</b>	<b>162</b>	<b>34</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>19,882</b>

**AVERAGE SALARIES \***

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 TO 45	45 TO 50	50 & UP	
UNDER 20	0	0	0	0	0	0	0	0	0	0	0	11,194
20 TO 24	16,806	19,881	0	0	0	0	0	0	0	0	0	16,863
25 TO 29	20,516	23,067	20,279	0	0	0	0	0	0	0	0	20,683
30 TO 34	21,540	24,765	23,451	0	0	0	0	0	0	0	0	21,815
35 TO 39	22,253	24,837	26,925	29,655	28,130	0	0	0	0	0	0	22,626
40 TO 44	21,496	25,747	22,785	39,173	34,481	0	0	0	0	0	0	22,308
45 TO 49	21,166	25,422	25,934	38,222	38,835	10,574	0	0	0	0	0	21,890
50 TO 54	20,899	25,669	25,915	33,350	31,278	0	0	0	0	0	0	21,563
55 TO 59	20,974	22,386	9,881	30,645	24,473	0	0	52,248	0	0	0	21,347
60 TO 64	21,109	25,278	0	23,952	44,988	0	40,949	0	0	0	0	21,826
65 & UP	15,378	18,956	23,314	30,578	19,908	0	5,191	0	0	0	0	16,737
<b>TOTAL</b>	<b>20,456</b>	<b>24,180</b>	<b>24,349</b>	<b>34,422</b>	<b>31,348</b>	<b>10,574</b>	<b>23,070</b>	<b>52,248</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20,875</b>

\* Based on Members and Salaries Input to Valuation; may include some Summer Employees.



ANALYSIS OF RETIRED MEMBERS  
BY CURRENT AGE

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RETIREMENT YEAR	NUMBER OF RETIREES				AVERAGE BENEFIT			
	SERVICE	DISABILITY		HAZARDOUS DUTY	SERVICE	DISABILITY		HAZARDOUS DUTY
		SERVICE CONNECTED	NON-SERVICE CONNECTED			SERVICE CONNECTED	NON-SERVICE CONNECTED	
Pre-1959	159	18	39	9	5,898	4,299	4,058	5,928
1959	58	3	5	5	5,898	4,702	4,941	8,095
1960	46	7	4	2	5,315	3,814	4,215	7,908
1961	58	3	7	3	6,027	5,802	4,641	7,265
1962	96	6	4	0	6,168	4,534	4,275	0
1963	103	8	10	2	6,299	5,090	5,008	7,059
1964	105	12	11	1	5,454	6,158	4,804	7,622
1965	113	4	6	1	6,141	4,168	5,283	10,625
1966	134	10	18	0	6,166	4,870	4,870	0
1967	148	6	22	1	5,734	4,793	5,635	10,530
1968	199	13	19	2	6,647	5,897	5,189	7,205
1969	320	13	25	1	7,342	6,394	6,389	6,609
1970	323	11	51	3	8,008	6,123	6,715	7,853
1971	472	17	65	6	8,392	7,624	6,419	11,132
1972	553	26	72	22	8,723	7,896	7,237	12,230
1973	648	27	73	22	8,911	9,432	7,621	13,896
1974	526	26	50	24	8,104	9,426	7,788	15,373
1975	813	49	72	21	8,786	8,682	7,425	16,917
1976	890	16	52	24	7,929	7,850	7,308	14,810
1977	712	12	29	14	7,608	6,054	6,875	13,964
1978	761	10	40	25	7,413	6,764	5,554	15,406
1979	1,440	11	43	42	7,806	7,901	5,873	15,457
1980	926	18	39	35	7,267	5,954	5,308	14,584
1981	761	22	36	53	8,041	6,678	5,763	15,031
1982	661	17	32	35	8,297	8,144	6,886	16,049
1983	675	14	42	43	9,595	8,385	8,068	17,179
1984	856	32	47	64	10,079	9,167	8,043	18,135
1985	951	36	40	70	10,722	8,897	9,300	18,639
1986	1,033	43	53	58	12,164	8,879	9,096	21,584
1987	1,021	31	48	84	12,664	11,781	8,658	20,897
1988 (to July)	714	17	17	45	13,771	12,092	11,838	20,552

ANALYSIS OF RETIRED MEMBERS  
BY CURRENT AGE

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AGE	NUMBER OF RETIREES				AVERAGE BENEFIT			
	SERVICE	DISABILITY		HAZARDOUS DUTY	SERVICE	DISABILITY		HAZARDOUS DUTY
		SERVICE CONNECTED	NON-SERVICE CONNECTED			SERVICE CONNECTED	NON-SERVICE CONNECTED	
less than 40		29	12		10,868	6,001		
40 to 44		51	17		8,975	8,563		
45 to 49	1	50	47	25	21,360	10,590	9,283	20,886
50 to 54	1	65	91	143	12,149	8,589	8,995	18,569
55 to 59	886	75	157	151	13,712	7,752	8,157	18,350
60 to 64	2,486	84	182	184	10,867	7,526	6,775	17,586
65 to 69	3,955	59	177	126	9,460	6,083	5,999	14,777
70 to 74	3,841	58	136	51	8,292	7,021	6,636	14,222
75 to 79	2,588	34	122	25	7,893	7,100	6,627	11,540
80 to 84	1,518	25	82	10	7,682	6,822	6,088	10,056
85 to 89	728	5	40	2	6,509	5,803	4,939	7,193
90 to 94	225	2	6		4,821	2,004	4,612	
95 to 99	46	1	2		4,926	2,268	4,246	
TOTALS	16,275	538	1,071	717	9,007	7,970	6,995	16,980