



Office of the Superintendent of
Financial Institutions Canada
Office of the Chief Actuary

Bureau du surintendant des
institutions financières Canada
Bureau de l'actuaire en chef

ACTUARIAL REPORT

on the

GOVERNMENT ANNUITIES

as at 31 March 2016



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Canada 

Table of Contents

	Page
I. Executive Summary.....	4
II. Introduction	6
III. Data.....	7
IV. Methods and Assumptions.....	9
V. Results.....	10
VI. Experience.....	13
VII. Actuarial Opinion.....	14
Appendix 1 – Contract Types	15
Appendix 2 – Membership Data.....	17
Appendix 3 – Sources of Data.....	22
Appendix 4 – Mortality Tables	23
Appendix 5 – Experience-Adjusted Mortality	25

Tables

	Page
Table 1 Results Overview	4
Table 2 Multipliers for Deferred Pension Amounts.....	7
Table 3 Balance Sheet	10
Table 4 Calculation of Interest.....	11
Table 5 Development of Actuarial Liabilities.....	12
Table 6 Gains (Losses)	13
Table 7 Membership Data - Contract Types 10-16: Vested Ordinary Life.....	17
Table 8 Membership Data - Contract Types 21-29: Vested Guaranteed	18
Table 9 Membership Data - Contract Types 30-37: Vested Joint & Survivor.....	19
Table 10 Membership Data - Contract Types 50 & 80: Vested Certain.....	19
Table 11 Membership Data - Contract Type 60: Vested Temporary	19
Table 12 Membership Data - Contract Types 70-79: Vested Reducing.....	20
Table 13 Membership Data - Contract Types 10-16: Deferred Ordinary Life.....	20
Table 14 Membership Data - Contract Types 21-24: Deferred Guaranteed.....	20
Table 15 Membership Reconciliation.....	21
Table 16 Mortality Rates	23
Table 17 Life Expectancies.....	24
Table 18 Development of Actuarial Liabilities (with Experience-Adjusted Mortality)	25
Table 19 Sample Mortality Rates (Experience-Adjusted Mortality)	26

I. Executive Summary

A. Purpose of Report

In accordance with section 15 of the *Government Annuities Improvement Act* (“the Improvement Act”) an actuarial valuation was conducted as at 31 March 2016 for purposes of determining the actuarial liabilities and financial position of the Government Annuities Account (“the Account”). Section 15 of the Improvement Act also states that any surplus or deficit emerging as a result of the actuarial valuation shall be reported and, in the case of a surplus, credited to the Federal Government’s Consolidated Revenue Fund (CRF) and charged to the Account or, in the case of a deficit, charged to the Federal Government’s CRF and credited to the Account.

B. Data, Method and Assumptions

Data on current retirees, beneficiaries, deferred members, premiums and benefit payments were provided by Employment and Social Development Canada (ESDC) and Service Canada. The data are gathered through the electronic reports from the Government Annuities Secured Website. The Government Annuities Branch located in Bathurst administers the annuities as well as the corresponding website. The data are from a reliable source. We have performed summary tests on the data, and have found that they are accurate, reliable and sufficient for the purposes of the valuation. A description of contract types and a summary of the data are shown in Appendix 1 and Appendix 2 of this report. The actuarial liabilities are the present value of expected future benefits, determined in accordance with accepted actuarial practice and statutory valuation assumptions. Subsection 3(4) of the *Government Annuities Regulations* (“the Regulations”) states that the actuarial liability is to be determined using an interest rate of 7% per annum and the mortality rates of the Annuity Table for 1983, as modified by Projection Scale G.

C. Results

The following table summarizes the results of the actuarial valuation as at 31 March 2016.

Table 1 Results Overview

	As at 31 March 2016	
Assets		\$ 135,647,596
Liabilities		<u>\$ 133,820,089</u>
Surplus (Deficit)		\$ 1,827,507
	Count	Average Annual Pension
Vested Members	33,357	\$ 666
Deferred Members	316	\$ 1,693
Total	<u>33,673</u>	<u>\$ 676</u>

D. Conclusion

The surplus of \$1,827,507 is credited to the Federal Government's CRF and charged to the Account. The next valuation will be performed as at 31 March 2017.

II. Introduction

The Canadian *Government Annuities Act* of 1908 was one of the earliest significant pieces of social legislation in Canada. Its purpose was to encourage Canadians to prepare financially for their retirement. Government Annuities were purchased either by individuals or by employers as pension plans for their employees.

By the 1960's, other social benefit plans, such as Old Age Security (OAS) and the Canada Pension Plan were introduced and began gaining importance in providing Canadians with basic retirement income. The government's recognition that retired Canadians could now be served by other social security programs as well as the private sector brought about the decision to disband the Annuities sales force. In 1975, an Act of Parliament formally ended the sale of Government Annuities. Employers, however, could register new employees under group contracts until 1979. The Government Annuities are not sponsored by the Government – meaning the Government has no fiduciary liability. Its responsibilities are limited to provide and secure benefits in accordance with each contract's provisions.

The Annuities Branch continues to administer contracts under payment and those due to become payable, on behalf of clients from across Canada and around the world. The Account is not subject to any federal or provincial pension legislation; it is only subject to the *Government Annuities Act*, the Improvement Act and the Regulations. The assets and liabilities are shown in the Public Accounts of Canada. The assets are notional and are not subject to any investment policy or performance goals and objectives.

The Office of the Chief Actuary, Office of the Superintendent of Financial Institutions Canada, has the mandate of performing the annual actuarial valuation of the Account as of 31 March 2016. The purpose of the valuation is to establish the Account's liabilities, notional assets, and financial position, based on the statutory valuation assumptions.

III. Data

A. Data Required

Since the actuarial valuation determines both the assets and the liabilities, full details on the members as well as on the cash flows that occurred within the year are needed.

B. Member Data

Basic data on pensioners, beneficiaries and deferred members are provided by ESDC and Service Canada. The data are retrieved from the Government Annuities Secure Website maintained by the Annuities Branch in Bathurst. The site enables the production of reports which show the member data required to establish the liabilities: certificate number, maturity date, member, spouse and beneficiaries' gender and dates of birth, annual pension amounts, and form of pension.

The required data reports are VY4741 for vested members (pensioners) and GY5642 for deferred members (members with deferred rights).

Notes on VY4741 Vested Data

Additional pension amounts data are required from Service Canada concerning the continuing pensions for joint and survivor contracts with percentages other than 50% or 100%, as well as for reducing annuities. VY4741 data does not show the accurate continuing pension amounts for annuities of type 29, 37, and 70-79.

Moreover, manual additions must be done, as the VY4741 report excludes certain members due to internal validation controls at Bathurst. The data related to this limited number of members were extracted from the VY5141 report. There were 40 such members as at 31 March 2016.

Notes on GY5642 Deferred Data

Pursuant to the Improvement Act which granted annual accrual of contributions accounts at 7% from 1 April 1975, the following table shows the multipliers that must be applied to the annual original pension amounts:

Table 2 Multipliers for Deferred Pension Amounts

Premium Series	Original Interest Rate	Multiplier
4	4.0%	1.22
5	3.0%	1.32
6	3.5%	1.29
7	4.0%	1.22
8	5.0%	1.14

These multipliers reflect the increase between the original interest rate applicable on the contracts and 7%. As the deferred members data only show the pension amounts prior to the enhancements, these multipliers are used to update the annual pensions.

It can be seen that the methodology used to derive these multipliers granted higher increases to contracts with lower interest rates, and vice-versa. The objective sought at the time was to distribute the increases as equitably as possible.

A reconciliation of pension amounts and membership status with last year's membership has been performed. A detailed summary of membership data is shown in the Appendix 2 of this report.

C. Asset Data

Income consists of premiums received, funds reclaimed from the CRF for previously untraceable annuitants, notional earned interest and any transfer needed to cover the actuarial deficit. Payments and other charges represent matured annuities, commuted value of death benefits, premium refunds and withdrawals, and transfers to the CRF of actuarial surpluses and unclaimed annuities related to untraceable annuitants.

All reports used to determine the value of assets are provided by ESDC.

A list showing the names and short descriptions of the required reports is given in Appendix 3 of this report.

The data used are considered to be sufficient and reliable for the purposes of the actuarial valuation.

IV. Methods and Assumptions

A. Liability Valuation Method

The actuarial liabilities are associated with two groups of members: vested and deferred. The vested group consists of the participants for whom the pensions are in payment as at 31 March 2016. The deferred group consists of members for whom payment of pensions will start in the future. The liabilities are the actuarial present value of future pension payments, the result of discounting the future expected benefits with interest and post-retirement mortality.

B. Assumptions

The interest and post-retirement mortality assumptions are statutory, as stated in section 15 of the Improvement Act and subsection 3(4) of the Regulations. Namely, the liabilities must be based on a rate of interest of 7% per annum and on the mortality rates of the Annuity Table for 1983, as modified by Projection Scale G, published in Transactions of the Society of Actuaries, Vol. XXXV (1983), at pages 882 and 883.

Accordingly, the 1983 individual annuity mortality table (IAM83) is used for individual contracts and the 1983 group annuity mortality table (GAM83) is used for group contracts. Both tables are sex-distinct, and are projected for 15 years with Projection Scale G. Furthermore, for consistency with the methodology used to develop these mortality tables, the liabilities were calculated based on the annuitants' attained age (age last) at the valuation date.

Extracts from these mortality tables as well as associated life expectancies can be found in Appendix 4 of this report.

C. Asset Valuation Method

Since section 14 of the *Government Annuities Act* states that the monies received or paid under this act form part of the CRF, the assets are notional. Each year, any difference with the liabilities calculated is either credited (in the case of a surplus) or charged (in the case of a deficit) to the CRF, with a corresponding charge or credit to the Account. Following these adjustments, the assets value as at 1 April 2015 is equal to the 31 March 2015 liabilities. The assets value as at 31 March 2016 prior to any charge or credit to the CRF is obtained by adding interest at 7% on the 1 April 2015 value and adjusting for cash inflows and outflows also at 7% annual interest rate.

V. Results

A. Balance Sheet

The following table presents a summary of the balance sheet of the Account for the 2016 and 2015 fiscal years:

Table 3 Balance Sheet

Fiscal Year	2015 – 2016	2014 – 2015
Assets as at 1 April	\$ 149,598,082	\$ 166,137,502
<u>INCOME</u>		
Interest to 31 March	\$ 9,574,465	\$ 10,651,513
Premiums for Deferred Annuities	4,790	27,673
Unclaimed annuities recovered from CRF	<u>205,480</u>	<u>310,053</u>
TOTAL	9,784,735	10,989,239
<u>PAYMENTS AND OTHER CHARGES</u>		
Payments to Vested Members:		
Vested Regular Annuity Payments	\$ 23,370,681 ¹	\$ 25,766,811 ²
Vested Commuted Values	<u>122,613</u>	<u>104,856</u>
Total Payments to Vested Members:	23,493,294	25,871,667
Monies Refunded	168,133	80,341
Values Transferred to CRF (Vested & Deferred)	<u>73,794</u>	<u>33,040</u>
TOTAL	23,735,221	25,985,048
INCOME LESS PAYMENTS AND OTHER CHARGES	\$ (13,950,486)	\$ (14,995,809)
Assets as at 31 March	\$ 135,647,596	\$ 151,141,693
Surplus charged to the Account and credited to the CRF	\$ (1,827,507)	\$ (1,543,611)
Net Assets as at 31 March	\$ 133,820,089	\$ 149,598,082
Actuarial Liabilities as at 31 March	\$ 133,820,089	\$ 149,598,082

¹ Includes annuity and retroactive payments totalling \$213,326 for members that were recovered from the CRF in 2015-2016

² Includes annuity and retroactive payments totalling \$264,303 for members that were recovered from the CRF in 2014-2015 as well as -\$165,938 for write-offs, cash summary net of premiums, IS refunds and receivables that was previously reported under a line item labeled as "Other"

B. Calculation of Interest

The following table outlines the calculation of the notional 7% annual interest credited to the Account for the 2016 and 2015 fiscal years:

Table 4 Calculation of Interest

Fiscal Year	2015 – 2016	2014 - 2015
<u>VESTED MEMBERS</u>		
Interest on :		
Prescribed Assets as at 1 April of prior year	\$ 9,998,139	\$ 11,086,483
Maturities	92,939	143,787
CRF Recoveries	1,202	23
Less interest on :		
Annuity Payments	(886,574)	(952,844) ¹
Commutated Values	(3,290)	(3,971)
Transfers to CRF	0	0
TOTAL VESTED	9,202,416	10,273,478
<u>DEFERRED MEMBERS</u>		
Interest on :		
Prescribed Assets as at 1 April of prior year	473,727	543,142
Premiums	110	1,304
CRF Recoveries	9,580	12,924
Less interest on :		
Maturities	(92,939)	(143,787)
Refunds	(15,370)	(34,410)
Transfers to CRF	(3,059)	(1,138)
TOTAL DEFERRED	372,049	378,035
TOTAL INTEREST	\$ 9,574,465	\$ 10,651,513

¹ Includes interest of \$5,796 for write-offs, cash summary net of premiums, IS refunds and receivables that was previously reported under a line item labeled as "Other".

C. Development of Actuarial Liabilities

The following table outlines the Account’s actuarial liabilities by members’ category as at 31 March of 2016 and 2015:

Table 5 Development of Actuarial Liabilities

Fiscal Year	Contract Type	2015 – 2016	2014 – 2015
<u>VESTED MEMBERS</u>			
Males, Ordinary Life	10 – 16	\$ 66,871,971	\$ 74,648,292
Females, Ordinary Life	10 – 16	30,923,693	33,575,693
Males, Guaranteed	21 – 29	14,292,682	16,068,231
Females, Guaranteed	21 – 29	6,636,754	6,872,764
Last Survivor	30 – 37	8,781,681	9,966,487
Reducing at OAS	70 – 79	1,074,422	1,136,364
Annuities Certain	50, 80	408,381	518,406
Temporary Annuities	60	16,775	13,550
Suspended Payments		20,047	30,771
VESTED TOTAL		129,026,406	142,830,558
<u>DEFERRED MEMBERS</u>			
Males, Ordinary Life	10	105,041	98,169
Females, Ordinary Life	10	128,039	129,614
Males, Guaranteed	21 - 24	3,026,080	3,574,724
Females, Guaranteed	21 - 24	1,470,095	1,780,866
Refunds in Process		0	21,268
Suspense Accounts	Account 721	64,428	1,162,883
DEFERRED TOTAL		4,793,683	6,767,524
TOTAL ACTUARIAL LIABILITIES		\$ 133,820,089	\$ 149,598,082

VI. Experience

A. Analysis of Experience

As there are no new contracts purchased under the *Government Annuities Act*, the main sources of experience gains or losses are mortality and retirements of existing vested and deferred members. Mortality gains or losses include changes in expected future payments due to the death or survival of annuitants and the difference between actual and expected benefit payments during the year.

In the 2015-2016 fiscal year, significant efforts were made to trace individuals with unclaimed annuities. As a result of this, funds in the amount of \$205,480 were recovered from the CRF. However, the sum of the liability incurred for these individuals and the related retroactive and annuity payments made during the fiscal year exceed the amount transferred from the CRF. This, as well as other miscellaneous data changes, resulted in a net loss of \$197,798 during the fiscal year. Also during the 2015-2016 fiscal year, a large amount was removed from the suspense account due to the refund issued and the forfeiture of interest, and new amounts were added. This resulted in a net gain of \$1,179,857 during the fiscal year.

The table below presents a reconciliation of the surplus between 31 March 2015 and 31 March 2016:

Table 6 Gains (Losses)

Surplus as at 31 March 2015	-
Premiums paid with interest	\$ 4,900
Vested members mortality	857,870
Deferred members - retirements, mortality, refunds	(17,322)
Transfers from CRF and other data changes	(197,798)
Changes to the suspense account	1,179,857
Surplus as at 31 March 2016	\$ 1,827,507

B. Mortality Study

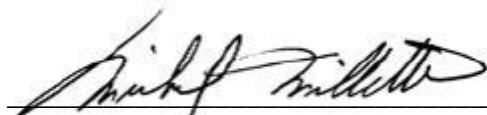
Following an external audit of the Account as at 31 March 2014, ESDC management asked the Office of the Chief Actuary to conduct a mortality experience study and to include the amount of the actuarial liabilities under experience-adjusted mortality rates in future Actuarial Reports on the Government Annuities. The Office of the Chief Actuary has determined that the liabilities as at 31 March 2016 under experience-adjusted mortality rates is \$126.5 million, which is \$7.3 million lower than under the prescribed mortality rates. Details on the development of the actuarial liabilities under the experience-adjusted mortality as well as sample mortality rates can be found in Appendix 5.

VII. Actuarial Opinion

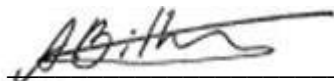
In our opinion, considering that this report is prepared pursuant to the *Government Annuities Act* and the *Government Annuities Improvement Act*:

- the data on which this report is based are sufficient and reliable for the purpose of the valuation;
- the assumptions used comply with legislative requirements;
- the methodology employed is appropriate and consistent with sound actuarial principles; and
- as at 31 March 2016, there is a surplus of \$1,827,507 which is credited to the Federal Government's Consolidated Revenue Fund and charged to the Government Annuities Account.

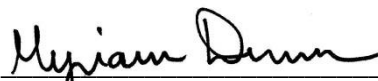
This report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada. As of 1 September 2016, there are no subsequent events of which we are aware that would have an impact on the valuation.



Michel Millette
Senior Actuary
Fellow of the Canadian Institute of Actuaries
Office of the Chief Actuary, OSFI



Assia Billig
Actuary
Fellow of the Canadian Institute of Actuaries
Office of the Chief Actuary, OSFI



Myriam Demers
Actuarial Officer
Associate of the Society of Actuaries
Office of the Chief Actuary, OSFI

Ottawa, Canada
1 September 2016

Appendix 1 – Contract Types

The following describes the annuities provisions as specified by the contracts:

Ordinary Life: At maturity, this annuity is payable for as long as the annuitant lives, but at death the annuity ceases immediately and there are no death benefits.

Guaranteed: The annuity under this contract is payable for life but it is guaranteed for a minimum period of 5, 10, 15 or 20 years.

Contingent Survivor: This annuity is based on two lives. The annuity is payable to the principal annuitant for as long as he or she lives. At death, the annuity is payable to the survivor until his or her death.

Joint and Last Survivor: This contract differs from the Contingent Survivor contract in that the annuity instalments are payable to both parties. After the death of one partner, the annuity is made payable to the survivor as long as he or she lives.

Reducing Option: The Reducing Option is an arrangement whereby the level of the annuity purchased is paid at an increased amount from age 50 (or later) to age 65. At age 65, the annuity decreases by the amount of Old Age Security in effect at the date of maturity. The annuity is payable for life, with death benefits available for the duration of the guaranteed period, if there is one.

The following describes the contract types:

Single Life - No Guarantee (10 – 16)

10. Ordinary
11. Guarantee expired: on valuation change of 21 – 24
12. From last or contingent survivor: 30, 35, 36, 37
13. From last survivor guarantee expired: on first death of 31
14. From reducing ordinary: on reduction of 70
15. From reducing guaranteed: on reduction of 79, on valuation change of 29 or from 71-74 where reduction and end of guarantee coincide
16. From reducing survivor: 36, 37

Single Life with Guarantee (21 – 29)

21. Guaranteed 5 years
22. Guaranteed 10 years
23. Guaranteed 15 years
24. Guaranteed 20 years
29. From 71-74 after reduction still within guarantee

Joint Lives No Guarantee (30 – 37)

- 30. Ordinary Last Survivor (100%)
- 31. Last Survivor guarantee expired (100%)
- 35. Contingent Survivor (100%)
- 36. Contingent Survivor reducing by one half at death of Principal Annuitant (50%)
- 37. Contingent Survivor reducing by any other amount at death of Principal Annuitant

Annuities Certain (50 & 80)

- 50. Certain level amount (Includes from 80 after reduction)
- 80. Certain, reducing

Temporary Annuities (60)

- 60. Temporary

Reducing Annuities (70- 79)

- 70. Ordinary, reducing
- 71. Guaranteed 5 years, reducing
- 72. Guaranteed 10 years, reducing
- 73. Guaranteed 15 years, reducing
- 74. Guaranteed 20 years, reducing
- 79. From 71-74, guarantee expired before reduction

Appendix 2 – Membership Data

A. Vested members

Table 7 Membership Data - Contract Types 10-16: Vested Ordinary Life

AGE		MALES	FEMALES	TOTAL
50-59	Average Pension	514	614	576
	Number	13	21	34
	Average Age	56.1	56.3	56.2
60-69	Average Pension	685	702	695
	Number	187	243	430
	Average Age	65.9	65.9	65.9
70-79	Average Pension	594	554	582
	Number	3,276	1,472	4,748
	Average Age	76.6	75.7	76.3
80-89	Average Pension	669	566	641
	Number	11,788	4,338	16,126
	Average Age	84.7	85.0	84.8
90-100	Average Pension	716	530	640
	Number	4,547	3,181	7,728
	Average Age	92.7	93.4	93.0
100 +	Average Pension	808	483	583
	Number	62	140	202
	Average Age	101.9	102.2	102.1
Total Average Pension		668	554	632
Total Number		19,873	9,395	29,268
Total Average Age		85.0	86.1	85.4

Table 8 Membership Data - Contract Types 21-29: Vested Guaranteed

AGE		MALES	FEMALES	TOTAL
50-59	Average Pension	2,800	2,659	2,734
	Number	17	15	32
	Average Age	57.0	57.3	57.2
	Average guarantee	10.4	12.9	11.6
60-69	Average Pension	1,520	1,349	1,453
	Number	373	240	613
	Average Age	66.9	66.4	66.7
	Average guarantee	8.6	7.7	8.2
70-79	Average Pension	1,004	996	1,002
	Number	909	253	1,162
	Average Age	74.4	73.7	74.3
	Average guarantee	4.1	4.9	4.3
80-89	Average Pension	894	860	887
	Number	78	20	98
	Average Age	81.8	83.0	82.1
	Average guarantee	2.5	2.4	2.5
Total Average Pension		1,160	1,199	1,171
Total Number		1,377	528	1,905
Average Age		72.6	70.2	71.9
Average guarantee		5.3	6.3	5.6

Table 9 Membership Data - Contract Types 30-37: Vested Joint & Survivor

AGE		MALES	FEMALES	TOTAL
60-69	Average Pension	1,067	-	1,067
	Number	8	-	8
	Average Age	68.0	-	68.0
	Average Spouse Age	65.0	-	65.0
	Average Continuing Percentage	95%	-	95%
70-79	Average Pension	383	232	378
	Number	492	17	509
	Average Age	77.1	76.8	77.0
	Average Spouse Age	74.6	75.6	74.6
	Average Continuing Percentage	72%	73%	72%
80-89	Average Pension	673	355	667
	Number	1,245	24	1,269
	Average Age	84.0	82.9	83.9
	Average Spouse Age	80.8	83.5	80.9
	Average Continuing Percentage	76%	68%	75%
90+	Average Pension	709	985	713
	Number	208	3	211
	Average Age	92.0	92.3	92.0
	Average Spouse Age	87.5	93.3	87.6
	Average Continuing Percentage	76%	72%	76%
Total Average Pension		605	350	599
Total Number		1,953	44	1,997
Average Age		83.0	81.2	83.0
Average Spouse Age		79.9	81.1	79.9
Average Continuing Percentage		75%	70%	75%

Table 10 Membership Data - Contract Types 50 & 80: Vested Certain

Average Pension	1,119
Number	127
Average Certain Period	3.39

Table 11 Membership Data - Contract Type 60: Vested Temporary

	MALES	FEMALES	TOTAL
Average Pension	443	713	578
Number	5	5	10
Average Age	62.0	61.4	61.7
Average Period	3.0	3.6	3.3

Table 12 Membership Data - Contract Types 70-79: Vested Reducing

	MALES	FEMALES	TOTAL
Average Pension	2,874	3,697	3,269
Number	26	24	50
Average Reduced Pension	1,345	1,411	1,377
Average Age	61.2	62.0	61.5

B. Deferred Members

Table 13 Membership Data - Contract Types 10-16: Deferred Ordinary Life

	MALES	FEMALES	TOTAL
Average Pension	2,047	2,236	2,122
Number	9	6	15
Average Age	64.4	63.5	64.1

Table 14 Membership Data - Contract Types 21-24: Deferred Guaranteed

	MALES	FEMALES	TOTAL
Average Pension	1,799	1,440	1,672
Number	194	107	301
Average Age	60.7	59.7	60.3
Average Guarantee	14.0	14.1	14.1

C. Membership Reconciliation

Table 15 Membership Reconciliation

VESTED							
Contract Types	10-16	21-29	30-37	50&80	60	70-79	Total
31.03.2015 Count	31,987	2,202	2,190	176	8	62	36,625
Maturities	2	47	0	0	2	6	57
Transfers from/to Other Contract Types	506	(317)	(183)	12	0	(18)	0
Deaths or Expired Annuities ¹	(3,249)	(31)	(10)	(58)	0	0	(3,348)
Net CRF Transfers ²	22	4	0	(3)	0	0	23
31.03.2016 Count	29,268	1,905	1,997	127	10	50	33,357
DEFERRED							
31.03.2015 Count							396
Maturities							(57)
Deaths and Refunds							(17)
Net CRF Transfers							(6)
31.03.2016 Count							316

¹ The 3,348 Deaths or Expired Annuities are composed of 2,195 group certificates and 1,153 individual contracts.

² The 23 net CRF transfers are composed of 11 group certificates (net) and 12 individual contracts (net).

Appendix 3 – Sources of Data

Reports Required

The following are the reports used in order to perform the Government Annuities Account valuation. The main reports are provided by ESDC and Service Canada.

Membership Data

VY4741P1: Basic Vested Data

VY5141: Vested Annuitants to be added manually (Records to be completed using report VY4742P1)

GY5642: Basic Deferred Data

Service Canada also provides us with accurate pension amounts for plans 16, 37, 70-79, and 29, and additional data for plans 50 and 80. This data consists of pension amounts, reduced pension amounts where applicable, date of reduction and date of final payment. Even though the total actuarial liability is taken directly from VY5141 for plans 50 and 80, it must be individually calculated for purposes of gains and losses analysis.

Asset Data

VM3942: Vested benefit payments and maturities by period

GY5646, GM4741, and GM4742: Data related to refunds

Premiums paid are provided by the Annuity Accounting Division of ESDC.

Benefit payments are provided by the Annuity Accounting Division of ESDC.

The monthly VM3942 reports are extracted to reconcile the Annuity Accounting Division's benefit payments. Ultimately, the Annuity Accounting Division's figures are used for balance sheet purposes. The monthly GM4741 and GM4742 reports must be extracted for group and individual contracts.

Other Data

ESDC also provides balances for suspense accounts (GY5644 and GR3442), refunds in progress (GY5941) and suspended payments (VY5443).

Appendix 4 – Mortality Tables

Projection of Mortality

The mortality assumption is statutory, as stated in section 15 of the Improvement Act and subsection 3(4) of the Regulations. Mortality rates are to follow the Annuity Table for 1983, as modified by Projection Scale G published in Transactions of the Society of Actuaries, Vol. XXXV (1983), at pages 882 and 883. SOR/97-495, s. 2.

Accordingly, the IAM83 table is used for individual contracts and the GAM83 table is used for group contracts. Both tables are used on sex-distinct basis and are projected for 15 years with Projection Scale G. Furthermore, for consistency with the methodology used to develop these mortality tables, the liabilities were calculated based on the annuitants' attained age (age last) at the valuation date.

The following table shows the mortality rates as well as Projection scale G for selected attained ages:

Table 16 Mortality Rates

AGE	GAM83 ORIGINAL		IAM83 ORIGINAL		PROJECTION SCALE G		GAM83 PROJECTED		IAM83 PROJECTED	
	MALES	FEMALES	MALES	FEMALES	MALES	FEMALES	MALES	FEMALES	MALES	FEMALES
10	0.000293	0.000096	0.000382	0.000141	0.007500	0.012000	0.000262	0.000080	0.000341	0.000118
15	0.000325	0.000140	0.000435	0.000188	0.002200	0.007000	0.000314	0.000126	0.000421	0.000169
20	0.000377	0.000189	0.000505	0.000260	0.001400	0.005000	0.000369	0.000175	0.000494	0.000241
25	0.000464	0.000253	0.000622	0.000349	0.001000	0.006500	0.000457	0.000229	0.000613	0.000316
30	0.000607	0.000342	0.000759	0.000441	0.004900	0.010500	0.000564	0.000292	0.000705	0.000376
35	0.000860	0.000476	0.000917	0.000545	0.015000	0.018500	0.000686	0.000360	0.000731	0.000412
40	0.001238	0.000665	0.001341	0.000742	0.020000	0.022500	0.000914	0.000473	0.000990	0.000527
45	0.002183	0.001010	0.002399	0.001122	0.018500	0.021000	0.001650	0.000735	0.001813	0.000816
50	0.003909	0.001647	0.004057	0.001830	0.017500	0.020000	0.003000	0.001216	0.003113	0.001352
55	0.006131	0.002541	0.005994	0.002891	0.016000	0.018500	0.004813	0.001920	0.004706	0.002185
60	0.009158	0.004241	0.008338	0.004467	0.015000	0.017500	0.007300	0.003254	0.006647	0.003428
65	0.015592	0.007064	0.012851	0.007336	0.015000	0.017500	0.012429	0.005420	0.010244	0.005629
70	0.027530	0.012385	0.021371	0.011697	0.013500	0.017500	0.022452	0.009504	0.017429	0.008976
75	0.044597	0.023992	0.035046	0.020127	0.012500	0.016000	0.036929	0.018836	0.029020	0.015802
80	0.074070	0.042945	0.057026	0.036395	0.012500	0.015000	0.061334	0.034234	0.047220	0.029013
85	0.114836	0.069918	0.090987	0.065518	0.012500	0.015000	0.095090	0.055736	0.075342	0.052228
90	0.166307	0.111750	0.134887	0.113605	0.011000	0.013500	0.140882	0.091139	0.114265	0.092652
95	0.234086	0.182419	0.191214	0.174228	0.010000	0.012500	0.201328	0.151052	0.164455	0.144269
100	0.319185	0.295187	0.270906	0.239215	0.004000	0.005000	0.300561	0.273806	0.255099	0.221888
105	0.469531	0.487816	0.405278	0.353414	0.000000	0.000000	0.469531	0.487816	0.405278	0.353414
110	1.000000	1.000000	0.634814	0.584462	0.000000	0.000000	1.000000	1.000000	0.634814	0.584462

Life Expectancies

The following table shows life expectancies under the above-stated mortality assumption for selected attained ages:

Table 17 Life Expectancies

AGE	GROUP		INDIVIDUAL	
	MALES	FEMALES	MALES	FEMALES
15	65.4	71.8	67.1	72.2
20	60.5	66.8	62.2	67.3
25	55.6	61.9	57.4	62.4
30	50.7	57.0	52.5	57.5
35	45.9	52.1	47.7	52.6
40	41.0	47.2	42.9	47.7
45	36.2	42.3	38.1	42.8
50	31.6	37.5	33.5	38.0
55	27.1	32.7	29.1	33.3
60	22.8	28.1	24.8	28.7
65	18.7	23.6	20.7	24.3
70	15.0	19.3	16.9	20.0
75	11.8	15.3	13.5	16.0
80	9.1	11.9	10.5	12.4
85	7.0	9.1	8.1	9.3
90	5.3	6.6	6.2	6.9
95	4.0	4.6	4.6	5.1
100	2.8	2.9	3.2	3.6
105	1.9	1.9	2.2	2.5
110	1.0	1.0	1.5	1.6

Appendix 5 – Experience-Adjusted Mortality

The experience-adjusted mortality rates are based on the Canada Pension Plan retirement beneficiaries' mortality assumptions, as developed for the 26th Actuarial Report on the Canada Pension Plan as at 31 December 2012. These rates are further adjusted using a 3% load for males and a 4% load for females. Table 18 shows the development of actuarial liabilities under these rates while table 19 provides sample experience-adjusted mortality rates at different ages and for different years.

Table 18 Development of Actuarial Liabilities (with Experience-Adjusted Mortality)

Fiscal Year	Contract Type	2015 – 2016	2014 – 2015
<u>VESTED MEMBERS</u>			
Males, Ordinary Life	10 – 16	\$ 62,968,380	\$ 70,278,154
Females, Ordinary Life	10 – 16	27,840,330	30,180,344
Males, Guaranteed	21 – 29	14,264,066	16,011,227
Females, Guaranteed	21 – 29	6,457,426	6,676,069
Last Survivor	30 – 37	8,436,556	9,578,999
Reducing at OAS	70 – 79	1,070,273	1,129,778
Annuities Certain	50, 80	408,381	518,406
Temporary Annuities	60	14,915	12,395
Suspended Payments		20,047	30,771
VESTED TOTAL		121,480,375	134,416,144
<u>DEFERRED MEMBERS</u>			
Males, Ordinary Life	10	111,826	104,511
Females, Ordinary Life	10	133,505	134,869
Males, Guaranteed	21 - 24	3,184,416	3,768,914
Females, Guaranteed	21 - 24	1,509,431	1,826,958
Refunds in Process		0	21,268
Suspense Accounts	Account 721	64,428	1,162,883
DEFERRED TOTAL		5,003,607	7,019,402
TOTAL ACTUARIAL LIABILITIES		\$ 126,483,983	\$ 141,435,546

Table 19 Sample Mortality Rates (Experience-Adjusted Mortality)

AGE	Males				Females			
	2016-17	2026-27	2036-37	2046-47	2016-17	2026-27	2036-37	2046-47
50	0.003153	0.002832	0.002612	0.002411	0.002090	0.001903	0.001755	0.001620
55	0.004742	0.004186	0.003859	0.003561	0.003070	0.002753	0.002539	0.002343
60	0.005368	0.004648	0.004282	0.003950	0.003278	0.002903	0.002677	0.002476
65	0.011647	0.010086	0.009304	0.008577	0.007512	0.006652	0.006141	0.005663
70	0.017303	0.014826	0.013668	0.012611	0.011645	0.010314	0.009517	0.008783
75	0.028425	0.023941	0.022059	0.020375	0.019348	0.017114	0.015783	0.014574
80	0.049796	0.042419	0.039109	0.036121	0.034334	0.030399	0.028040	0.025892
85	0.087811	0.076668	0.071572	0.066909	0.062108	0.055749	0.052057	0.048666
90	0.154930	0.140849	0.134064	0.127801	0.114102	0.104632	0.099608	0.094964
95	0.246527	0.231955	0.224024	0.216545	0.201100	0.189118	0.182661	0.176583
100	0.335840	0.321253	0.311631	0.302360	0.305196	0.292212	0.283469	0.275083
105	0.423797	0.409612	0.397177	0.385153	0.411017	0.397751	0.386087	0.374664
110	0.541445	0.529551	0.516956	0.505052	0.515828	0.504933	0.493427	0.482174
115	0.658143	0.651390	0.643748	0.636165	0.618942	0.612314	0.605404	0.598383
120	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000