

April 12, 1951.

Civil Service Superannuation Act 1924

Report on Actuarial Examination  
of the  
Superannuation Account in the Consolidated Revenue Fund  
for the period  
March 31, 1931 to December 31, 1947

The Honourable D. C. Abbott, K.C.,  
Minister of Finance,  
O t t a w a.

Dear Sir:

In accordance with instructions we have completed an actuarial examination of the Civil Service Superannuation Account in the Consolidated Revenue Fund and have the honour to report thereon.

Data

The Superannuation Branch of the Department of Finance transcribed from their records data sufficient for valuation concerning each contributor and each pensioner. The data were transcribed on sheets especially designed and printed for the purpose. Concerning beneficiaries, the data included information relating to every person who was in receipt of an annual allowance at the valuation date or who had at any time been in receipt of an allowance from the Account. For contributors the data related to persons contributing as at the valuation date or who had at any time made contributions to the Account.

From these sheets the Bureau of Statistics prepared punched cards, computed ages and durations by machine methods and sorted and tabulated the cards as required for valuation purposes and for all the ancillary investigations.

The work of extracting and transcribing the information took a very long time. This was due principally to the fact that data had to be supplied concerning contributors whose service had terminated prior to the valuation date, some of which could only be obtained from departmental records. Much delay occurred in securing the necessary information from the several departments. Also, much of the information had to be obtained by reference to contributors' files--a slow and tedious process.

The preparation of punched cards and the necessary sorting and tabulation took considerable time. The complexity of the tabulations required careful planning and sorting and was far more time-consuming than the mere volume of cards would indicate.

The following table shows the number of entrants to the scheme and the number of terminations according to cause over the whole existence of the scheme until December 31, 1947. Also shown is the number of persons who came on to the pension roll and the number terminated.

TABLE I

Contributors

	<u>Entrants</u>	<u>Terminations</u>					<u>In Service at 31-12-47</u>
		<u>With-drawal, Dismissals, etc.</u>	<u>Position Abolished</u>	<u>Ill Health Retirement</u>	<u>Age Retirement</u>	<u>Death in Service</u>	
<u>Men</u>							
Whole Time-	46,100	4,789	1,575	4,218	4,763	3,575	27,180
Seasonal -	1,885	197	36	125	255	144	1,128
Prevailing Rates -	<u>1,995</u>	<u>96</u>	<u>126</u>	<u>110</u>	<u>290</u>	<u>52</u>	<u>1,321</u>
Total -	49,980	5,082	1,737	4,453	5,308	3,771	29,629
<u>Women</u>							
Whole Time-	9,176	3,504	283	693	299	213	4,184
Seasonal -	70	34	2	2	2	1	29
Prevailing Rates -	<u>102</u>	<u>8</u>	<u>37</u>	<u>10</u>	<u>4</u>	<u>-</u>	<u>43</u>
Total -	9,348	3,546	322	705	305	214	4,256
Total All Contributors	59,328	8,628	2,059	5,158	5,613	3,985	33,885

Pensioners

	<u>Pensions Granted</u>	<u>Pensions Terminated</u>		<u>On Pension at 31-12-47</u>
		<u>Death</u>	<u>Misconduct Disappearance</u>	
<u>Men:</u>				
Age	5,018	1,961	-	3,057
Ill health	4,046	1,061	2	2,983
Abolition	<u>993</u>	<u>308</u>	<u>-</u>	<u>685</u>
Total Men -	10,057	3,330	2	6,725
<u>Women:</u>				
Age	280	66	-	214
Ill health	615	122	1	492
Abolition	<u>211</u>	<u>41</u>	<u>-</u>	<u>170</u>
Total Women -	1,106	229	1	876
Total Pensioners -	11,163	3,559	3	7,601

Widows

<u>Pensions Granted</u>	<u>Pensions Terminated</u>		<u>On Pension at 31-12-47</u>
	<u>Death</u>	<u>Remarriage</u>	
4,605	920	151	3,534

Children

<u>Pensions Granted</u>	<u>Pensions Terminated</u>			<u>On Pension at 31-12-47</u>
	<u>Death</u>	<u>Reached Age 18</u>	<u>No Longer Dependent</u>	
2,842	14	2,039	2	787

Benefits

There follow, in summary form, the benefit provisions of the Act as at December 31, 1947, classified according to the reason for termination of service.

Summary of Benefits

Service under 10 years

Service over 10 years

(1) Retirement because of Age

At the option of the contributor -

- |  |  |
|--|--|
| (a) one month's pay for each year of service, or   | An annual superannuation allowance with allowances to surviving widow and/or children. |
| (b) an adjusted annual retiring allowance, with allowances to surviving widow and/or children. |  |

(2) Retirement because of Ill health

At the option of the contributor -

- |  |  |
|--|--|
| (a) one month's pay for each year of service, or   | An annual retiring allowance with allowances to surviving widow and/or children. |
| (b) an adjusted annual retiring allowance, with allowances to surviving widow and/or children. |  |

(3) Retirement because of Abolition of Office

At the option of the contributor -

- |  |   |
|--|---|
| (a) one month's pay for each year of service, or   | An annual retiring allowance reduced by 1/3 prior to age 65, with allowances to surviving widow and/or children; if a contributor before August 15, 1944, no reduction prior to age 65. |
| (b) a deferred adjusted annual retiring allowance, with allowances to surviving widow and/or children. |   |

(4) Voluntary withdrawal, dismissal or removal (not for misconduct)

At the option of the contributor -

- |  |  |
|--|--|
| (a) the total contributed, or  | (a) the total contributed, or  |
| (b) a deferred adjusted annual retiring allowance, with allowances to surviving widow and/or children. | (b) a deferred adjusted annual retiring allowance, with allowances to surviving widow and/or children. |

(5) Dismissal for Misconduct

The total contributed

The total contributed

Service under 10 years

Service over 10 years

(6) Death in Service

(i) Leaving widow and/or children -

(i) Leaving widow and/or children -

(a) annual allowances based on deferred adjusted annual allowance that would have been granted if contributor had just prior to death retired and accepted such an allowance; or

annual allowances

(b) one month's salary for each year of service.

(ii) No widow or children -

(ii) No widow or children -

the total contributed.

the total contributed.

Note 1: Annual retiring superannuation allowance: 2% of average annual salary during final 10 years of service for each year of countable service, not exceeding 35 years; maximum salary countable, \$15,000.

Note 2: Adjusted annual retiring allowance: computed as in Note 1, reduced by 1% thereof for each year of service short of 20 years.

Note 3: Deferred adjusted annual retiring allowance: computed as in Note 2, payment thereof being deferred to age 60.

Note 4: Allowance to a widow and/or children: If an annual allowance or an adjusted annual allowance or a deferred adjusted annual allowance has been granted to a contributor, then on his death an annual allowance equal to one-half thereof becomes payable to his widow, starting immediately and continuing until her death or remarriage, together with an additional one-fifth of her allowance for each child under eighteen; maximum for each child \$300.

On death of a contributor in the Service, an allowance becomes payable to his widow until her death or remarriage, equal to one-half of the annual retiring allowance that would have been payable to the contributor had he retired because of ill health immediately prior to his death, together with an additional one-fifth of her allowance for each child under eighteen; maximum for each child \$300.

In no case is the total of the annual allowances payable for all the children to exceed one-half of the widow's allowance if there is a widow surviving. The allowances for orphaned children are double the above.

Note 5: Minimum Return: The total benefit payable to or in respect of each contributor is not, in any case, less than the total he contributed.

Note 6: Retirement Age: Retirement because of age is permitted from age 60 to 65 and is compulsory at age 65 subject to extension in individual cases when in the public interest.

### Contributions

For men, the rates of contribution under the Act are as follows:

- (i) for salaries of \$1200 per annum or less, 5% of salary;
- (ii) for salaries over \$1200 but not more than \$1500 per annum, 5½% of salary;
- (iii) for salaries over \$1500 per annum, 6% of salary.

For women, the rate of contribution is 5% for all salary classes.

No contributions are to be made in respect of a period of service in excess of 35 years.

Within one year of becoming a contributor election may be made to contribute for prior service in the Civil Service (and for certain other service that may be deemed under the Act to be service in the Civil Service) and to have this service counted for the purposes of the Act. The contribution required is a lump sum equal to the total contributions that would have been made during that service on the basis of the above rates, had he then been subject to the Act, accumulated at simple interest (4%) to the date of election, or the equivalent thereof in monthly instalments.

A period of active service overseas in the Armed Forces prior to becoming a Civil Servant, or a period of employment outside of the Civil Service countable for benefits under an established superannuation fund or plan, may be counted for the purposes of the Act if a contributor elects to contribute in respect thereof; and the contribution required is double the contribution that would be required for a comparable period of service in the Civil Service.

### Changes in Benefits and Contributions

Since the previous valuation, March 31, 1931, the Act has been amended three times--in 1940, in 1944 and in 1947. The principal changes in benefits and contributions, as compared with those in effect at the time of the last valuation, are as follows:

1. On withdrawal from the Service, a contributor now has the option of receiving a refund of the contributions he has paid, or a deferred adjusted retiring allowance as described above (1947 amendment). Prior to the 1944 amendment there was no benefit payable on withdrawal with less than 10 years of service (except for women leaving to become married), and a refund of contributions only was available on withdrawal with ten or more years of service. The 1944 amendment provided for a refund of contributions regardless of the period of service.
2. On retirement due to age or ill-health, with less than ten years of service, a contributor now has the option of receiving a gratuity of one month's pay for each year of service or an adjusted annual retiring allowance as described above (1947 amendment). Prior to the 1947 amendment, the benefit in these contingencies was limited to the gratuity only.

3. On retirement due to abolition of office a contributor having less than ten years of service now has the option of receiving a gratuity of one month's pay for each year of service or a deferred adjusted annual retiring allowance (1947 amendment). Prior to the 1947 amendment, this benefit was limited to the gratuity only. A contributor having more than ten years of service may be granted an annual retiring allowance reduced by one-third prior to age 65, but this reduction applies only to persons who became contributors after August 15, 1944, the date of this amendment.
4. The minimum total benefit payable to, or in respect of any contributor, whether in the form of a lump sum or annual allowances, equals the total of his contributions without interest (1947 amendment). Prior to the 1947 amendment, there was no such minimum guarantee.
5. For persons who became contributors prior to August 11, 1939, if no election was made to contribute for prior service, that service was to count as one-half for benefit purposes. As it was understood that the cost of the scheme would be shared approximately equally between the contributor and the government, this half was the government's share. For entrants after that date, prior service counts only to the extent that the contributor also pays his share (1940 amendment and P.C.2261 August 11, 1939).
6. Contribution rates for men entering after August 11, 1939 are, for salaries not exceeding \$1200 per annum, 5%; for salaries in excess of \$1200 but not exceeding \$1500 per annum, 5½%; and for salaries over \$1500, 6%. The former rate was 5% of salary for all classes (1940 amendment and P.C.2261 August 11, 1939).
7. An annual superannuation allowance may now be granted to a contributor on or after attaining age 60 (1947 amendment). Prior to the 1947 amendment, such an allowance could not be granted until age 65.

### Valuation Bases

#### 1. Rates of Increase in Salaries

The most important benefits depend on the length of service and on the average salary received during the ten years (or in some cases five years) prior to retirement or death; and the contributions depend on the salary received from year to year. Hence it is essential to determine the rates at which the present salaries of contributors will, on the average, increase from age to age in the future under normal conditions.

The data furnished by the Superannuation Branch included the salary of each contributor at December 31, 1947 and five years earlier (if he was then a contributor), whence the average salary of contributors at each age was obtained. Information was also obtained concerning revisions in salary rates since December 31, 1947, showing the average salary paid to approximately 100,000 civil servants at the end of each year and the general pattern of each major revision.

From these and other data, rates of increase in salaries age by age that may normally be expected to hold in the future were determined. There is no provision in these rates for future increases in the general level of salaries. Rates of increase were determined for men and women separately.

The following table shows, for specimen ages, how a salary of \$1000 would increase in the future on the basis of these rates of increase. Complete salary scales based upon these rates of increase are shown in the Appendix.

TABLE II

<u>Age</u>	<u>Men</u>				<u>Women</u>			
	\$1000	\$	\$	\$	\$1000	\$	\$	\$
20	\$1000				\$1000			
25	1076				1091			
30	1198	1000			1180	1000		
35	1325	1106			1250	1059		
40	1400	1169	1000		1289	1092	1000	
45	1434	1197	1024		1323	1121	1026	
50	1450	1210	1036	1000	1357	1150	1053	1000
55	1473	1229	1052	1015	1391	1179	1079	1025
60	1520	1268	1085	1048	1419	1202	1100	1045
65	1591	1328	1136	1097	1442	1222	1119	1063

2. Mortality

For valuation purposes the mortality in the future is required for each of the following groups:

- (a) Contributors retired because of age;
- (b) Contributors retired because of ill health;
- (c) Contributors retired because of abolition of office;
- (d) Contributors granted deferred annual retiring allowances;
- (e) Widows of contributors and pensioners;
- (f) Children of contributors and pensioners;
- (g) Active contributors.

The mortality bases used are considered and illustrated in the following paragraphs, each group separately.

(a) Contributors retired because of age - A comparison of the mortality of persons in receipt of annual allowances in the periods 1924-30, 1930-1940, 1940-47 showed a trend toward lighter mortality. Hence it was considered necessary to make provision for further improvement in mortality as respects persons who may be retired in the future.

For men presently in receipt of allowances, the experience showed that the rates of mortality in Column (2) of the table below, for specimen ages, would be appropriate. The relevant annuity values are shown in Column (4). For women, the experience showed that the Mortality of Annuitants, 1900-1920, a(f), rated up one year, would be appropriate. These rates, at specimen ages, are given in Column (3) of the table below, and the relevant annuity values in Column (5).

TABLE III

<u>Age</u>	<u>Rate of Mortality</u>		<u>Value of Annuity of 1 per annum; interest 4%</u>	
	<u>Men</u>	<u>Women</u>	<u>Men</u>	<u>Women</u>
(1)	(2)	(3)	(4)	(5)
60	.02711	.01370	10.398	12.185
65	.03391	.01961	8.921	10.439
70	.04758	.03041	7.288	8.582
75	.07290	.04996	5.677	6.711
80	.11347	.08507	4.193	4.959
85	.18118	.14466	2.950	3.518
90	.26478	.22155	2.092	2.445
95	.34906	.31849	1.471	1.653

For persons who may be retired in the future, the mortality used was the Mortality of Annuitants, 1900-1920, a(m) and a(i), the age being rated down one year. This represents approximately a set-back of two years in age as against the mortality found to be appropriate for persons now in receipt of allowances.

(b) Contributors retired because of ill health - For persons who had been retired on account of ill health, the experience showed that, for a few years following retirement, the mortality improved very rapidly owing of course to the death of those most seriously incapacitated. However, after about four years following retirement, increase in age became the determining factor. Hence to place a proper valuation on the allowances payable to persons under this head, it was necessary to take account both of age at retirement and the duration of disability in determining appropriate rates of mortality as a basis for annuity values. The rates of mortality and the relevant annuity values, for men and for women, are shown in the four following tables.

The same bases were used for both present pensioners and prospective pensioners, since the mortality of persons retiring on account of ill health is not likely to be subject to secular improvement as is the case for normal classes of lives.



TABLE IV

Age at Retirement	Rate of Mortality - Men					Ultimate	Attd. Age
	Year Following Retirement						
	1st yr.	2nd yr.	3rd yr.	4th yr.			
30	.1493	.1092	.0748	.0623	.0557		34
35	.0893	.0722	.0549	.0465	.0423		39
40	.0694	.0555	.0443	.0374	.0340		44
45	.0626	.0504	.0398	.0334	.0307		49
50	.0629	.0512	.0402	.0342	.0326		54
55	.0664	.0545	.0448	.0397	.0394		59
60	.0708	.0596	.0531	.0500	.0498		64
					.0620		69
					.0763		74
					.1041		79
					.1654		84

Age at Retirement	Value of Annuity of 1 per annum; interest 4% - Men					Ultimate	Attd. Age
	Year Following Retirement						
	1st yr.	2nd yr.	3rd yr.	4th yr.			
30	9.159	10.197	10.906	11.259	11.488		34
35	10.861	11.403	11.782	11.966	12.052		39
40	11.432	11.776	11.966	12.022	11.988		44
45	11.238	11.469	11.560	11.520	11.395		49
50	10.546	10.704	10.733	10.630	10.446		54
55	9.615	9.711	9.682	9.541	9.333		59
60	8.616	8.643	8.559	8.400	8.195		64
					7.065		69
					5.853		74
					4.472		79
					3.169		84

Age at Retirement	Rate of Mortality - Women					Ultimate	Attd. Age
	Year Following Retirement						
	1st yr.	2nd yr.	3rd yr.	4th yr.			
35	.0691	.0497	.0408	.0380	.0354		39
40	.0609	.0446	.0374	.0354	.0333		44
45	.0576	.0421	.0349	.0323	.0298		49
50	.0502	.0361	.0299	.0281	.0265		54
55	.0462	.0343	.0292	.0281	.0273		59
60	.0490	.0376	.0328	.0326	.0329		64
					.0487		69
					.0789		74
					.1083		79
					.1428		84

Age at Retirement	Value of Annuity of 1 per annum; interest 4% - Women					Ultimate	Attd. Age
	Year Following Retirement						
	1st yr.	2nd yr.	3rd yr.	4th yr.			
35	12.077	12.492	12.672	12.740	12.773		39
40	12.250	12.566	12.678	12.697	12.689		44
45	12.166	12.425	12.489	12.458	12.389		49
50	11.871	11.998	11.946	11.807	11.635		54
55	11.075	11.076	10.928	10.707	10.457		59
60	9.842	9.763	9.550	9.269	8.965		64
					7.329		69
					5.885		74
					4.777		79
					3.776		84

(c) Contributors retired because of Abolition of Office - There were not sufficient data under this head to give a basis for determining mortality rates from actual experience. The data, however, were sufficient to indicate that for men Mortality of Annuitants, 1900-1920, a(m), would be appropriate and for women, the Mortality of Annuitants, 1900-1920, a(f), rated up one year.

Specimen rates and annuity values are as follows:

TABLE V

<u>Age</u>	<u>Rate of Mortality</u>		<u>Value of Annuity of 1 per annum; interest 4%</u>	
	<u>Men</u>	<u>Women</u>	<u>Men</u>	<u>Women</u>
40	.00665	.00627	16.537	17.316
50	.00970	.00871	13.986	15.123
60	.02078	.01370	10.852	12.185
70	.04461	.03041	7.556	8.582
80	.10902	.08507	4.506	4.959
90	.22842	.22155	2.392	2.445

For contributors that may be retired in the future under this head the mortality used was the Mortality of Annuitants, 1900-1920, a(f) and a(m), the age being rated down one year.

(d) Contributors granted Deferred Adjusted Annual Retiring Allowances - No allowances under this head had been granted prior to the amendment in 1947. In valuing allowances that may be granted in the future the mortality used was the Mortality of Annuitants, 1900-1920, a(f) and a(m), the age being rated down one year.

(e) Widows - The data concerning widows to whom allowances had been granted were investigated for both the rate of mortality and the rate of remarriage. The experience indicated that the Mortality of Annuitants, 1900-1920, a(f), the age being rated up one year, would be appropriate for widows now receiving allowances. For prospective widows of present pensioners, it was thought desirable to use lighter mortality since allowances to them will fall in for payment in future years and all current mortality trends point towards improvement in mortality generally. Consequently, for this class the mortality used was the same as that used for widows now receiving allowances but with the age rated down one year, i.e. Mortality of Annuitants, 1900-1920, a(f), without rating. This latter basis was used also for prospective widows of present active contributors.

(f) Children - The mortality of children under age 18 has fallen so low in recent years that it was deemed sufficiently accurate to ignore mortality altogether.

(g) Active Contributors - Mortality among active contributors is shown in the following table as compared with that used in 1931. It is based on the actual experience of contributors in the Service, excluding the first five years of service. Probabilities derived from the 1931 data are shown for comparison.

TABLE VI

Probability of dying within 1 year following the ages indicated

<u>Age</u>	<u>Men</u>		<u>Women</u>	
	<u>1947 *</u>	<u>1931 **</u>	<u>1947*</u>	<u>1931 ***</u>
20	.0023	.0014	.0009	.0011
25	.0023	.0017	.0010	.0014
30	.0024	.0023	.0011	.0019
35	.0027	.0031	.0014	.0020
40	.0034	.0042	.0019	.0023
45	.0048	.0058	.0028	.0028
50	.0074	.0082	.0040	.0037
55	.0111	.0121	.0057	.0049
60	.0160	.0181	.0081	.0071
65	.0216	.0278	.0117	.0108

\* Excluding the first 5 years of service  
 \*\* Excluding the first 10 years of service  
 \*\*\* Including all years of service

The probabilities of dying from year to year, found to be appropriate in 1947, show important changes in comparison with those used in 1931. For men, at the most significant ages, the changes are definitely downward. For women, the changes are downward at the ages under forty-five and the reverse at the higher ages. However, having regard for the paucity of data in 1931 and differences in procedure in computing the probabilities it would be unwarranted to draw definitive conclusions concerning the changes in mortality during the period.

3. Probability of retiring because of ill health

The probabilities of retiring on account of ill health were derived from the experience, excluding the first five years of service, and specimen values are shown in the following table. Corresponding probabilities derived for the 1931 valuation are shown for comparison.

TABLE VII

Probability of retiring because of ill health within 1 year following the age indicated

<u>Age</u>	<u>Men</u>		<u>Women</u>	
	<u>1947 *</u>	<u>1931 ***</u> (including abolition of office)	<u>1947 *</u>	<u>1931 ***</u> (including abolition of office)
25	.0009	.0018	.0012	--
30	.0012	.0018	.0017	.0005
35	.0017	.0019	.0023	.0014
40	.0027	.0023	.0037	.0022
45	.0043	.0034	.0064	.0025
50	.0069	.0055	.0114	.0032
55	.0124	.0093	.0222	.0100

\* Excluding the first 5 years of service  
 \*\* Excluding the first 10 years of service  
 \*\*\* Including all years of service

It can be seen that the 1947 probabilities are higher than those for 1931, even though in the latter, probabilities of abolition of office and of ill health are combined. This seems to give evidence of either higher invalidity in the Service in recent years or the requirement of higher standards of fitness for continuance in the Service. That the latter might be the explanation is suggested by the lighter mortality observed among contributors retired because of ill health.

4. Probability of withdrawing from the Service

Under this head have been classed all terminations for reasons other than age, ill health and abolition of office. There are thus a few cases of dismissal and misconduct included but these are wholly negligible in the total. Probabilities were derived from the experience excluding the first five years of service. Specimen values are shown in the following table, compared with those used in 1931. The 1931 probabilities for men exclude the first ten years of service as there was then no benefit in the event of withdrawal during the first ten years. For women, the 1931 probabilities exclude all withdrawals during the first ten years of service other than withdrawal on marriage.

TABLE VIII

Probability of withdrawing within 1 year following the age indicated

<u>Age</u>	<u>Men</u>		<u>Women</u>	
	<u>1947 *</u>	<u>1931 **</u>	<u>1947 *</u>	<u>1931 ***</u>
25	.0190	.0071	.0865	.0437
30	.0154	.0070	.0685	.0370
35	.0122	.0067	.0442	.0213
40	.0097	.0061	.0240	.0123
45	.0076	.0052	.0144	.0074
50	.0058	.0042	.0080	.0044
55	.0043	.0034	.0033	.0020
59	.0033	.0030	.0005	.0010

- \* Excluding the first 5 years of service
- \*\* Excluding the first 10 years of service
- \*\*\* Excludes withdrawals during first 10 years of service other than withdrawal for marriage

5. Probability of retiring because of age

In 1947 the Act was amended to permit retirement at age 60. To arrive at suitable probabilities of retirement for the future, the experience was investigated first by treating withdrawals and ill health retirements that have taken place in the past at ages 60 and over as age retirements. The resulting probabilities were adjusted to give effect to a probable increase in retirements from age 60 to 65 and it was assumed that everyone would have left active service before age 69 (68 for women). The probabilities adopted for valuation were higher than past experience has shown for ages 65 and up and they were graded up fairly rapidly to the limiting age. It has been the general practice to retire persons at age 65 in recent years. However, the rising need for manpower and the number of extensions granted in recent years point toward the likelihood of an appreciable proportion continuing beyond age 65. It is believed that the probabilities used make adequate provision for future retirements on the basis of present practice.

Probabilities of retirement because of age are shown below:

TABLE IX

Probability of Retirement because of  
Age

<u>Age</u>	<u>Men</u>		<u>Women</u>	
	<u>1947*</u>	<u>1931**</u>	<u>1947*</u>	<u>1931***</u>
60	.100		.057	
1	.140		.070	
2	.186		.092	
3	.244		.130	
4	.315		.210	
65	.410	.044	.421	.110
6	.545	.059	.729	.170
7	.743	.092	1.000	.250
8	1.000	.170		.370
9		.365		.590
70		.955		.984

\* Excluding the first 5 years of service

\*\* Excluding the first 10 years of service

\*\*\* Including all years of service

The full influence of voluntary retirement between ages 60 and 65 cannot yet be judged. The experience of the last three years does not help much because there may have been a period of adjustment following the amendment that is not indicative of the future trends. The probabilities of retirement at ages 62, 63 and 64, shown in the above table, are considerably above the actual experience in the years 1948 and 1949 and this tends to compensate for any understatement there may be at the higher ages.

6. Probability of retiring because of abolition of office

There have been relatively few retirements under this head other than those arising from the Department of Interior, which were considered to be abnormal. As far as possible the effect of the Department of Interior cases was eliminated. Specimen probabilities of abolition of office used in the valuation are as follows:

TABLE X

Probability of Abolition of Office  
within one year following the age shown

<u>Age</u>	<u>Men *</u>	<u>Women *</u>
25	.0010	.0020
30	.0008	.0009
35	.0008	.0007
40	.0010	.0011
45	.0012	.0018
50	.0015	.0025
55	.0017	.0032

\* Excluding the first 5 years of service.

Probabilities of abolition of office were not obtained separately in 1931.

7. Rate of Remarriage of Widows

The remarriage rates among widows were investigated and compared with remarriage rates among pensioned war widows. There were 151 remarriages in the experience. Had the remarriage rates been the same as those for widows receiving pensions under the Pension Act there would have been 125 remarriages. Further investigation revealed that the average allowance to widows remarrying was \$303 per annum compared with an average of \$480 for all widows and \$720 for widows under the Pension Act ( at the time that experience was investigated). Thus it seems that the higher remarriage rates in the Service occur among widows with the smaller pensions. It is likely that for equivalent pensions, the remarriage rates do not differ much from the rates under the Pension Act, and it seems sufficiently accurate to use the latter. Specimens of these rates are as follows:

TABLE XI

Remarriage Rates of Widows

<u>Age at Widowhood</u>	<u>Year of Widowhood</u>				<u>Attained Age</u>
	<u>1st yr.</u>	<u>5th yr.</u>	<u>10th yr.</u>	<u>Ultimate</u>	
20	.1254	.1522	.0606	.0176	34
25	.0599	.1004	.0407	.0123	39
30	.0317	.0628	.0190	.0080	44
35	.0203	.0351	.0113	.0042	49
40	.0110	.0176	.0073	.0020	54
45	.0059	.0082	.0041	.0013	59
50	.0026	.0039	.0013	.0011	64
55	.0011	.0013	.0011	.0004	69

8. Proportion married at death (men)

This information is needed to calculate the value of prospective benefits to widows. Specimens of the proportions derived from the 1947 data are shown below:

TABLE XII

Proportions Married at Death

<u>Age Last Birthday at Death</u>	<u>Contributors</u> %	<u>Pensioners</u> %
30	65.7	33.4
35	73.0	50.2
40	78.5	63.7
45	81.9	72.4
50	83.7	77.2
55	84.0	78.9
60	82.9	78.0
65	81.3	74.6
70		69.3
75		60.9
80		50.1
85		39.6

9. Difference in age between husbands and wives

This information is needed to calculate the value of the widow's allowances emerging on death of a contributor or pensioner.

TABLE XIII

Difference in Age between husbands and wives

<u>Age Last Birthday of Husband</u>	<u>Excess of Husband's age over Wife's age at Death of Husband</u>
30	1.08 years
35	1.48
40	2.04
45	2.54
50	3.11
55	3.66
60	3.98
65	4.68
70	5.59
75	6.11

These differences were determined from the actual experience.

10. Family status as to children

Data were obtained relating to children for whom allowances had been granted. The average number of children left by persons dying at each age and the age of distribution of the children were determined from these data, separately for contributors and for pensioners.

TABLE XIV

Average Number of Children under Age 18 left on Death of Father at age shown

<u>Age Last Birthday</u>	<u>Contributors</u>	<u>Pensioners</u>
32	1.24	1.11
37	1.95	1.57
42	1.68	1.64
47	1.49	1.47
52	0.97	0.81
57	0.54	0.39
62	0.31	0.20
67	0.26	0.09

11. Capitalized value of annual allowances

After all these factors had been settled upon, it was then necessary to calculate the capitalized value of the benefit emerging on the happening of each of the various contingencies. These values are shown in the following table.

TABLE XV

Capitalized value on termination of service in the manner indicated below, of annual allowances granted in respect of an "earned" annual retirement allowance of 1 per annum, including provision for allowances to surviving widow and children and for minimum return; interest 4%

Men

Capitalized Value of Annual Allowances

<u>Age at Termination of Service (Last Birthday)</u>	<u>Withdrawal (Deferred Allowance)</u>	<u>Retirement because of ill health</u>	<u>Retirement because of Abolition of Office</u>	<u>Retirement because of age</u>	<u>Death *</u>
25	3.43	9.689	20.804		6.614
30	4.15	12.806	20.196		8.245
35	5.00	14.547	19.472		9.033
40	6.01	15.013	18.602		9.090
45	7.26	14.691	17.560		8.766
50	8.85	13.880	16.322		8.378
55	10.95	12.801	14.887		7.797
60				13.315	7.095
65				11.628	6.463
70				9.860	

Women

25	2.99	11.666	20.471		
30	3.67	12.333	19.764		
35	4.50	12.799	18.985		
40	5.55	12.912	18.116		
45	6.86	12.791	17.138		
50	8.58	12.444	16.017		
55	10.78	11.596	14.716		
60		10.331		13.214	
65				11.532	

\* Death leaving a widow and/or children entitled to annual allowances, the annual allowance to the widow being one-half the "earned" annual retiring allowance of the deceased contributor, and the children's allowances being one-fifth of the widow's allowance (doubled if orphans).



## 12. Interest

The regulations made under the Act provide that interest shall be credited to the Superannuation Account on the monthly balance of the Account at the rate of 4% per annum. The valuation was therefore based on this interest rate. It should be noted that by regulation this rate is used also in determining the lump sum contribution payable for prior service and in determining the instalment contributions that may be made in liquidation of the lump sum.

## 13. Seasonal employees and employees at prevailing rates

The proportion of these two classes to the total of all contributors is very small and the liability relatively unimportant in the total. Hence in valuing the benefits and contributions the probabilities of death, retirement, disability, withdrawal and abolition of office derived for whole time employees were used. In respect of the rate of increase of salaries from age to age, an examination of the data indicated that a uniform rate of salary at all ages would be appropriate.

### Special factors affecting the Account

It has been the practice to credit the Account with a "government contribution" equal to the total contribution by employees for current service. The valuation made in 1931 showed that the rate of contribution of 5% of salary for employees together with this matching government contribution was slightly more than sufficient to provide the benefits for future entrants under conditions then prevailing. However, as respects whatever service prior to becoming a contributor that may be countable under the Act, there has never been credited to the Account any contribution other than contributions made by employees at the same rates as are applicable for current service. Hence a very large deficiency in the Account has arisen from this source. We have estimated that on the bases of the cash contributions made up to March 31, 1947, the excess of employees' contributions over those of the government, accumulated with interest to that date, amount to some \$58,000,000.

This, however, does not nearly represent all of the deficiency so arising. Prior to 1939, employees were allowed to count one-half of their prior service, perhaps representative of the government's share, although they may not have elected to make the required contributions to permit the counting of the other half. Many employees did not in fact do so and the absence of a record of contributions makes it impossible to estimate what the government's contribution would have been for the service so countable.

Again, periods of service in the armed forces are countable under the Act in certain circumstances with no corresponding contributions therefor either by the government or by the employees. Employees who transferred from Funds 1 and 2 were allowed to count their service under these Funds in full for their own benefits and at one-half for widows benefits. There was a liability under this head in 1931 of some \$3,530,000, exclusive of the burden on the Account in respect of those who had transferred and been retired prior to 1931, for most of which no credit was ever made to the Superannuation Account.

It should be noted also that many employees are paying for their prior service by instalments falling due in the future and a comparison of contributions credited to the Account in the past does not measure the full government contribution that would have been made had it been the practice to match employees' contributions for prior service.

The second important factor is that of increases in the general level of salaries. In determining appropriate contribution rates, it is necessary to assume that salaries in the future will follow a normal pattern of increase from age to age; it is impossible to estimate future changes in the whole level of salaries. When contributions are made for a number of years on a given level of salaries to provide benefits based upon the years of service and the average salary for the final ten years of service, as under the Superannuation Act, then if the whole level of salaries is suddenly raised, the contributions made at the former level of salaries will obviously be insufficient to provide the benefits in respect of those years of service at the future level of salaries. Thus each rise in the general level of salaries results in an increase in the size of the future pensions but without any corresponding increase in the resources available to meet them, at least in respect of years of service prior to the increase. This factor has been a serious matter in recent years for all pension funds of this general type. There must be considered in this connection not only the current inflation, but also the inflation preceding, during and following World War I.

Under the Act as passed in 1924, civil servants who were then subject to the Retirement Act were allowed to transfer the contributions made under that Act to the Superannuation Account and to count under the Civil Service Superannuation Act all service for which those contributions had been made. Thus benefits were granted on the basis of salary levels in 1924, and higher levels in later years, in respect of years of service during which contributions were made on the basis of salaries at much lower levels. The importance of this factor can be appreciated from the following data:

TABLE XVI

Men

<u>Age in</u> <u>1913-14</u>	<u>Ratio of Salary in</u>		
	<u>1920-21 to salary</u> <u>in 1913-14</u>	<u>1925-26 to salary</u> <u>in 1920-21</u>	<u>1925-26 to salary</u> <u>in 1913-14</u>
21	1.88	1.31	2.46
36	1.50	1.22	1.83
51	1.37	1.18	1.62

Men

<u>Age in</u> <u>1920-21</u>	<u>Ratio of Salary in</u>		
	<u>1924-25 to salary</u> <u>in 1920-21</u>	<u>1929-30 to salary</u> <u>in 1924-25</u>	<u>1929-30 to salary</u> <u>in 1920-21</u>
19	1.46	1.26	1.84
24	1.33	1.22	1.62
39	1.21	1.13	1.37
54	1.15	1.12	1.29

Women

<u>Age in</u> <u>1920-21</u>	<u>Ratio of Salary in</u>		
	<u>1924-25 to salary</u> <u>in 1920-21</u>	<u>1929-30 to salary</u> <u>in 1924-25</u>	<u>1929-30 to salary</u> <u>in 1920-21</u>
24	1.22	1.26	1.54
39	1.17	1.16	1.35
54	1.11	1.11	1.23

In respect of men the average salary in 1930-31 by age attained was substantially 150% of the average in 1913-14 at the same ages; in respect of women, about 180%.

Considering the period after 1931, a major change in salary rates took place in September 1946 when the cost-of-living bonus was incorporated into the salary rates. In addition, a great many reclassifications and revisions of salary rates took place in the years 1946 and 1947. The ratio of increase ranges from 76% at age 20 to 24% at age 60 for men and from 54% to 28% for women as illustrated in the following table:

TABLE XVII  
Average Salaries

Age	Men			Women		
	1931	1947	Increase%	1931	1947	Increase%
20	\$ 1014	\$ 1786	76.1	\$ 952	\$ 1467	54.1
25	1341	1922	43.3	1131	1600	41.5
30	1568	2140	36.5	1273	1731	36.0
35	1734	2367	36.5	1391	1833	31.8
40	1870	2501	33.7	1483	1891	27.5
45	1978	2561	29.5	1551	1941	25.1
50	2055	2590	26.0	1590	1991	25.2
55	2117	2630	24.2	1614	2040	26.4
60	2170	2680	23.5	1626	2081	28.0
65	2212	2765	25.0	1635	2116	29.4

We have not made any attempt to measure the liability resulting solely from increase in salary levels prior to 1931 but the deficit revealed by the 1931 valuation is, in no small measure, due to these increases. In fact that deficit can be wholly attributed to the two causes - rise in general level of salaries and insufficient sums credited to the fund in respect of prior service counted for benefits. The deficit in 1931 was some \$45,000,000 and in 1933 it was estimated to be \$53,000,000.

Since that time further deficits have been incurred because of increases in the general level of salaries and the failure to credit the Account with sufficient contributions for prior service countable for benefits.

In an actuarial valuation, it is assumed that interest will be earned on the full reserve necessary to meet the future obligations, and allowance is made for this in valuing the benefits. If the fund is less than the full reserve, that is, if there is a deficit, and if the deficit is not liquidated immediately, there is a loss to the fund of the amount of interest on the deficit each year that it is allowed to stand. Consequently, the 1933 deficit would have accumulated at interest to \$96,000,000 by the end of 1947.

The amount by which the government contribution fell short of matching employee contributions for prior service during the period 1931-1947, together with interest at 4% is estimated at \$25,000,000, and as mentioned earlier, the matching of employees' contributions would not make full provision for prior service that was countable.

The increase in average salaries between 1931 and 1947 all took place after 1945. Salaries of contributors rose very much faster than would have been expected according to the salary scale used in 1931 and in 1947. We have estimated that this increase in salaries gave rise to an increase in net liability of the order of \$50,000,000.

Further reasons for an increasing deficit are found in the extension of benefits - deferred allowances, minimum return, allowances under 10 years of service - but these are very minor matters; and deferred allowances may even result in some gain to the Account. A more important factor is the improvement in mortality that has taken place in recent years and an increase in the rate of retirement because of ill health. The mortality of contributors retired because of ill health has also increased the cost. A further factor is the tendency towards retirement at earlier ages.

It might appear from this catalogue of deficiencies that there is something essentially wrong with this particular scheme of superannuation. However, the main purpose of any superannuation scheme is to superannuate employees in old age and to retire them in the event of earlier ill health. Unless the scheme is one which more or less automatically maintains a satisfactory relationship between the general level of salaries and the benefits payable in these contingencies, it cannot adequately answer the purposes for which it is intended. A scheme such as under the Superannuation Act maintains this relationship, at least approximately, by basing the annual allowances on the average salary over the final 10 years of service. This, however, results in a deficit being thrown up each time there is an increase in the general level of salaries.

Pension schemes can be and have been constructed on other lines, providing only such benefits as may be purchased by contributions currently made. Under these schemes, a rise in the general level of salaries does not throw up any deficit. However, such schemes lose contact with current conditions when salaries increase in the manner we have experienced many times over the last 27 years, and the pensions provided fall far short of what is necessary to retire employees in a socially acceptable manner. Schemes of this type must then be reconstructed if they are, in any proper sense, to fulfil their function. This reconstruction involves costs that compare with the liquidation of deficits thrown up by schemes such as that under the Superannuation Act, and in addition a reorganization is a very difficult and often very painful process.

Thus there is no escape from the necessity of providing pensions that bear some reasonable relation to final salary or average salary over a few final years. The general practice is for employers to undertake to liquidate deficits arising from time to time in their pension funds. This seems to be a wholly justifiable practice, first because it is in the employer's own interest to have a pension scheme that fulfils its functions in an adequate manner, and, second because, in a period of inflation, a business firm or manufacturer usually enjoys higher profits as a direct result of the inflation. If an attempt were made to place any substantial part of the burden on employees, the result would only be the earlier need for upward revision of salaries. Further, any such attempt would be inequitable in that new employees coming under the scheme would be charged heavily to liquidate a deficit arising in respect of older employees.

Valuation Summary as at December 31, 1947

There follows a summary of the results of the valuation.

Value of Benefits

1. Value of future benefits for present contributors \$  
and dependents ..... 326,301,000

<u>Men:</u> Whole Time	-	\$278,940,000
Seasonal	-	8,713,000
Prevailing Rates	-	<u>9,574,000</u>
Total Men	-	<u>\$297,227,000</u>

<u>Women:</u> Whole Time	-	\$ 28,678,000
Seasonal	-	158,000
Prevailing Rates	-	<u>238,000</u>
Total Women	-	<u>\$ 29,074,000</u>

Total All Contributors - \$326,301,000

2. Value of annual allowances granted ..... 93,534,000

	<u>Number</u>	<u>Annual Amount</u>	<u>Value</u>
Men:	6725	\$7,047,298	\$68,625,000
Women: (Retired)	876	688,302	6,600,000
(Widows)	3534	1,685,941	18,090,000
Children:	<u>726</u>	<u>57,926</u>	<u>219,000</u>
Total Pensioners	<u>11,861</u>	<u>\$9,479,468</u>	<u>\$93,534,000</u>

3. Value of deferred allowances granted ..... 6,000

	<u>Number</u>	<u>Amount</u>	<u>Value</u>
Men:	<u>2</u>	<u>\$1,121</u>	<u>\$6,000</u>

Total value of benefits \$419,841,000

Value of Future Contributions

1. Value of future contributions for current service \$  
including government contributions ..... 73,149,000

<u>Men:</u>	Whole Time	-	\$62,318,000
	Seasonal	-	1,917,000
	Prevailing Rates	-	<u>2,333,000</u>
	Total Men	-	<u>\$66,568,000</u>
<u>Women:</u>	Whole Time	-	\$ 6,497,000
	Seasonal	-	52,000
	Prevailing Rates	-	<u>32,000</u>
	Total Women	-	<u>\$ 6,581,000</u>
	Total Men and Women	-	<u>\$73,149,000</u>

2. Value of Future contributions for prior service .. 5,543,000

<u>Men:</u>	Whole Time	-	\$ 2,614,000
	Seasonal	-	115,000
	Prevailing Rates	-	<u>1,184,000</u>
	Total Men	-	<u>\$ 3,913,000</u>
<u>Women:</u>	Whole Time	-	\$ 280,000
	Seasonal	-	3,000
	Prevailing Rates	-	<u>52,000</u>
	Total Women	-	<u>\$ 335,000</u>
<u>Pensioners:</u>		-	<u>\$ 1,295,000</u>
Total Prior Service		-	<u>\$ 5,543,000</u>

Total value of future contributions ..... \$ 78,692,000

Reserve required to meet future obligations ....	\$341,149,000
(Total value of benefits less total value of future contributions)	
Balance in Account December 31, 1947 .....	<u>89,544,000</u>
Deficit	<u>\$251,605,000</u>

If the government were to match employee contributions for past service, now being made by instalments, the value of future contributions would be increased by \$5,511,000, and the deficit would be correspondingly reduced.

Since December 31, 1947, the number of contributors has increased from 33,703 to an estimated 47,803 at March 31, 1950. So far as these new contributors elected to pay for prior service (and nearly all of them would, by transfer of credits from the Retirement Fund) the failure to credit the Account with matching contributions on behalf of the government means a large addition to the deficit. Also, salaries have increased greatly since the valuation date as shown by the averages set out below:

TABLE XVIII

<u>Year</u>	<u>Average Annual Salary (approximately 100,000 civil servants)</u>	<u>Increase</u>	<u>Ratio to 1947</u>
December 31, 1947	\$1,976	\$ --	1.00
" 1948	2,159	183	1.09
" 1949	2,366	208	1.20
" 1950	2,413	47	1.22

These increases would have a very great effect on the liability. The following figures illustrate the effect of an increase of 10% in the general level of salaries:

TABLE XIX

<u>Attained Age (Became a contributor at age 25)</u>	<u>Percentage Increase in Reserve (Value of future benefits less value of future contributions)</u>	
	<u>Men</u> %	<u>Women</u> %
25	--	--
35	8.70	8.21
45	8.53	8.48
55	6.88	7.15

These illustrations relate only to one age at entry. As respects all contributors as at December 31, 1947, we have estimated that an increase of 10% in salaries occurring immediately after that date would have increased the reserve required from \$339,000,000 to approximately \$370,000,000.

Rate of Contribution

We have calculated as a proportion of payroll the rate of contribution required to support the benefits on the basis of the ages of contributors at the beginning of countable service, and without allowance for future increases in the general level of salaries. The following table shows the distribution of contributors according to these ages:

TABLE XX

<u>Age at Beginning of countable service</u>	<u>Number (Whole Time Employees)</u>	
	<u>Men</u>	<u>Women</u>
Under 20	1,477	560
20 - 24	4,824	1,408
25 - 29	7,162	902
30 - 34	5,336	550
35 - 39	3,227	324
40 - 44	2,262	203
45 - 49	1,632	129
50 - 54	844	70
55 - 59	324	35
60 - 64	80	5
Over 64	10	-
	<u>27,180</u>	<u>4,184</u>

These calculations, made on the basis of interest at 4% per annum, indicate that, for men, the necessary rate of contribution is a little less than 12½% of payroll and for women, a little less than 10% of payroll. The calculations involve whole time employees only, but seasonal employees and employees at prevailing rates constitute such a small proportion of the contributors as a whole that they would have no appreciable effect on the above rates of contribution.

The lower the average age at the commencement of countable service, the lower will be the rate of contribution, measured as a percentage of payroll, necessary to provide the benefits. It seems likely that, in the future, employees coming under the Act will on the average be younger at the commencement of countable service than was the case on the whole for contributors under the Act at the valuation date; this for the reason that in the past many persons coming under the Act did not elect to pay for prior service. In recent years, and in the future, owing to the requirement that contributions must be made to the Retirement Fund from the beginning of service, and that these contributions must be transferred to the Superannuation Account on coming under the Act, prior service will be automatically paid for except to the very slight extent to which an employee's contributions to the Retirement Fund with accrued interest may be insufficient to pay for all his prior service and he does not make up the difference. Further, prior pensionable service with a previous employer may, on payment of the appropriate contribution, be counted as service under the Act. By virtue of this provision the age at the commencement of countable service of such contributors will be lower than it otherwise would be. For these reasons we believe that if we ignore the possibility of further changes in the general level of salaries, and assume that the Account continues to be credited with interest at 4% per annum, contributions at the rate of 12% of the salary roll for men and 10% of the salary roll for women will, under present conditions as to mortality, withdrawal, disability and superannuation, be sufficient to support the benefits under the Act as respects future exponents to the scheme.

Conclusion

Under a pension scheme financed by means of an invested fund, an actuarial deficit in the fund means a real loss of interest earnings, and that is a real loss to both the employer and the contributors. The Superannuation Account being a



subsidiary account of certain transactions within the Consolidated Revenue Fund, interest is not earned on the balance of the Account in the sense that interest is earned on an invested fund; and although a continuing deficit in the Account continues to accumulate at interest from year to year, this accumulating interest does not in any sense represent a loss to the Treasury. From that point of view it does not seem to be important whether the necessary credits are made to meet deficits when they arise or at any later time.

However, the balance in the Account is set up in the government's balance sheet as the liability accrued in respect of benefits under the Civil Service Superannuation Act. The Account, therefore, does not serve its full purpose and may even be misleading, unless it represents the actual liability, as nearly as may be estimated. For this reason, we think that any deficit appearing in the Account should be liquidated as soon as may be reasonably possible. Also, the appearance of further deficits in the future will to some extent be avoided if a contribution is credited to the Account, on behalf of the government, to match contributions by employees for prior service.

There will be found in the Appendix hereto, the service tables used in the valuation.

In conclusion there should be acknowledged the able assistance given by the Bureau of Statistics, the co-operation of Mr. Gullock, Chief of the Superannuation Branch, and his staff, and of the staff of the Actuarial Branch of this Department.

Respectfully submitted,

(Sgd.) RICHARD HUMPHRYS

RH/M

Chief Actuary.

- A P P E N D I X -

Service Tables

Salary Scales

Service Table - Men

Aggregate, Excluding First Five Years of Service

Probability of Termination of Service by:

<u>Age</u>	<u>Death</u>	<u>Ill Health</u>	<u>Withdrawal</u>	<u>Abolition</u>	<u>Super-annuation</u>
20	.0023	.0008	.0235	.0014	
1	.0023	.0008	.0225	.0013	
2	.0023	.0008	.0216	.0012	
3	.0023	.0008	.0207	.0011	
4	.0023	.0009	.0198	.0010	
25	.0023	.0009	.0190	.0010	
6	.0024	.0009	.0183	.0009	
7	.0024	.0010	.0175	.0008	
8	.0024	.0010	.0168	.0008	
9	.0024	.0011	.0160	.0008	
30	.0024	.0012	.0154	.0008	
1	.0025	.0013	.0147	.0008	
2	.0025	.0014	.0140	.0008	
3	.0026	.0015	.0134	.0008	
4	.0026	.0016	.0128	.0008	
35	.0027	.0017	.0122	.0008	
6	.0028	.0019	.0117	.0009	
7	.0029	.0020	.0112	.0009	
8	.0030	.0022	.0107	.0009	
9	.0032	.0024	.0102	.0010	
40	.0034	.0027	.0097	.0010	
1	.0036	.0029	.0093	.0010	
2	.0039	.0032	.0088	.0011	
3	.0041	.0035	.0084	.0011	
4	.0045	.0039	.0080	.0012	
45	.0048	.0043	.0076	.0012	
6	.0053	.0047	.0072	.0013	
7	.0057	.0051	.0069	.0013	
8	.0062	.0057	.0065	.0014	
9	.0068	.0063	.0062	.0014	
50	.0074	.0069	.0058	.0015	
1	.0081	.0077	.0055	.0015	
2	.0088	.0081	.0052	.0016	
3	.0095	.0096	.0049	.0016	
4	.0103	.0109	.0046	.0017	
55	.0111	.0124	.0043	.0017	
6	.0120	.0143	.0040	.0018	
7	.0129	.0168	.0038	.0019	
8	.0139	.0199	.0035	.0019	
9	.0150	.0240	.0033	.0020	
60	.0160				.100
1	.0171				.140
2	.0182				.186
3	.0193				.244
4	.0205				.315
65	.0216				.410
6	.0228				.545
7	.0240				.743
8					1.000

Service Table - Men

Aggregate, Excluding First Five Years of Service

Age	Number continuing in service	Number Terminated by:				Super-annuation
		Death	Ill Health	Withdrawal	Abolition	
20	100,000	230	80	2350	140	
1	97,200	224	78	2187	126	
2	94,585	218	76	2043	114	
3	92,134	212	74	1907	101	
4	89,840	207	81	1779	90	
25	87,683	202	79	1666	88	
6	85,648	206	77	1567	77	
7	83,721	201	84	1465	67	
8	81,904	197	82	1376	66	
9	80,183	192	88	1283	64	
30	78,556	189	94	1210	63	
1	77,000	193	100	1132	62	
2	75,513	189	106	1057	60	
3	74,101	193	111	993	59	
4	72,745	189	116	931	58	
35	71,451	193	121	872	57	
6	70,208	197	133	821	63	
7	68,994	200	138	773	62	
8	67,821	203	149	726	61	
9	66,682	213	160	680	67	
40	65,562	223	177	636	66	
1	64,460	232	187	599	64	
2	63,378	247	203	558	70	
3	62,300	255	218	523	69	
4	61,235	276	239	490	73	
45	60,157	289	259	457	72	
6	59,080	313	278	425	77	
7	57,987	331	296	400	75	
8	56,885	353	324	370	80	
9	55,758	379	351	346	78	
50	54,604	404	377	317	82	
1	53,424	433	411	294	80	
2	52,206	459	423	271	84	
3	50,969	484	489	250	82	
4	49,664	512	541	228	84	
55	48,299	536	599	208	82	
6	46,874	562	670	187	84	
7	45,371	585	762	172	86	
8	43,766	608	871	153	83	
9	42,051	631	1009	139	84	
60	40,188	643				4019
1	35,526	607				4974
2	29,945	545				5570
3	23,830	460				5815
4	17,555	360				5530
65	11,665	252				4783
6	6,630	151				3613
7	2,866	69				2129
8	668					668

Service Table - Women

Aggregate, Excluding First Five Years of Service

Probability of Termination of Service by:

<u>Age</u>	<u>Death</u>	<u>Ill Health</u>	<u>Withdrawal</u>	<u>Abolition</u>	<u>Super-annuation</u>
20	.0009	.0010	.1020	.0044	
1	.0009	.0010	.0989	.0038	
2	.0009	.0011	.0960	.0032	
3	.0009	.0011	.0929	.0028	
4	.0010	.0011	.0897	.0023	
25	.0010	.0012	.0865	.0020	
6	.0010	.0012	.0832	.0017	
7	.0010	.0013	.0798	.0014	
8	.0011	.0014	.0762	.0012	
9	.0011	.0015	.0724	.0010	
30	.0011	.0017	.0685	.0009	
1	.0012	.0017	.0644	.0008	
2	.0012	.0018	.0600	.0007	
3	.0013	.0020	.0552	.0007	
4	.0014	.0021	.0501	.0007	
35	.0014	.0023	.0442	.0007	
6	.0015	.0026	.0384	.0008	
7	.0016	.0028	.0338	.0009	
8	.0017	.0031	.0299	.0009	
9	.0018	.0034	.0267	.0010	
40	.0019	.0037	.0240	.0011	
1	.0021	.0042	.0216	.0013	
2	.0022	.0046	.0195	.0014	
3	.0024	.0051	.0177	.0015	
4	.0026	.0057	.0160	.0016	
45	.0028	.0064	.0144	.0018	
6	.0030	.0071	.0130	.0019	
7	.0032	.0080	.0116	.0021	
8	.0034	.0090	.0104	.0022	
9	.0037	.0101	.0092	.0024	
50	.0040	.0114	.0080	.0025	
1	.0043	.0129	.0069	.0027	
2	.0046	.0147	.0059	.0028	
3	.0049	.0167	.0050	.0029	
4	.0053	.0192	.0041	.0031	
55	.0057	.0222	.0033	.0032	
6	.0061	.0262	.0025	.0033	
7	.0066	.0313	.0017	.0034	
8	.0070	.0382	.0011	.0035	
9	.0076	.0471	.0005	.0036	
60	.0081				.057
1	.0087				.070
2	.0094				.092
3	.0101				.130
4	.0109				.210
65	.0117				.421
6	.0126				.729
7					1.000

Service Table - Women

Aggregate, Excluding First Five Years of Service

<u>Age</u>	<u>Number continuing in service</u>	<u>Number Terminated by:</u>			
		<u>Death</u>	<u>Ill Health</u>	<u>Withdrawal</u>	<u>Abolition</u>
20	100,000	90	100	10200	440
1	89,170	80	89	8819	339
2	79,843	72	88	7665	255
3	71,763	65	79	6667	201
4	64,751	65	71	5808	149
25	58,658	59	70	5074	117
6	53,338	53	64	4438	91
7	48,692	49	63	3886	68
8	44,626	49	62	3401	54
9	41,060	45	62	2973	41
30	37,939	42	64	2599	34
1	35,200	42	60	2267	28
2	32,803	39	59	1968	23
3	30,714	40	61	1695	21
4	28,897	40	61	1448	20
35	27,328	38	63	1208	19
6	26,000	39	68	998	21
7	24,874	40	70	841	22
8	23,901	41	74	715	22
9	23,049	41	78	615	23
40	22,292	42	82	535	25
1	21,608	45	91	467	28
2	20,977	46	96	409	29
3	20,397	48	104	361	31
4	19,852	52	113	318	32
45	19,337	54	124	278	35
6	18,846	57	134	245	36
7	18,374	59	147	213	39
8	17,916	61	161	186	39
9	17,469	65	176	161	42
50	17,025	68	194	136	43
1	16,584	71	214	114	45
2	16,140	74	237	95	45
3	15,689	77	262	78	45
4	15,227	81	292	62	47
55	14,745	84	327	49	47
6	14,238	87	373	36	47
7	13,695	90	429	23	47
8	13,106	92	501	14	46
9	12,453	95	587	6	45
60	11,720	95			668
1	10,957	95			767
2	10,095	95			929
3	9,071	92			1179
4	7,800	85			1638
65	6,077	71			2558
6	3,448	43			2514
7	891				891

Salary Scales \*

<u>Age</u>	<u>Men</u>	<u>Women</u>
20	.5949	.6884
1	.6019	.7006
2	.6099	.7175
3	.6189	.7255
4	.6289	.7382
25	.6402	.7508
6	.6526	.7635
7	.6662	.7762
8	.6809	.7884
9	.6965	.8006
30	.7129	.8123
1	.7292	.8236
2	.7448	.8344
3	.7602	.8442
4	.7748	.8527
35	.7885	.8602
6	.8008	.8667
7	.8115	.8728
8	.8201	.8780
9	.8271	.8827
40	.8331	.8874
1	.8384	.8921
2	.8431	.8968
3	.8471	.9015
4	.8504	.9061
45	.8531	.9108
6	.8554	.9155
7	.8574	.9202
8	.8591	.9249
9	.8608	.9296
50	.8628	.9343
1	.8648	.9390
2	.8668	.9437
3	.8694	.9484
4	.8724	.9531
55	.8761	.9573
6	.8804	.9615
7	.8851	.9653
8	.8904	.9690
9	.8967	.9728
60	.9041	.9765
1	.9117	.9803
2	.9197	.9840
3	.9280	.9873
4	.9370	.9901
65	.9467	.9930
6	.9567	.9953
7	.9670	.9972
8	.9777	.9986

\* On page 7 will be found illustrations of salaries starting at \$1000 at specimen ages and increasing according to these scales.