Office of the Superintendent of Financial Institutions Canada
Bureau du surintendant des institutions financières Canada

Office of the Chief Actuary
Bureau de l'actuaire en chef

ACTUARIAL REPORT

on the Pension Plan for the

PUBLIC SERVICE OF CANADA

as at 31 March 2011

Canada

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18 May 2012

The Honourable Tony Clement, P.C., M.P.
President of the Treasury Board
Ottawa, Canada
K1A 0R5

Dear Minister:

Pursuant to section 6 of the *Public Pensions Reporting Act*, I am pleased to submit the report on the actuarial review as at 31 March 2011 of the Public Service pension plan. This actuarial review is in respect of pension benefits and contributions which are defined by Parts I, III and IV of the *Public Service Superannuation Act*, the *Special Retirement Arrangements Act* and the *Pension Benefits Division Act*.

Yours sincerely,

Jean-Claude Ménard

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Chief Actuary
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I. Executive Summary

This actuarial report on the pension plan for the Public Service of Canada (PS) was made pursuant to the *Public Pensions Reporting Act* (PPRA).

This actuarial valuation is as at 31 March 2011 and is in respect of pension benefits and contributions defined by Parts I, III, and IV of the *Public Service Superannuation Act* (PSSA), the *Special Retirement Arrangements Act*, which covers the Retirement Compensation Arrangement (RCA) and the *Pension Benefits Division Act* (PBDA).

The previous actuarial report was made as at 31 March 2008. The date of the next periodic review is scheduled to occur no later than 31 March 2014.

A. Purpose of Actuarial Report

The purpose of this actuarial valuation is to determine the state of the Public Service Superannuation Account, Pension Fund and Retirement Compensation Arrangements Accounts as well as to assist the President of the Treasury Board in making informed decisions regarding the financing of the government's pension benefit obligation.

B. Valuation Basis

There have been no changes to the plan provisions since the previous valuation. This report is based on pension benefit provisions enacted by legislation, summarized in Appendices 1 and 2.

The financial data on which this valuation is based are composed of invested assets (Pension Fund) which the government has earmarked for the payment of benefits for service since 1 April 2000, and accounts available for benefits established to track government's pension benefit obligations such as the Superannuation Account, for service prior to 1 April 2000, and the RCA Account for benefits in excess of those that can be provided under the *Income Tax Act* limits for registered pension plans. These pension assets and accounts available for benefits are summarized in Appendix 3. The membership data is summarized in Appendix 4.

The valuation was prepared using accepted actuarial practices in Canada, methods and assumptions which are summarized in Appendices 5 to 8.

All actuarial assumptions used in this report are best-estimate assumptions. They are individually reasonable for the purposes of the valuation at the date of this report.

Actuarial assumptions used in the previous report were revised based on economic trends and demographic experience. A complete description of the assumptions is shown in Appendices 6 to 8. The following table presents a summary of the ultimate economic assumptions used in this report and a comparison with those used in the previous report.

Table 1 Ultimate Best-Estimate Economic Assumptions

	31 March 2011	31 March 2008
Assumed level of inflation	2.3%	2.4%
Real increase in average pensionable earnings	1.2%	1.1%
Real rate of return on the Pension Fund	4.1%	4.3%
Real rate of return on the Superannuation Account	2.7%	2.8%

C. Main Findings

The proposed amounts to be credited to (or debited from) the accounts and the Pension Fund are shown on a calendar year basis in this section beginning with calendar year 2013, which is the first calendar year that follows the expected tabling of this report. Valuation results on a plan year[1] basis are shown in Section II.

1) PSSA – Superannuation Account (Service prior to 1 April 2000)

As at 31 March 2011, the total of the amounts available for benefits payable under the Account is $95,927 million and the actuarial liability for service prior[2] to 1 April 2000 is $93,057 million. The total of the amounts available for benefits is less than 110% of the corresponding actuarial liability; it is 103% of the actuarial liability. The surplus of the total of the amounts available for benefits over the actuarial liabilities is $2,870 million.

2) PSSA – Pension Fund (Service since 1 April 2000)

a) Current Service Cost[3]

The PSSA total normal cost, borne jointly by the contributors and the government, is $4,297 million for calendar year 2013. The estimated members'[4] contributions are $1,558 million and the estimated government contributions are $2,739 million for calendar year 2013. The Pension Fund administrative expenses are $32 million (included in the total current service cost) for calendar year 2013. The following table shows the projected current service cost expressed as a percentage of the expected pensionable payroll[5] for the three calendar years following the expected laying date of this report. The ratio of government current service cost to contributors current service cost is also shown.

Projected current service costs shown in this table are based on the member contribution rates shown in Appendix 1.

Table 2 PSSA Current Service Cost on a Calendar Year Basis

Calendar Year	Current Service Cost as a percentage of pensionable payroll			Ratio of Government to Contributors Current Service Cost
	Contributors	Government	Total	
2013	7.28	12.79	20.07	1.76
2014	7.51	12.70	20.21	1.69
2015	7.57	12.69	20.26	1.68

b) Financial position and amortization of actuarial surplus (deficit)

As at 31 March 2011, the value of the assets in respect of the Pension Fund is $42,425 million and the actuarial liability is $46,849 million, resulting in an actuarial deficit of $4,424 million.

1 Any reference to a given plan year in this report should be taken as the 12-month period ending 31 March of the given year.
2 The actuarial liability for service prior to 1 April 2000 refers to the actuarial liability for service accrued prior to that date except for service elections since 1 April 2000 that are deemed to be service accrued since that date.
3 Also called normal cost.
4 Any reference to *member* in this report should be read as *contributor* as defined in the PSSA.
5 Pensionable payroll means the aggregate of pensionable earnings of all contributors with less than 35 years of service.

In accordance with the PSSA, the deficit of $3,659 million could be amortized in 15 equal annual special payments of $397[1] million beginning on 31 March 2013.

c) Non-permitted actuarial surplus

If there exists in the opinion of the President of the Treasury Board a non-permitted actuarial surplus[2] in the Pension Fund, any future contributions to the Fund may be reduced in a manner determined by the President or the non-permitted actuarial surplus may be paid out of the Fund and into the Consolidated Revenue Fund. As at 31 March 2011, a non-permitted actuarial surplus does not exist.

3) RCA No. 1 Account

As at 31 March 2011, the total of the amounts available for benefits payable under the Account is $1,648 million and the actuarial liability is $1,581 million resulting in an actuarial excess of $67 million.

The total current service cost, borne jointly by the contributors and the government, is 0.38% of pensionable payroll for calendar year 2013 and is estimated to be 0.38% of pensionable payroll for the following two plan years. The following table shows the projected current service costs for the three calendar years following the expected laying of this report. The ratio of government current service cost to contributors current service cost is also shown.

Table 3 RCA No. 1 Current Service Cost on a Calendar Year Basis

Calendar Year	Current Service Cost ($ millions) Contributors	Government	Total	Ratio of Government to Contributors Current Service Cost
2013	9	73	82	8.1
2014	9	74	83	8.2
2015	9	76	85	8.4

4) RCA No. 2 Account

As at 31 March 2011, the total of the amounts available for benefits payable under the Account is $1,568 million and the actuarial liability is $1,664 million resulting in an actuarial deficit of $96 million.

In accordance with the PSSA, the $96 million deficit could be amortized in 15 equal annual special payments of $8 million beginning on 31 March 2013, after taking into consideration the special payment of $6.2 million scheduled to be made on 31 March 2012.

1 The actuarial smoothing adjustment of $765 million is ignored to calculate the amortization payments. (See page 11).
2 A non-permitted actuarial surplus exists when the amount by which the actuarial value of assets exceeds liabilities for service since 1 April 2000 is greater than the lesser of (a) and (b), where:
(a) is 20% of the amount of liabilities for service since 1 April 2000, and
(b) is the greater of (i) and (ii) where:
(i) is twice the estimated amount, for the calendar year following the date of that report, of the total of
(A) the current service cost contributions that would be required of contributors, and
(B) the current service cost contributions that would be required of the government, and
(ii) is 10% of the amount of liabilities for service since 1 April 2000.

II. Valuation Results

This report is based on pension benefit provisions enacted by legislation, summarized in Appendices 1 and 2, and the financial and membership data, summarized in Appendices 3 and 4. The valuation was prepared using accepted actuarial practices in Canada, methods and assumptions summarized in Appendices 5 to 8. Emerging experience, differing from the corresponding assumptions, will result in gains or losses to be revealed in subsequent reports.

Projections of the Superannuation Account and Pension Fund financial positions are shown in Appendices 9 and 10, respectively.

A. PSSA - Financial Position

Beginning on 1 April 2000, employer and employee contributions to the Public Service pension plan are no longer credited to the Public Service Superannuation Account. Rather, they are credited to the Public Service Pension Fund, and an amount equal to contributions net of the benefits paid and the administrative expenses is transferred to the Public Sector Pension Investment Board (PSPIB) and invested in the financial markets. The valuation results of this section show the financial position for both PSSA financing arrangements as at 31 March 2011. The results of the previous valuation are also shown for comparison purposes.

Table 4 Balance Sheet - Superannuation account
(Service prior to 1 April 2000)
($ millions)

	31 March 2011	31 March 2008
Recorded Account balance	95,782	91,279
Present value of prior service contributions	145	275
Total	95,927	91,554
Actuarial Liability		
Active contributors	29,860	34,132
Non-active contributors	733	322
Retirement pensioners	53,296	43,896
Termination with no option	96	172
Disability pensioners	2,334	2,106
Surviving dependents	6,083	5,488
Outstanding payments	-	28
Administrative expenses	628	666
Pension Modernization Cost	27	134
Total Actuarial Liability	93,057	86,944
Actuarial Excess/(Shortfall)	2,870	4,610

Table 5 Balance Sheet - Pension Fund
(Service Since 1 April 2000)
($ millions)

	31 March 2011	31 March 2008
Assets		
Market value of assets	42,530	28,398
Actuarial smoothing adjustment	(765)	91
Present value of prior service contributions	660	511
Total assets	42,425	29,000
Actuarial Liability		
Active contributors	36,912	23,600
Non-active contributors	449	144
Retirement pensioners	8,814	3,883
Termination with no option	38	67
Disability pensioners	458	192
Surviving dependents	165	71
Outstanding payments	-	20
Pension Modernization Cost	13	51
Total Actuarial Liability	46,849	28,028
Actuarial Surplus/(Deficit)	(4,424)	972

The actuarial smoothing adjustment to the market value of assets is not taken into account to calculate the special payment to amortize the actuarial deficit. Therefore, the actuarial deficit of $3,659 million could be amortized in 15 equal annual payments of $397 million beginning on 31 March 2013 such that the projected value of assets would be equal to the projected value of liabilities in 15 years.

The actuarial smoothing adjustment of $765 million will disappear over the next five years as the unrecognized investment gains will be gradually recognized.

B. PSSA - Reconciliation of the Changes in Financial Position

This section reconciles the changes in the financial position in respect of the Superannuation Account and the Pension Fund shown in this valuation using the main elements responsible for the changes. The items shown are explained afterward.

Table 6 Reconciliation of PSSA Financial position
($ millions)

	Superannuation Account Actuarial Excess	Pension Fund Actuarial Surplus/(Deficit)
As at 31 March 2008	4,610	972
Recognized investment losses as at 31 March 2008	-	(91)
Change in methodology	(173)	(141)
Retroactive changes to the population data	(246)	(457)
Expected interest on initial financial position	919	54
Net experience gains and losses	583	(2,717)
Revision of actuarial assumptions	(2,737)	(1,510)
Change in the present value of administrative expenses	4	-
Change in the present value of the Pension Modernization Cost	(18)	(9)
Change in the present value of prior service contributions	(23)	304
Expected retroactive salary increases	(49)	(63)
Unrecognized investment gains as at 31 March 2011	-	(765)
As at 31 March 2011	2,870	(4,424)

1) Unrecognized Investment Losses as at 31 March 2008

An actuarial asset valuation method that minimizes the impact of short-term fluctuations in the market value of assets was used in the previous valuation report, causing the actuarial value of the Pension Fund assets to be $91 million more than their market value.

2) Change in Methodology

A technical error was uncovered during the current actuarial review. The newly developed promotional and seniority salary increases assumption of the previous report was not implemented fully and the result was that the projected salary increases were lower than those anticipated. The net impact of the correction of the error resulted in an increase the actuarial liabilities of $173 million and $141 million respectively in both the Superannuation Account and the Pension Fund.

3) Retroactive Changes to the Population Data

The population data maintained by Public Works Government Services Canada (PWGSC) is constantly subject to retroactive changes due mostly to new bargaining agreements. Approximately 80,000 contributors had a 2.3% retroactive economic salary increase during plan year 2008 which resulted in an increase in the actuarial liabilities of $246 million and $457 million respectively in both the Superannuation Account and the Pension Fund.

4) Expected Interest on Initial Financial Position

After factoring the change in methodology and the retroactive changes to the population data items mentioned previously, the expected interest to 31 March 2011 on the Account actuarial excess of $4,191 million as at 31 March 2008 amounted to $919 million. After recognizing the change in methodology, the retroactive changes to the population data and the investment losses items, the expected interest to 31 March 2011 on the resulting Pension Fund actuarial surplus of $283 million as at 31 March 2008 amounted to $54 million. These amounts of interest were based on the Account and Fund yields projected in the previous report for the three-year intervaluation period.

5) Experience Gains and Losses

Since the previous valuation, experience gains and losses have increased the Superannuation Account actuarial excess by $583 million and have decreased the Pension Fund actuarial surplus by $2,717 million. The main items are described in the following table.

Table 7 Net Experience Gains and Losses
($ millions)

	Superannuation Account	Pension Fund
Demographic experience (i)		
New members	(41)	(203)
Retirements	(90)	186
Non-disabled pensioner terminations	88	84
Deaths with an annuity	9	22
Terminations with an annuity	16	21
Non-disabled pensioner deaths	(159)	(13)
Deaths with a return of contributions or a transfer value	(22)	(13)
Terminations with a return of contributions or a transfer value	(104)	(10)
Disabilities with an annuity	(21)	(5)
Disabled pensioner deaths	17	2
Widow(er) deaths	(68)	0
Total	(375)	71
Investment earnings (ii)	(141)	(2,823)
Promotional and seniority increases (iii)	145	(312)
Cost/contributions difference (iv)	54	175
Pension indexation (v)	1,227	133
Expected/actual disbursements (vi)	(203)	(34)
YMPE increases	31	29
Administrative expenses	44	15
Pension Benefit Division	(38)	(13)
Miscellaneous	(161)	42
Experience Gains and Losses	583	(2,717)

(i) The net impact of the demographic experience increased the Account actuarial liabilities by $375 million and reduced the Fund actuarial liabilities by $71 million. Lower expected deaths amongst healthy pensioner as well as lower than anticipated terminations with a return of contributions or the commuted value of the accrued pension accounted for most of the impact on the Account actuarial liabilities while larger than expected population increases impacted the Pension Fund actuarial liabilities.

(ii) The rates of interest credited to the Account were in aggregate smaller than the corresponding projected Account yields in the previous valuation; consequently the experience loss was $141 million. The global economy and financial markets took a turn for the worst during plan year 2009, showing a -22.7% return, and even though the markets rebounded during plans 2010 and 2011 with positive returns of 21.5% and 14.5%, the Pension Fund experienced an investment loss of $2,823 million over the three-year intervaluation period.

(iii) Lower than expected promotional salary increases for long term service members resulted in a decrease of $145 million in the Account actuarial liabilities while higher than expected promotional salary increases for short term service members resulted in an increase of $312 million in the Fund actuarial liabilities.

(iv) Higher than expected contributions, mostly from the higher than anticipated number of new entrants, resulted in an increase of $54 million in the Account excess and a decrease of $175 million in the Pension Fund actuarial deficit.

(v) The January 2010 and 2011 pension benefit indexation were lower than the projected pension indexing by 1.5% and 0.6% respectively, which resulted in a $1,227 million increase in the Account actuarial excess. The impact on the Fund actuarial deficit was a decrease of $133 million.

(vi) Greater than anticipated pension payments resulted in a decrease of $203 million in the Account excess and an increase of $34 million in the Fund actuarial deficit.

6) Revision of Actuarial Assumptions

Actuarial assumptions were revised based on economic trends and demographic experience as described in Appendices 6and 7. This revision has increased the Superannuation Account actuarial liability by $2,737 million and increased the Pension Fund actuarial liability by $1,510 million. The impact of these revisions is shown in table 8 on the following page where the most significant items are discussed thereafter.

Table 8 Revision of Actuarial Assumptions
($ millions)

Assumption	Superannuation Account	Pension Fund
Economic assumptions	(1,249)	(1,258)
Mortality improvement factors	(1,133)	(684)
Survivor mortality rates	(435)	0
Pensionable retirements	415	443
Pensioners mortality rates	(391)	85
Proportion married at death	86	30
Withdrawals	(40)	(187)
Seniority and promotional salary increases	26	74
Other items	(16)	(13)
Net impact of revision	(2,737)	(1,510)

The net impact of the revision of the assumptions is largely attributable to the changes in economic assumptions as well as the new mortality improvements factors. As described in Appendix 6, all economic assumptions made in the previous valuation were revised, with the most important being as follows:

- ultimate level of inflation lowered from 2.4% to 2.3%;
- ultimate real increase in average earnings increased from 1.1% to 1.2%;
- ultimate real rate of return on the Pension Fund lowered from 4.3% to 4.1%;
- ultimate real rate of return on the Superannuation Account lowered from 2.8% to 2.7%

7) Change in the present value of prior service contributions

The expected total government cost is shown in table 19 of page 20. The government is expected to make additional contributions in excess of the current service cost for members expected prior service elections. The change in the present value of prior service contributions corresponds to members' elections since the last report where the members opted to pay for these elections by instalments. Members' prior service elections paid through instalments have the effect of increasing the Fund assets by $304 million.

8) Unrecognized Investment Gains

The actuarial asset valuation method described in the 2008 valuation report, which role is to minimize the impact of short-term fluctuations in the market value of assets, was used for this valuation. For this valuation, the method caused the actuarial value of assets to be $765 million less than the market value of the Pension Fund assets as at 31 March 2011.

C. PSSA - Cost Certificate

1) Current Service Cost

The details of the current service cost for plan year 2012 and reconciliation with the 2009 current service cost are shown below.

Table 9 Current Service Cost for Plan Year 2012
($ millions)

Member required contributions	1,389
Government current service cost	2,698
Total current service cost	4,087
Expected pensionable payroll	20,677
Total current service cost as % of expected pensionable payroll	19.76%

Table 10 Reconciliation of PSSA Current Service Cost
(% percentage of pensionable payroll)

For plan year 2009	18.46
Expected current service cost change	0.47
Change in demographics	0.05
Changes in assumptions	
Economic assumptions	0.53
Mortality improvement factors	0.36
Withdrawals	0.21
Pensioners mortality rates	(0.10)
Pensionable retirements	(0.22)
For plan year 2012	19.76

2) Projection of Current Service Costs

The current service cost is borne jointly by the members and the government. The member contribution rates have been changed since the last valuation. They are as follows:

Table 11 Member Contribution Rates

Calendar year	Below YMPE	Above YMPE
2011	5.80%	8.40%
2012	6.20%	8.60%
2013	6.60%	8.80%
2014	6.90%	9.00%

Contributions rates beyond 2014 are assumed to remain constant. The following PSSA current service costs in dollar amount are also expressed as a percentage of the projected pensionable payroll in each given plan year. Current service costs are shown below on a plan year basis; member contributions and the government current service costs are also shown on a calendar year basis in the Executive Summary.

Table 12 Projection of Current Service Cost

Plan Year	Current Service Cost ($ millions)			Current Service Cost as a % of Pensionable Payroll			Portion Borne by Contributors: Government
	Contributors	Government	Total	Contributors	Government	Total	
2012	1,389	2,698	4,087	6.72	13.05	19.77	34% : 66%
2013	1,486	2,721	4,207	7.04	12.89	19.93	35% : 65%
2014	1,583	2,744	4,327	7.36	12.76	20.12	37% : 63%
2015	1,659	2,779	4,438	7.56	12.68	20.24	37% : 63%
2016	1,713	2,870	4,583	7.58	12.70	20.28	37% : 63%
2021	2,171	3,739	5,910	7.61	13.10	20.71	37% : 63%
2026	2,786	4,871	7,657	7.63	13.34	20.97	36% : 64%

3) Administrative Expenses

Based upon the assumptions described in section B of Appendix 7, the Fund administrative expenses are included in the total current service costs. As in the previous report, the expected administrative expenses exclude the PSPIB operating expenses as these are recognized implicitly through a decrease in the real rate of return. The Fund administrative expenses are estimated to be as follows:

Table 13 Pension Fund Administrative Expenses

Plan Year	($ millions)
2012	26.5
2013	29.4
2014	32.3
2015	35.4

The Account administrative expenses have been capitalized and are shown as a liability in the balance sheet.

4) Contributions for Prior Service Elections

Contributions for prior service elections are based upon the valuation data and the assumptions described in section B of Appendix 7. They were estimated as follows:

Table 14 Estimated Contributions for Prior Service
($ millions)

Plan Year	Superannuation Account		Pension Fund	
	Contributors	Government	Contributors	Government
2012	21	20	101	158
2013	18	17	104	159
2014	15	14	109	163

D. PSSA - Sensitivity to Variations in Key Assumptions

This pension plan actuarial report is based on the projection of assets and accounts available for benefits and liabilities over a long period of time. The information required by statute, which is presented in the main report, has been derived using best-estimate assumptions regarding future demographic and economic trends. The key best-estimate assumptions, i.e. those for which changes within a reasonable range have the most significant impact on the long-term financial results, are described in Appendices 6 and 7. Given the length of the projection period and the number of assumptions required, it is unlikely that the actual experience will develop precisely in accordance with best-estimate assumptions that underlie the actuarial estimates. Individual sensitivity tests have been performed that consist of projections of the pension plan's financial status using alternative assumptions.

The following table measures the effect on the plan year 2012 current service cost, the liabilities for service prior to 1 April 2000 and for service since that date, if key economic assumptions are varied by one percentage point per annum from plan year 2012 onward.

Table 15 Sensitivity of Valuation Results

			Actuarial Liability ($ millions)			
	Current Service Cost (%)		Service prior to April 2000		Service since April 2000	
Assumption(s) Varied	2012	Effect		Effect		Effect
None (i.e. current basis)	19.76	None	93,057	None	46,849	None
Investment yield						
- if 1% higher	15.68	(4.09)	82,100	(10,957)	38,704	(8,145)
- if 1% lower	23.83	4.06	106,680	13,623	55,407	8,558
Inflation						
- if 1% higher	22.38	2.62	103,770	10,713	52,788	5,939
- if 1% lower	17.62	(2.15)	84,076	(8,981)	41,933	(4,916)
Salary, YMPE and MPE						
- if 1% higher	22.01	2.25	94,391	1,333	50,350	3,501
- if 1% lower	17.86	(1.90)	91,832	(1,225)	43,823	(3,026)
All economic assumptions						
- if 1% higher	19.44	(0.32)	91,964	(1,093)	46,169	(680)
- if 1% lower	20.25	0.49	94,525	1,467	47,612	763

The differences between the results above and those shown in the valuation can also serve as a basis for approximating the effect of other numerical variations in a key assumption to the extent that such effects are linear.

E. RCA - Valuation Results

The valuation results of this section show the financial position of the RCA financing arrangements as at 31 March 2011. The results of the previous valuation are also shown for comparison purposes.

1) Balance Sheets

Table 16 RCA No. 1 - Balance Sheet
($ millions)

	31 March 2011	31 March 2008
RCA No.1 Recorded Account balance	837	644
Tax credit (CRA refundable tax)	811	629
Total	1,648	1,273
Actuarial Liability	-	-
Pensionable excess earnings		
• Active contributors	729	517
• Pensioners	386	241
Survivor Allowance		
• Active contributors	155	131
• Pensioners	289	205
Former deputy heads	22	20
Total Actuarial Liability	1,581	1,114
Actuarial Excess/(Shortfall)	67	159

The sum of the recorded balance of the RCA No. 1 Account and tax credit (Canada Revenue Agency (CRA) refundable tax) is $1,648 million; it exceeds the actuarial liability of $1,581 million by $67 million as at 31 March 2011 ($159 million as at 31 March 2008).

Table 17 RCA No. 2 - Balance Sheet
($ millions)

	31 March 2011	31 March 2008
RCA No.2 Recorded Account balance	783	819
Tax credit (CRA refundable tax)	785	816
Total	1,568	1,635
Actuarial Liability	1,664	1,711
Actuarial Excess/(Shortfall)	(96)	(76)

Since the last valuation as at 31 March 2008 the RCA No. 2 Account actuarial deficit of $76 million has augmented by $20 million to reach $96 million as at 31 March 2011. Based upon half the yield projected on the Superannuation Account shown in Appendix 6 and after taking into account the actuarial adjustment liability payment of the $6.2 million scheduled to be made on 31 March 2012, the $96 million deficit could be amortized over the maximum period of 15 years provided for in the PSSA in annual equal instalments of $8 million beginning on 31 March 2013.

2) RCA No. 1 Current Service Cost

The projected current service cost, borne jointly by the contributors and the government, of 0.43% for plan year 2012 calculated in the previous valuation has decreased by 0.05% to 0.38% of pensionable payroll in this valuation.

The RCA No. 1 current service cost for plan year 2012 is estimated to remain constant at 0.38% of pensionable payroll for plan years 2013 and 2014.

The following table shows the estimated RCA No. 1 current service cost for the next three plan years.

Table 18 RCA No. 1 - Current Service Costs
($ millions)

Plan Year	2012	2013	2014
Total current service cost			
Pensionable excess earnings	61.7	63.4	64.8
Survivor Allowance	17.1	17.4	17.5
Former deputy heads	0.3	0.3	0.1
Total	79.1	81.1	82.4
Member contributions			
Pensionable excess earnings	8.7	8.4	8.5
Former deputy heads	0.1	0.1	0.1
Total Member Contributions	8.8	8.5	8.6
Government current service cost	70.3	72.6	73.8
Current service cost as % of total pensionable payroll	0.38%	0.38%	0.38%

F. Summary of Estimated Government Costs

The following table summarizes the estimated total government costs on a plan year basis.

Table 19 Estimated Government Cost
($ millions)

Plan Year	Current Service Cost		Minimum Special Payments		Total Prior Service Contributions	Total Government Cost
	PSSA	RCA No. 1	PSSA	RCA No. 2		
2012	2,698	70	-	6	179	2,953
2013	2,722	73	397	8	176	3,376
2014	2,744	74	397	8	177	3,400

III. Actuarial Opinion

In our opinion, considering that this report was prepared pursuant to the *Public Pensions Reporting Act*,

- the valuation input data on which the valuation is based are sufficient and reliable for the purposes of the valuation;
- the assumptions that have been used are, individually and in aggregate, appropriate for the purposes of the valuation;
- the methods employed are appropriate for the purposes of the valuation; and
- this report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada.

In particular, this report was prepared in accordance with the Standards of Practice (General Standards and Practice – Specific Standards for Pension Plans) published by the Canadian Institute of Actuaries.

To the best of our knowledge, after inquiring with Public Works Government Services Canada and the Treasury Board of Canada Secretariat, there were no subsequent events between the valuation date and the date of this report that would have a material impact on the results of this valuation.

The payment of accrued pension benefits being the responsibility of the government, the likelihood of the plan being wound-up and its obligation not being fulfilled is practically nonexistent; also the PSSA does not define the benefits payable upon wind-up. Therefore, a hypothetical wind-up valuation has not been performed.

Daniel Hébert

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Senior Actuary

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Chief Actuary

Ottawa, Canada
18 May 2012

Appendix 1 – Summary of Pension Benefit Provisions

The government has been providing its employees with a pension plan since 1870. Pensions for members of the Public Service are provided primarily under the *Public Service Superannuation Act* (PSSA) as enacted in 1954 and modified thereafter. Benefits are also provided to public servants under the *Special Retirement Arrangements Act*. Benefits may be modified in accordance with the *Pension Benefits Division Act* if there is a breakdown of a spousal union.

Changes since the last valuation

The previous valuation report was based on the pension benefit provisions as they stood as at 31 March 2008. Except for the 2012 member contribution rates shown below, there were no changes to the plan provisions since the last valuation.

Summary of Pension Benefit Provisions

Summarized in this Appendix are the pension benefits provided under the PSSA registered provisions which are in compliance with the *Income Tax Act*. The portion of the benefits in excess of the *Income Tax Act* limits for registered pension plans is provided under the retirement compensation arrangements described in Appendix 2.

The legislation shall prevail if there is a discrepancy between it and this summary.

A. Membership

Subject to the exceptions mentioned in the next paragraph, membership in the plan is compulsory for all full-time and part-time employees working 12 or more hours per week (except those who were grandfathered as at 4 July 1994) in the Public Service. This includes all positions in any department or portion of:

- the executive government of Canada;
- the Senate and the House of Commons;
- the Library of Parliament; and
- any board, commission or corporation listed in a Schedule to the Act, as well as those designated as contributors by the President of the Treasury Board either individually or as members of a class for persons engaged as seasonal employees and some others.

The main groups of persons employed in the Public Service to which the Act does not apply are:

- part-time employees working less than 12 hours per week;
- persons locally engaged outside Canada;
- employees of some Crown corporations, boards or commissions covered by their own pension plans; and
- seasonal employees, and some others, unless designated as contributors by the President of the Treasury Board.

Since the previous valuation no entities have left the plan.

B. Contributions

1. Members

During the first 35 years of pensionable service, members contribute according to the rates shown in the following table.

Calendar Year	2011	2012	2013	2014
Contribution rates on earnings **up to** the maximum covered by the CPP/QPP	5.8%	6.2%	6.6%	6.9%
Contribution rates on any earnings **over** the maximum covered by the CPP/QPP	8.4%	8.6%	8.8%	9.0%

The rates beyond 2012 have been changed from the previous report and are consistent with previously stated government objective of moving to a 60:40 current service cost sharing ratio. Rates beyond 2014 are assumed to remain constant.

After 35 years of pensionable service, members contribute only 1% of pensionable earnings.

In order to keep their rights to an early retirement benefit, “deemed operational” members of CSC contribute an additional 0.625% of total earnings during a calendar year in addition to the above contribution rates.

2. Government

a) Current Service

The government determines the normal monthly contribution as that amount, which when combined with the required contributions by members in respect of current service, is sufficient to cover the cost, as estimated by the President of the Treasury Board, of all future benefits that have accrued in respect of pensionable service during that month and the Fund administrative expenses incurred during that month.

b) Elected Prior Service

The government matches member contributions made to the Superannuation Account for prior service elections; however, it makes no contributions if the member is paying the double rate.

Government credits to the Pension Fund in respect of elected prior service are as described for current service; however, the government contributes only 75% of the member contribution if the member is paying the double rate.

c) Excess Notional Assets and Actuarial Surplus

Bill C-78, which received Royal Assent on 14 September 1999, gives the government the authority to:

- debit the excess of the balance of the Superannuation Account over the actuarial liability subject to limitations, and

- deal with any actuarial surplus, subject to limitations, in the Pension Fund as they occur, either by reducing employee and/or employer contributions or by making withdrawals.

d) Actuarial Deficit

If an actuarial deficit is identified through a statutory actuarial report, the Superannuation Account and/or the Pension Fund are to be credited with such annual amounts that in the opinion of the President of the Treasury Board will fully amortize the actuarial deficit over a period not exceeding 15 years.

C. Summary Description of Benefits

The objective of the PSSA pension plan is to provide an employment earnings-related lifetime retirement pension to eligible members. Benefits to members in case of disability and to the spouse and children in case of death are also provided.

Subject to coordination with the pensions paid by the Canada Pension Plan (CPP) or the Québec Pension Plan (QPP), the initial rate of retirement pension is equal to 2% of the highest average of annual pensionable earnings over any period of five consecutive years, multiplied by the number of years of pensionable service not exceeding 35. Once in pay, the pension is indexed annually with the Consumer Price Index. Such indexation also applies to deferred pensions during the deferral period.

Detailed notes on the following overview are provided in the following section.

Contributor's Type of Termination	Benefit
With less than two years of service[1]	Return of contributions
With two or more years of service[1]**; and**	
▪ Disability	Immediate annuity
▪ Death leaving no surviving spouse or eligible children	Minimum benefit
▪ Death leaving surviving spouse and/or eligible children	Survivor allowance(s)
▪ Leaving prior to age 45, except for death or disability	
- Actual operational service between 20 and 25 years	Actual operational service annual allowance[2]
- Actual operational service 25 years or more	Immediate annuity
- Otherwise	Deferred annuity or transfer value
▪ Leaving at ages 45 to 49, except for death or disability, and	
- Deemed operational service 20 years or more	Deemed operational service annual allowance[3]
- Actual operational service between 20 and 25 years	Actual operational service annual allowance[2]
- Actual operational service 25 years or more	Immediate annuity
- Otherwise	Deferred annuity or transfer value
▪ Leaving at age 50 or over, except for death or disability, and	
- Deemed operational service between 20 and 25 years	Deemed operational service annual allowance[3]
- Deemed operational service 25 years or more	Immediate annuity
- Actual operational service between 20 and 25 years	Actual operational service annual allowance[2]
- Actual operational service 25 years or more	Immediate annuity
- Otherwise, but age 60 or over, or age 55 or over and service 30 years or more	Immediate annuity
- Otherwise	Deferred annuity or annual allowance

Deferred and Immediate Pensioner's Type of Termination	Benefit
▪ Disability before age 60 while entitled to a deferred annuity or an annual allowance	Immediate annuity
▪ Death leaving no eligible survivor	Minimum benefit
▪ Death leaving eligible survivor(s)	Survivor allowance(s)

1 Thresholds are determined using total pensionable service, including operational service.
2 Based on actual operational service only. Additional non-operational and/or deemed operational service, if any, results in the applicable non-operational benefit and/or deemed operational benefit (see Note 10).
3 Based on deemed operational service only. Additional non-operational service, if any, results in the applicable non-operational benefit (see Note 9).

D. Explanatory Notes

1. Pensionable Earnings

Pensionable earnings mean the annual employment earnings (excluding overtime but including pensionable allowances such as bilingual bonuses) of a contributor.

Pensionable payroll means the aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.

2. Indexation

a) Level of Indexation Adjustments
All immediate and deferred annuities (pensions and allowances) are adjusted every January to the extent warranted by the increase, as at 30 September of the previous year, in the 12-month average Consumer Price Index relative to the corresponding figure one year earlier. If the indicated adjustment is negative, annuities are not decreased for that year; however, it is carried-forward and the next positive adjustment is diminished accordingly.

b) First Indexation Adjustment
Indexation adjustments accrue from the end of the month in which employment terminates. The first annual adjustment following termination of employment is prorated accordingly.

c) Commencement of Indexation Payments
The indexation portion of a retirement, disability or survivor pension normally starts being paid when the pension is put into pay. However, regarding an operational service retirement pension, indexation payments start only when the pensioner is either

- at least 55 years old, provided the sum of age and pensionable service is at least 85; or
- at least 60 years old.

3. Pensionable Service, Actual Operational Service and Deemed Operational Service

Pensionable service of a contributor includes any period of service in the Public Service for which the contributor has been required to contribute or has elected to contribute, if eligible to do so, and such other types of service for which the contributor has elected to make the required special contributions to the Public Service Superannuation Account or Pension Fund. Pensionable service is limited to 35 years.

Actual operational service refers to CSC employees working in federal correctional facilities, parole offices, and community correctional centres. More specifically, operational service is defined as service by a person employed by CSC whose principal place of work is not: the national headquarters or a regional headquarters of CSC; the offices of the CSC Commissioner; or a regional CSC Staff College or any other institution that provides similar training to CSC employees.

Deemed operational service refers to CSC employees in operational service for one or more periods totalling at least 10 years, who then cease to be engaged in operational service but continue to be employed by CSC and elect to continue to accumulate operational service and contribute an additional 0.625% of earnings.

4. **Return of Contributions**

Return of contributions means the payment of an amount equal to the accumulated current and prior service contributions paid or transferred by the contributor into the plan. Interest is credited quarterly on returned contributions in accordance with the investment return on the Pension Fund.

5. **Immediate Annuity**

Immediate annuity means an unreduced pension that becomes payable immediately upon a pensionable retirement or pensionable disability. The annual amount is equal to 2% of the highest average of annual pensionable earnings of the contributor over any period of five[1] consecutive years, multiplied by the number of years of pensionable service not exceeding 35. For contributors with periods of part-time pensionable service, earnings used in the five-year average are based on a full 37.5-hour workweek but the resulting average is multiplied by the proportion of a full workweek averaged by the contributor over the entire period of pensionable service.

When a pensioner attains age 65 or becomes entitled to a disability pension from the CPP or the QPP, the annual pension amount is reduced by a percentage of the *indexed CPP annual pensionable earnings*[2] (or, if lesser, the indexed five-year[1] pensionable earnings average on which the immediate annuity is based), *multiplied by the years of CPP pensionable service*[3]. The applicable percentage (it was 0.7% before 1 January 2008) depends on the year the pensioner attains age 65 or becomes entitled to a disability pension. The following table shows the applicable percentage:

	Calendar Years				
	2008	2009	2010	2011	2012+
Coordination Percentage	0.685%	0.670%	0.655%	0.640%	0.625%

Annuities are payable at the end of month until the month in which the pensioner dies or until the disabled pensioner recovers from disability (the last payment would then be pro-rated). Upon the death of the pensioner, either a survivor allowance (Note 13) or a residual death benefit (Note 14) may be payable.

6. **Deferred Annuity**

Deferred annuity means an annuity that normally becomes payable to a former contributor who reaches age 60. The annual payment is determined as for an immediate

[1] If the number of years of pensionable service is less than five, then the averaging is over the entire period of pensionable service.
[2] *Indexed CPP annual pensionable earnings* means the average of the YMPE, as defined in the CPP, over the five calendar years leading up to and including the one in which pensionable service terminated, increased by indexation proportionate to that accrued in respect of the immediate annuity.
[3] *Years of CPP pensionable service* mean the number of years of PSSA pensionable service after 1965 or after attaining age 18, whichever is later, but not exceeding 35.

annuity (Note 5) but is also adjusted to reflect the indexation (Note 2) from the date of termination to the commencement of benefit payments.

The deferred annuity becomes an immediate annuity during any period of disability beginning before age 60. If the disability ceases before age 60, the immediate annuity reverts to the original deferred annuity unless the pensioner elects an annual allowance (Notes 8, 9 and 10) that is the prescribed actuarial equivalent to the deferred annuity.

7. Transfer Value

Members who, at their date of termination of pensionable service, are under age 50 and are eligible for a deferred annuity may elect to transfer the commuted value of their benefits, determined in accordance with the regulations, to

- a locked-in Registered Retirement Savings Plan of the prescribed kind; or
- another pension plan registered under the *Income Tax Act;* or
- a financial institution for the purchase of a locked-in immediate or deferred annuity of the prescribed kind.

8. Annual Allowance For Members

Annual allowance means an annuity payable immediately on retirement or upon attaining age 50, if later. The amount of the allowance is equal to the amount of the deferred annuity to which the member would otherwise be entitled, reduced by 5% for each year between 60 and the age when the allowance becomes payable. However, if the member is at least 50 years old at termination, and has at least 25 years of pensionable service[1], then the difference is reduced (subject to the above as a maximum) to the greater of

- 55 minus the age, and
- 30 minus the number of years of pensionable service[1].

The Treasury Board can waive all or part of the reduction for members who are involuntarily retired at ages 55 and over with at least ten years of Public Service employment.

When a member in receipt of an annual allowance becomes disabled before reaching age 60, the annual allowance becomes an immediate annuity adjusted in accordance with regulations to take into account the amount of any annual allowance received prior to becoming disabled.

9. Deemed Operational Service - Immediate Annuity and Annual Allowance

A deemed operational service immediate annuity differs from an immediate annuity (Note 5) only in that it is available as early as age 50 with 25 years of operational service.

A deemed operational service annual allowance differs from an annual allowance (Note 8) in two ways. Firstly it is available as early as age 45 with 20 years of

[1] For privatized members who elected not to transfer their PSSA benefits to their new employer's pension plan, service (including any operational) with the new employer is included.

operational service. Secondly the reduction factor is 5% multiplied by the greater of

- 50 minus the age, and
- 25 minus the years of operational service.

The foregoing operational service-related benefits are calculated in relation to both deemed and actual operational service only. Additional non-operational service results in the applicable non-operational benefit where any thresholds or reductions are based on total pensionable service, including operational service.

10. Actual Operational Service - Immediate Annuity and Annual Allowance

An actual operational service immediate annuity differs from an immediate annuity (Note 5 and Note 9) only in that it is available when the member has accrued 25 years of actual operational service.

An actual operational service annual allowance differs from other annual allowances (Note 8 and Note 9)) in two ways. Firstly it is available as soon as 20 years of actual operational service is accrued. Secondly the reduction factor is 5% multiplied by

- 25 minus the years of actual operational service.

The foregoing operational service-related benefits are calculated in relation to actual operational service only. Additional non-operational service results in the applicable non-operational benefit where any thresholds or reductions are based on total pensionable service, including operational service. Also, additional deemed operational service results in the applicable deemed operational benefit where any thresholds or reductions are based on operational pensionable service.

11. Eligible Surviving Spouse

Eligible surviving spouse means the surviving spouse (includes a common-law or same-sex partner recognized under the plan) of a contributor or pensioner except if:

- the contributor or pensioner died within one year of commencement of the spousal union, unless the Treasury Board is satisfied that the health of the contributor or pensioner at the time of such commencement justified an expectation of surviving for at least one year; or
- the pensioner married after ceasing to be a contributor, unless after such marriage the pensioner either:
  - became a contributor again, or
  - made an optional survivor benefit election within 12 months following marriage to accept a reduced pension so that the new spouse would be eligible for a survivor benefit. This reduction is reversed if and when the new spouse predeceases the pensioner or the spousal union is terminated for reason other than death.

12. Eligible Surviving Children

Eligible surviving children includes all children of the contributor or pensioner who are under age 18, and any child of the contributor or pensioner who is age 18 or over but under 25, in full-time attendance at a school or university, having been in such attendance substantially without interruption since he or she reached age 18 or the contributor or pensioner died, whichever occurred later.

13. Annual Allowance for Eligible Survivor(s)

Annual allowance means, for the eligible surviving spouse and children of a contributor or pensioner, an annuity that becomes payable immediately upon the death of that individual. The amount of the allowance is determined with reference to a basic allowance that is equal to 1% of the highest average of annual pensionable earnings of the contributor over five consecutive years, multiplied by the number of years of pensionable service not exceeding 35.

The annual allowance for a spouse is equal to the basic allowance unless the spouse became eligible as a result of an optional survivor benefit election, in which case it is equal to the percentage of the basic allowance specified by the pensioner making the election.

The annual allowance for an eligible surviving child is equal to 20% of the basic allowance, subject to a reduction if there are more than four eligible surviving children in the same family. The allowance otherwise payable to an eligible surviving child is doubled if the child is an orphan.

Survivor annual allowances are not integrated with the CPP or the QPP and are payable in equal monthly instalments in arrears until the end of the month in which the survivor dies or otherwise loses eligibility. If applicable, a residual benefit (Note 14) is payable to the estate upon the death of the last survivor.

14. Minimum and Residual Death Benefits

If a contributor or a pensioner dies leaving no eligible survivor, the lump sum normally paid is the excess of five times the annual amount of the immediate annuity to which the contributor would have been entitled, or the pensioner was entitled, at the time of death, less any pension payments already received. Indexation adjustments are excluded from these calculations.

The same formula is used to determine the residual death benefit, which is the lump sum payable upon the death of an eligible survivor but also subtracting all amounts (excluding indexation adjustments) already paid to the survivor.

15. Division of Pension with Former Spouse

In accordance with the *Pension Benefits Division Act*, upon the breakdown of a spousal union (including common-law), a lump sum can be debited by court order or by mutual consent from the accounts and/or the Fund, as the case may be, to the credit of the former spouse of a contributor or pensioner. The maximum transferable amount is half the value, calculated as at the transfer date, of the retirement pension accrued by the contributor or pensioner during the period of cohabitation. If the member's benefits are not vested, the maximum transferable amount corresponds to half the member's contributions made during the period subject to division, accumulated with interest at the rate applicable on a refund of contributions. The accrued benefits of the contributor or pensioner are then reduced accordingly.

Appendix 2 – Retirement Compensation Arrangement Benefit Provisions

Retirement compensation arrangements (RCAs) are prefunded arrangements not subject to the benefit limitations of registered pension plans and therefore are less tax-advantaged as the fund must transfer a 50% refundable tax to the Canada Revenue Agency (CRA) immediately. Under the PSSA RCA a debit is made from the RCA Account such that in total roughly half the recorded balance in the Account is held as a tax credit (CRA refundable tax). This Appendix describes the Public Service pension benefits financed through retirement compensation arrangements (RCA No. 1 and RCA No. 2) rather than through the registered PSSA provisions that have a material impact on this valuation

Effective 15 December 1994, RCA No. 1 was established pursuant to the *Special Retirement Arrangements Act* (SRAA) to provide for all pension benefits in excess of those that may, in accordance with the *Income Tax Act* (ITA) restrictions on registered pension plans, be paid under the PSSA registered provisions.

Effective 1 April 1995, RCA No. 2 was established by the RCA regulations as a program for certain Public Service employees declared surplus before 1 April 1998 as part of the downsizing initiative. Participation was limited to individuals between ages 50 and 54 who met the conditions specified in the regulations. RCA No. 2 pays the difference between a pension unreduced for early retirement and the reduced pension payable in accordance with the PSSA. It is financed entirely by the government.

The following benefits have been provided under RCA No. 1 since 20 November 1997, unless otherwise indicated, to the extent that they are in excess of the ITA limit.

Benefit	**PSSA Registered Provisions limit**
Survivor allowance for service from 1 January 1992 onward (see Note 13 of Appendix 1)	<u>Pre-retirement death</u> • Maximum spouse allowance is two-thirds of greater of A and B; and • Maximum aggregate dependants' allowance is the greater of A and B, where A is the amount of member annuity earned to date of death, and B is the hypothetical amount of member annuity earned to age 65 where the average annual salary is limited to 1.5 times the average YMPE <u>Post-retirement death</u> The amount of spouse allowance is limited in any year to a maximum of two-thirds the retirement benefit that would have been payable to the member in that year.

Benefit	PSSA Registered Provisions limit
Minimum lump sum death benefit (see Note 14 of Appendix 1)	Pre-retirement death The amount of pre-retirement death benefit if the member has no eligible dependants is limited to the greater of the member contributions with interest and the present value of the member's accrued benefits on the day prior to death. Post-retirement death If the member has no eligible dependants at retirement, then the minimum death benefit is limited to the member contributions with interest.
Continued benefit accrual for former deputy heads (provided since 15 December 1994 for service since then)	This entire benefit is outside the registered plan limit. Deputy heads ceasing employment under age 60 may elect to be deemed full-time employees absent from the Public Service on leave without pay up to age 60.
Elective service for service prior to 1 January 1990	The amount of lifetime retirement benefits for each such year of service is limited to two-thirds of the defined benefit limit (i.e. $2,646.67 for calendar year 2012) for the year in which the lifetime retirement benefits commence to be paid. For years subsequent to the commencement year of lifetime retirement benefits, this amount can be adjusted to reflect increases in the Consumer Price Index.
Excess pensionable earnings (provided since 15 December 1994 for service since then)	The highest average of pensionable earnings is subject to a prescribed yearly maximum that varies by calendar year and the registered plan's benefit formula. The calendar year 2012 Maximum Pensionable Earnings is $148,000.

Appendix 3 – Assets, Accounts and Rates of Return

A. Assets and Accounts Available for Benefits

The pension promise to Public Service employees enacted by legislation encompasses government assets and accounts. The assets the government uses to finance the pension promise are composed of invested assets (Pension Fund) which the government has earmarked for the payment of benefits, and accounts (Superannuation, RCA No. 1 and RCA No. 2 accounts) established to track its pension benefit obligations.

1. Public Service Superannuation Account

PSSA benefits earned up to 31 March 2000 are financed entirely through the Public Service Superannuation Account, which forms part of the Accounts of Canada.

The Account was credited with all PSSA contributions made by members and the government prior to 1 April 2000, as well as with prior service contributions for elections made prior to 1 April 2000 and leave without pay contributions for periods before 1 April 2000 but remitted after that date. It is charged with both the benefit payments made in respect of service earned under the Account and the allocated portion of the plan administrative expenses.

The Account is credited with interest earnings as though net cash flows were invested quarterly in 20-year Government of Canada bonds issued at prescribed interest rates and held to maturity. No formal debt instrument is issued to the Account by the government in recognition of the amounts therein. Interest earnings are credited every three months on the basis of the average yield for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces and RCMP pension plans.

Table 20 Reconciliation of Balances in Superannuation Account
($ millions)

Plan Year	2009	2010	2011	2009-2011
Public Accounts opening balance	91,279	93,055	94,569	91,279
INCOME				
Interest earnings	6,284	6,159	6,005	18,448
Employer contributions	29	26	24	79
Member contributions	36	33	29	98
Transfers received	-	1	-	1
Actuarial liability adjustments	-	-	-	-
Subtotal	*6,349*	*6,219*	*6,058*	*18,626*
EXPENDITURES				
Annuities	4,361	4,531	4,655	13,547
Pension divisions	31	28	24	83
Return of contributions	-	-	-	-
Pension transfer value payments	44	26	32	102
Transfers to other pension plans	36	14	31	81
Minimum benefits	13	12	13	38
Administrative expenses	88	94	90	272
Subtotal	*4,573*	*4,705*	*4,845*	*14,123*
Public Accounts closing balance	93,055	94,569	95,782	95,782

Since the last valuation, the Account balance has grown by $4.5 billion (a 4.9% increase) to reach $95.8 billion as at 31 March 2011.

2. Public Service Pension Fund

Since 1 April 2000, PSSA contributions (except for prior service elections made prior to 1 April 2000) have been credited to the Public Service Pension Fund. The Fund is invested in the financial markets with a view to achieving maximum rates of return without undue risk.

The Fund has been credited with all PSSA contributions since 1 April 2000, as well as with prior service contributions in respect of elections made since that date and leave without pay contributions for periods after that date. The Fund is also credited with the net investment earnings generated by the capital assets managed by the PSPIB. It is debited with both the benefit payments made in respect of service earned and prior service elections made since 1 April 2000 and the allocated portion of the plan administrative expenses.

Table 21 Reconciliation of Balances in Pension Fund
($ millions)

Plan Year	2009	2010	2011	2009-2011
Opening balance	28,398	24,675	33,920	28,398
INCOME				
Investment earnings	(6,947)	5,458	5,047	3,558
Employer contributions	2,425	2,774	2,772	7,971
Member contributions	1,251	1,489	1,497	4,237
Transfers received	50	109	72	231
Actuarial liability adjustments	-	-	-	-
Subtotal	*(3,221)*	*9,830*	*9,388*	*15,997*
EXPENDITURES				
Annuities	333	440	570	1,343
Pension divisions	9	10	10	29
Return of contributions	10	11	15	36
Pension transfer value payments	90	61	98	249
Transfers to other pension plans	27	22	40	89
Minimum benefits	5	6	9	20
Administrative expenses	28	35	38	101
Subtotal	*502*	*585*	*780*	*1,867*
Closing balance	24,675	33,920	42,528	42,528

Since the last valuation, the Fund balance has increased by $14.1 billion (a 50% increase) to reach $42.5 billion as at 31 March 2011.

3. Public Service RCA No. 1 Account

The amount in the RCA No. 1 account available for benefits is composed of the recorded balance in the Retirement Compensation Arrangements Account, which forms part of the Accounts of Canada, and a tax credit (CRA refundable tax). Each calendar year, a debit is made from the RCA Account such that in total roughly half the recorded balance in the Account is held as a tax credit (CRA refundable tax).

No formal debt instrument is issued to the Account by the government in recognition of the amounts therein. Interest earnings are credited every three months on the basis of the average yield for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces and RCMP pension plans.

Table 22 Reconciliation of Balances in RCA No.1 Account
($ millions)

Plan Year	2009	2010	2011	2009-2011
Public Accounts opening balance	643.8	701.3	767.7	643.8
INCOME				
Interest earnings	47.1	49.2	52.1	148.4
Employer contributions	68.4	79.9	96.4	244.7
Member contributions	9.5	10.9	11.1	31.5
Transfers received	0.0	0.0	0.0	0.0
Actuarial liability adjustments	0.0	0.0	0.0	0.0
Subtotal	*125.0*	*140.0*	*159.6*	*424.6*
EXPENDITURES				
Annuities	11.3	13.5	15.7	40.5
Pension divisions	0.8	0.2	0.4	1.4
Return of contributions	0.0	0.0	0.0	0.0
Pension transfer value payments	0.5	0.6	0.4	1.5
Transfers to other pension plans	1.8	0.3	2.3	4.4
Minimum benefits	0.1	0.0	0.1	0.2
Transfer to Canada Post Corporation	0.0	0.0	0.0	0.0
Amount transfer to CRA	53.0	58.9	71.0	182.9
Subtotal	*67.5*	*73.5*	*89.9*	*230.9*
Public Accounts closing balance	701.3	767.8	837.4	837.5
Refundable tax	681.6	740.5	811.4	811.4

Since the last valuation, the Account balance has grown by $193.7 million (a 30% increase) to reach $837.5 million as at 31 March 2011 and the refundable tax has increased by $182.9 million (a 29% increase) to reach $811.4 million.

4. Public Service RCA No. 2 Account

The amount in the RCA No. 2 account available for benefits is composed of the recorded balance in the Retirement Compensation Arrangements Account, which forms part of the Accounts of Canada, and a refundable tax. Each calendar year, a debit is made from the RCA Account such that in total roughly half the recorded balance in the Account is held as a tax credit (CRA refundable tax).

No formal debt instrument is issued to the Account by the government in recognition of the amounts therein. Interest earnings are credited every three months on the basis of the average yield for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces and RCMP pension plan.

Table 23 Reconciliation of Balances in RCA No.2 Account
($ millions)

Plan Year	2009	2010	2011	2009-2011
Public Accounts opening balance	818.9	810.2	796.6	818.9
INCOME				
Interest earnings	55.3	52.6	49.6	157.5
Actuarial liability adjustments	9.5	6.2	6.2	21.9
Subtotal	*64.8*	*58.8*	*55.8*	*179.4*
EXPENDITURES				
Annuities	81.2	82.2	82.0	245.4
Amount transfer to CRA	(7.7)	(9.7)	(12.7)	(30.1)
Subtotal	*73.5*	*72.5*	*69.3*	*215.3*
Public Accounts closing balance	810.2	796.5	783.1	783.1
Refundable tax	807.9	798.1	785.5	785.5

Since the last valuation, the Account balance decreased by $35.8 million (a 4.4% reduction) to $783.1 million as at 31 March 2011 and the refundable tax has decreased by $30.1 million (a 3.7% reduction) to $785.5 million.

B. Rates of Interest (Return)

The rates of interest in respect of the Superannuation Account were calculated using the foregoing entries. The Account yields are based on book values since the notional bonds are deemed to be held to maturity. The results were computed using the dollar-weighted approach and assume that cash flows occur in the middle of the plan year (except for actuarial liability adjustments, which occur on 31 March). The Fund rates of return are those from the Public Sector Pension Investment Board (PSPIB) 2011 Annual Report.

Table 24 Rates of Interest (Return)

Plan Year	Superannuation Account	Pension Fund
2009	7.1%	(22.7%)
2010	6.8%	21.5%
2010	6.8%	21.5%

C. Sources of Asset Data

The Superannuation Account, RCA No. 1 Account, RCA No. 2 Account and Pension Fund entries shown in Section A above were taken from the Public Accounts of Canada and the financial statements of the Public Sector Pension Investment Board.

Appendix 4 – Membership Data

A. Sources of Membership Data

The valuation input data required in respect of contributors (both active and non-active), pensioners and survivors are extracted from master computer files maintained by the Superannuation Directorate of the Department of Public Works and Government Services Canada. The Compensation Systems Branch of that department is responsible for the extraction of the data.

The main valuation data file supplied by the Superannuation Directorate contained the historical status information on all members up to 31 March 2011.

B. Validation of Membership Data

1. Status-Related Tests

The following status tests were made on the main valuation data file:

- a consistency check that a status could be established for each record of a member. The status of a member may change over time but at a given point in time it can be only one of the following: contributor, outstanding termination, pensioner, deceased leaving an eligible survivor;
- a consistency check of the changes in status of a member during the intervaluation period; e.g.
    - if a contributor record indicated that the member retired, then a pensioner record should exist; and
    - if a contributor or pensioner record indicated that the member died leaving an eligible survivor, then a corresponding survivor record should exist;
- a reconciliation between the status of members as at 31 March 2011 from the current valuation data and the status of the members as at 31 March 2008 from the previous valuation data; and
- a comparison of valuation data as at 31 March 2011 with the membership shown in the Report on the Administration of the *Public Service Superannuation Act* for the fiscal year ending 31 March 2011.

2. Benefit-Related Tests

Consistency tests were made to ensure that all proper information to value the member benefits based on individual statuses as at 31 March 2011 was included, by verifying that

a) For Active Members

- the pensionable service was reasonable in relation to the attained age;
- the salary was included and, if not, imputing a salary by updating a salary rate from a previous year with an average earnings increase or failing that, using the average salary rate for that sex; and

- salaries included negotiated increases in effect and increasing the salary rates accordingly if this was not the case.

b) For Pensioners and Survivors in Receipt of an Annuity

- the amount of the annuity, including indexation, was included; and
- the benefits were indexed up to 1 January 2011.

c) For Outstanding Terminations

- the lump sum payment was recognized

d) For Adjustments to Status and Benefit Data

- appropriate adjustments were made to the basic data, after consulting with the data providers, based on the omissions and discrepancies identified by the tests described herein and several additional tests.

C. Membership Data

The following tables show the detailed reconciliation of membership data since the last valuation. Detailed membership data upon which this valuation is based are shown in Appendix 12.

Table 25 Reconciliation of Contributors

	Participating Accruing		Participating Non-accruing		Total	Non-Participating Non-Accruing		
	Male	Female	Male	Female	Participating	Male	Female	Total
As at 31 March 2008	**128,856**	**161,030**	**2,692**	**1,326**	**293,904**	**477**	**586**	**1,063**
Data corrections	347	590	208	96	1,241	(9)	(47)	(56)
New Contributors					-			-
)New entrants	31,710	38,971	155	26	70,862	-	-	-
Rehired /cash-out	6,250	10,193	37	7	16,487	-	-	-
Rehired/pensioners	1,135	2,411	37	21	3,604	-	-	-
Subtotal	39,095	51,575	229	54	90,953	-	-	-
Changes of								
Accrual	(3,935)	(3,308)	3,935	3,308	-	-	-	-
Active/Non-Active	(453)	(612)	(48)	(12)	(1,125)	501	624	1,125
Service Type	(4)	-	4	-	-	-	-	-
Subtotal	(4,392)	(3,920)	3,891	3,296	(1,125)	501	624	1,125
ROC or TV	(12,495)	(17,295)	(114)	(21)	(29,925)	(343)	(477)	(820)
Pensionable terminations								
Disability	(570)	(1,244)	(11)	(5)	(1,830)	(1)	(2)	(3)
Deferred Annuity (DA)	(3,689)	(5,713)	(58)	(81)	(9,541)	(24)	(63)	(87)
Death (no survivors)	(125)	(174)	(5)	(3)	(307)	(3)	(4)	(7)
Death (with survivors)	(423)	(299)	(30)	(3)	(755)	(4)	-	(4)
Annuitant (IA/AA) [1]	(9,497)	(9,816)	(3,552)	(2,637)	(25,502)	(119)	(71)	(190)
Subtotal	(14,304)	(17,246)	(3,656)	(2,729)	(37,935)	(151)	(140)	(291)
As at 31 March 2011	**137,107**	**174,734**	**3,250**	**2,022**	**317,113**	**475**	**546**	**1,021**

[1] IA refers to Immediate Annuity while AA means Annual Allowance.

Table 26 Reconciliation of Pensioners

	Deferred Annuity or Deferred AA			Disability Annuity			IA / AA[1]		
Retirement Pensioners	Male	Female	Total	Male	Female	Total	Male	Female	Total
Reported As at 31 March 2008	**5,553**	**6,703**	**12,256**	**6,404**	**6,606**	**13,010**	**101,483**	**57,860**	**159,343**
Suspended As at 31 March 2008	(97)	(113)	(210)	(3)	-	(3)	(13)	(7)	(20)
As at 31 March 2008	**5,456**	**6,590**	**12,046**	**6,401**	**6,606**	**13,007**	**101,470**	**57,853**	**159,323**
Data corrections	159	266	425	(83)	(42)	(125)	(835)	(764)	(1,599)
New Entrant From									
Contributor	919	1,613	2,532	582	1,251	1,833	12,982	12,288	25,270
Disabled Annuitant									
Deferred Annuitant				11	17	28	1,200	1,364	2,564
Pensioner (IA/AA)									
Subtotal	919	1,613	2,532	593	1,268	1,861	14,182	13,652	27,834
Transfer Status to									
Contributor	(346)	(755)	(1,101)	(1)	(3)	(4)	(144)	(186)	(330)
Disabled Annuitant	(11)	(17)	(28)	-	-	-	-	-	-
Deferred Annuitant									
Pensioner (IA/AA)	(1,204)	(1,365)	(2,569)				(34)	(24)	(58)
Subtotal	(1,561)	(2,137)	(3,698)	(1)	(3)	(4)	(178)	(210)	(388)
Termination									
Cash Paid Out	(17)	(23)	(40)	-	(1)	(1)	(2)	(3)	(5)
Death (no survivors)	(5)	(9)	(14)	(411)	(389)	(800)	(4,609)	(3,423)	(8,032)
Death (with survivors)	(31)	(12)	(43)	(458)	(141)	(599)	(5,820)	(810)	(6,630)
Subtotal	(53)	(44)	(97)	(869)	(531)	(1,400)	(10,431)	(4,236)	(14,667)
Newly Suspended	(86)	(97)	(183)	(3)	(8)	(11)	(63)	(56)	(119)
As at 31 March 2011	**4,924**	**6,302**	**11,226**	**6,040**	**7,290**	**13,330**	**104,145**	**66,239**	**170,384**

1 IA refers to Immediate Annuity while AA means Annual Allowance.

Table 27 Reconciliation of Deemed Pensioners

	Deferred Annuity or Deferred AA			Disability Annuity			IA / AA[1]		
Deemed Pensioners	Male	Female	Total	Male	Female	Total	Male	Female	Total
Reported As at 31 March 2008	**2,132**	**2,573**	**4,705**	**1**	**3**	**4**	**505**	**342**	**847**
Suspended As at 31 March 2008	(189)	(248)	(437)	(1)	(5)	(6)	(384)	(258)	(642)
As at 31 March 2008	**1,943**	**2,325**	**4,268**	**-**	**(2)**	**(2)**	**121**	**84**	**205**
Data corrections	(1,009)	(1,003)	(2,012)	29	31	60	479	309	788
New Entrant From									
Contributor	2,889	4,286	7,175	-	-	-	225	263	488
Disabled Annuitant			-						
Deferred Annuitant				9	7	16	155	166	321
Pensioner (IA/AA)									
Subtotal	2,889	4,286	7,175	9	7	16	380	429	809
Transfer Status to									
Contributor	(636)	(1,399)	(2,035)	-	-	-	(48)	(92)	(140)
Disabled Annuitant	(9)	(7)	(16)	-	-	-	-	-	-
Deferred Annuitant									
Pensioner (IA/AA)	(153)	(166)	(319)						
Subtotal	(798)	(1,572)	(2,370)	-	-	-	(48)	(92)	(140)
Termination									
Cash Paid Out	(31)	(36)	(67)	-	-	-	(3)	(1)	(4)
Death (no survivors)	-	(1)	(1)	(2)	(2)	(4)	(15)	(15)	(30)
Death (with survivors)	(1)	(2)	(3)	-	-	-	(33)	(7)	(40)
Subtotal	(32)	(39)	(71)	(2)	(2)	(4)	(51)	(23)	(74)
Newly Suspended	(121)	(186)	(307)	-	(1)	(1)	(77)	(67)	(144)
As at 31 March 2011	**3,059**	**4,058**	**7,117**	**36**	**33**	**69**	**815**	**646**	**1,461**

[1] IA refers to Immediate Annuity while AA means Annual Allowance.

Table 28 Reconciliation of Spouse Survivors

	Widows	Widowers	Total
As at 31 March 2008 (report)	**51,466**	**4,508**	**55,974**
Suspended as at 31 March 2008	(1,461)	(101)	(1,562)
As at 31 March 2008	50,005	4,407	54,412
Data corrections	(342)	15	(327)
New from Contributors	427	283	710
New from Pensioners	6,362	980	7,342
Spouse deaths	(6,657)	(557)	(7,214)
Newly Suspended	(1,194)	(89)	(1,283)
As at 31 March 2011	**48,601**	**5,039**	**53,640**

Table 29 Reconciliation of Survivors - Children/Students

	Children	Students	Total
As at 31 March 2008 (report)	761	746	1,507
Data corrections	138	16	154
New from Contributors	298	138	436
New from Pensioners	52	53	105
Termination of Benefits	(255)	(706)	(961)
Eligible as Student	(258)	258	-
As at 31 March 2011	**736**	**505**	**1,241**

Table 30 Reconciliation of Pensioners with ERI Benefits

	Male	Female	Total
As at 31 March 2008	6,640	4,188	10,828
Pensioner deaths	(178)	(77)	(255)
Transfer to Contributors	(1)	-	(1)
As at 31 March 2011	**6,461**	**4,111**	**10,572**

Appendix 5 – PSSA Valuation Methodology

A. Plan Assets

1. Public Service Superannuation Account

The amount in the Superannuation Account available for benefits consists essentially of the recorded balance of the Superannuation Account in the Accounts of Canada. The underlying notional bond portfolio described in Appendix 3 is shown at the book value.

The only other Account-related amount available for benefits consists of the discounted value of future member contributions and government credits in respect of prior service elections. The discounted value of future member contributions was calculated using the projected Account yields. The government is assumed to match these future member contributions when paid at a single rate but it makes no contributions if the member is paying the double rate.

2. Public Service Pension Fund

For valuation purposes, an adjusted market value method is used to determine the actuarial value of assets in respect of the Pension Fund. The method is unchanged from the previous valuation.

Under the adjusted market value method, the difference between the observed investment returns during a given plan year and the expected investment returns for that year based on the previous report assumptions is spread over five years, subject to a 10% corridor. As a result, the actuarial value of assets is a five-year smoothed market value where the appreciation of investment gains or losses is recognized at the rate of 20% per year. The value produced by this method is related to the market value of the assets but is more stable than the market value.

The only other Fund-related asset consists of the discounted value of future member contributions and government credits in respect of prior service elections. The discounted value of future member contributions was calculated using the assumed rates of return on the Pension Fund. The government is assumed to contribute in the same proportion as for the PSSA current service cost when member contributions are paid at the single rate, but it is assumed to contribute 75% of the member contributions when the member is paying the double rate.

The actuarial value of the assets, determined as at 31 March 2011, under the adjusted market value method is $42,425 million and was determined as follows:

Table 31 Actuarial Value of Pension Fund Assets
($ millions)

Plan Year	2007	2008	2009	2010	2011	
Actual net investment return (A)	2,442	(199)	(6,947)	5,458	5,047	
Expected investment return (B)	1,361	1,704	1,799	1,593	2,141	
Investment gains (losses) (A-B)	1,081	(1,903)	(8,746)	3,866	2,907	
Gains (losses) recognized immediately	-	-	-	-	-	
Investment gains (losses) to be amortized	1,081	(1,903)	(8,746)	3,866	2,907	
Unrecognized percentage	0%	20%	40%	60%	80%	
Unrecognized investment gains (losses)	-	(381)	(3,498)	2,319	2,325	
Market value as at 31 March 2011						42,530
Plus						
Present value of prior service contributions						660
Less						
Total unrecognized investment gains (losses)						765
Actuarial value as at 31 March 2011						42,425

B. Actuarial Cost Method

As benefits earned in respect of current service will not be payable for many years, the purpose of an actuarial cost method is to assign costs over the working lifetime of the members.

As in the previous valuations, the projected accrued benefit actuarial cost method (also known as the projected unit credit method) was used to determine the current service cost and actuarial liability. Consistent with this cost method; pensionable earnings are projected up to retirement using the assumed annual increases in average pensionable earnings (including seniority and promotional increases). The yearly maximum salary cap and other benefit limits under the *Income Tax Act* described in Appendix 2 were taken into account to determine the benefits payable under the PSSA and those payable under the RCA No. 1.

1. Current Service Costs

Under the projected accrued benefit actuarial cost method, the current service cost, also called normal cost, computed in respect of a given year is the sum of the value, discounted in accordance with the actuarial assumptions for the Pension Fund, of all future payable benefits considered to accrue in respect of that year of service. The Pension Fund administrative expenses are deemed to be included in the total current service cost.

Under this method, the current service cost for an individual member will increase each year as the member approaches retirement. However, all other things being equal, the current service cost for the total population, expressed as a percentage of total pensionable payroll, can be expected to remain stable as long as the average age and service of the total population remain constant.

For a given year, the government current service cost is the total current service cost reduced by the members' contributions during the year.

2. **Actuarial Liability**

The actuarial liability with respect to contributors corresponds to the value, discounted in accordance with the actuarial assumptions, of all future payable benefits accrued as at the valuation date in respect of all previous service. For pensioners and survivors, the actuarial liability corresponds to the value, discounted in accordance with the actuarial assumptions, of future payable benefits.

3. **Actuarial Excess (Deficit)**

It is very unlikely that the actual experience will develop precisely in accordance with the assumptions that underlie the actuarial estimates. Thus a balancing item must be calculated under this cost method to estimate the necessary adjustments. Adjustments may also be necessary if the terms of the pension benefits enacted by legislation are modified or if assumptions need to be updated.

The actuarial excess or deficit is the difference between the total value of assets or amounts available for benefits and the actuarial liability. A new actuarial deficit may be amortized over a period not exceeding 15 years through special payments and the disposition of any actuarial surplus is defined in the PSSA.

4. **Government Contributions**

The recommended government contribution corresponds to the sum of:

- the government current service cost;
- the government contributions for prior service; and
- as applicable, special payments in respect of a deficit or as the case may be, actuarial surplus credits.

C. Projected Yields

The projected rates of return (shown in Appendix 6) assumed for computing the present value of accrued benefits to be credited from the Superannuation Account are the projected annual yields on the combined book value of the Superannuation Accounts of the Public Service, Canadian Forces, and RCMP pension plans.

The projected Account yields were determined by an iterative process involving the following:

- the combined notional bond portfolio of the three Accounts as at the valuation date;
- the assumed future new money interest rates (also shown in Appendix 6);
- the expected future benefits payable in respect of all pension entitlements accrued up to 31 March 2000;
- the expected future contributions for prior service elections made up to 31 March 2000, and
- the expected future administrative expenses,

taking into account that each quarterly interest credit to an Account is calculated as if the principal at the beginning of a quarter remains unchanged during the quarter.

The projected rates of return (shown in Appendix 6) assumed for computing the present value of the benefits accrued or accruing to be credited to the Pension Fund were developed on the basis that the Fund holds a diversified mix of assets.

D. Membership Data

For valuation purposes, individual data on each member were used.

The member data shown in Appendices 4 and 12 were provided as at 31 March 2011. This valuation is based on the member data as at the valuation date.

The information in respect of the contributions for elected prior service was provided as at 31 March 2011. Future member contributions in respect of elected prior take into account only the payment streams that are still in effect at 31 March 2011. Only payments due after 31 March 2011 are included.

Appendix 6 – PSSA Economic Assumptions

The payment of accrued pension benefits is the responsibility of the government, therefore the likelihood of the plan being wound-up and its obligation not being fulfilled is practically nonexistent, consequently all the assumptions used in this report are best-estimate assumptions, i.e. they reflect our best judgement of the future long-term experience of the plan and do not include a margin.

A. Inflation-Related Assumptions

1. Level of Inflation

Price increases, as measured by changes in the Consumer Price Index (CPI), tend to fluctuate from year to year. In 2006, the Bank of Canada and the Government renewed their commitment to keep inflation between 1% and 3% until the end of 2011. In November 2011, this commitment was renewed until the end of 2016. Therefore, a price increase rate of 2.0% is assumed for plan years 2012 to 2017. For plan years 2018 to 2020, the CPI is assumed to increase from 2.0% to 2.3% and to remain at 2.3% thereafter. The ultimate rate of 2.3% is 0.1% lower than the assumed rate in the previous valuation.

2. Increase in Pension Factor

The year's pension indexing factor is required in the valuation process by virtue of its role in maintaining the purchasing power of pensions. It was derived by applying the indexation formula described in Appendix 1, which relates to the assumed Consumer Price Index increases over successive 12-month periods ending on 30 September.

B. Employment Earnings Increases

1. Increase in the Year's Maximum Pensionable Earnings (YMPE)

The YMPE is required in the valuation process because the plan is coordinated with the Canada Pension Plan and the Quebec Pension Plan. The assumed increase in the YMPE for a given calendar year is derived, in accordance with the Canada Pension Plan, to correspond to the increase in the average weekly earnings (AWE), as calculated by Statistics Canada, over successive 12-month periods ending on 30 June. The AWE, and thus the YMPE, is deemed to include a component for seniority and promotional increases. The YMPE is equal to $50,100 for calendar year 2012. Future increases in the YMPE correspond to the assumed real[1] increase in the AWE plus assumed increases in the CPI.

The real-wage differential is developed taking into account historical trends, a possible labour shortage, and an assumed moderate economic growth for Canada with a relatively high unemployment rate in fiscal year 2012. Thus, a real-wage differential of 0.5% is assumed for 2013, and is assumed to gradually increase to the ultimate assumption of 1.3% by 2021. The ultimate real-wage differential assumption combined with the ultimate price increase assumption results in an assumed annual increase in

[1] Note that all of the real rates presented in this report are actually differentials, i.e. the difference between the effective annual rate and the rate of increase in prices. This differs from the technical definition of a real rate of return, which, for example in the case of the ultimate Fund assumption would be 4.0% (derived from 1.064/1.023) rather than 4.1%.

nominal wages of 3.6% in 2021 and thereafter. Thus, the ultimate rate of increase for the YMPE is 3.6%, resulting from a 1.3% increase in the real AWE and a 2.3% increase in the CPI.

2. Increase in Average Pensionable Earnings

Average pensionable earnings are applicable to Plan members only, whereas the YMPE applies to the general working population in Canada. In addition, increases in average pensionable earnings are exclusive of seniority and promotional increases, which are considered under a separate demographic assumption. Thus, the annual increase in average pensionable earnings is assumed to be 0.1% lower than the corresponding increase in the YMPE. The ultimate increase in average pensionable earnings is 3.5%.

3. Increase in Maximum Pensionable Earnings (MPE)

Since the plan is coordinated with the Canada Pension Plan and the Quebec Pension Plan, the tax-related maximum pensionable earnings were derived from both the maximum annual pension accrual under a registered defined benefit plan and the YMPE. The maximum annual pension accrual of $2,552.22 for 2011 will increase to $2,646.67 for 2012, in accordance with Income Tax Regulations. Thereafter, the maximum annual pension accrual is assumed to increase in accordance with the assumed annual increase in the YMPE, which is the same as the assumed annual increase in the AWE.

The MPE is equal to $148,000 for calendar year 2012.

C. Investment-Related Assumptions

1. New Money Rate

The new money rate is the nominal yield on long-term Government of Canada bonds and is set for each year in the projection period. The real yield on long-term federal bonds is equal to the new money rate less the assumed rate of inflation.

Recognizing recent experience, the real yield on long-term federal bonds is assumed to be 1.8% in plan year 2012, and is assumed to increase gradually to its ultimate level of 2.7% first attained in plan year 2017. The ultimate real yield is 0.1% less than assumed in the previous valuation, which was 2.8%. The real yield on long-term bonds is based on historical yields.

2. Projected Yields on Superannuation Account

These yields are required for the computation of present values of benefits to determine the liability for service prior to 1 April 2000. The methodology used to determine the projected yields on the Account is described in section C of Appendix 5. The methodology is unchanged from previous valuations.

3. Rate of Return on the Fund

The expected annual nominal rates of return on the Fund are required for the computation of present values of benefits to determine the liability for service since 1 April 2000 and the current service cost. The following sections describe how the rates of return on the Fund are determined.

a) Investment Strategy

Since 1 April 2000, assets resulting from transferred amounts equal to the government and member contributions, net of benefit payments and administration expenses, are invested in capital markets through the Public Sector Pension Investment Board (PSPIB). PSPIB invests funds to maximize returns without undue risk of loss according to its own investment policies that take into account the needs of contributors and beneficiaries, as well as financial market constraints. For the purpose of this report, the investments have been grouped into three broad categories: equities, fixed income securities and real return assets. Equities consist of Canadian, foreign developed market and emerging market equities. Fixed income securities consist of bonds which are usually a mix of federal, provincial, corporate and real return bonds. Real return assets include such categories as real estate and infrastructure.

As at 31 March 2011, the asset mix for the Plan consisted of 21% fixed income securities (including world inflation-linked bonds), 66% equity and 13% real return assets. PSPIB has developed a long-term target Policy Portfolio (approved by its Board of Directors on 31 March 2011 and subject to an annual review), which consists of 18% fixed income securities (including world inflation-linked bonds), 56% equity and 26% real return assets. The Policy Portfolio asset mix weights represent long-term targets. Therefore, the initial asset mix for the Plan is mostly derived using the actual investments reported by PSPIB as at 31 March 2011.

The asset mix of the Plan portfolio at the beginning of plan year 2011 consists of 21% fixed income, 65% equity and 14% real return assets. As PSPIB Policy Portfolio reflects long-term expectations, it is assumed that the asset mix of the Plan portfolio will converge slowly toward the Policy Portfolio, but not necessarily reaching its ultimate weights. The ultimate asset mix of the Plan portfolio is reached in plan year 2020 and consists of 20% fixed income securities, 55% equity and 25% real return assets.

Table 32 shows the assumed asset mix for each plan year throughout the projection period.

Table 32 Asset Mix
(in percentage)

Plan Year	Fixed Income Securities	Canadian Equity	U.S. and Foreign Equity	Emerging Market Equity	Real Estate & Infrastructure
2012	21	33	25	7	14
2013	20	30	27	7	16
2014	20	27	28	7	18
2015	20	25	28	7	20
2016	20	24	28	7	21
2017	20	23	28	7	22
2018	20	22	28	7	23
2019	20	21	28	7	24
2020+	20	20	28	7	25

b) Real Rates of Return by Asset Type

Real rates of return are required in order to discount benefits payable in the future for the determination of Plan liabilities and current service cost. They are assumed for each year of the projection period and for each of the main asset categories in which Plan assets are invested. All of the real rates of return described in this section are net of investment expenses other than operating expenses, that is, net of transaction costs and investment management fees and include an allowance for rebalancing and diversification. Subsection c) describes how the portfolio returns are further reduced for operating expenses. Over the last three plan years, investment expenses other than operating expenses have been, on average, equal to about 0.20% of average net assets. It is assumed that 50% of those investment expenses (transaction costs and investment management fees) are incurred through active management decisions that are expected to be self-supporting. Therefore, it is assumed that going forward transaction costs and investment management fees will represent 0.10% of average net assets.

The real rates of return were developed by looking at historical returns (expressed in Canadian dollars) and adjusting the returns upward or downward to reflect expectations that differ from the past. It is assumed that currency variations will impact the real rates of return over the projection period, creating gains and losses. However, as the projection period is long, these gains and losses are expected to offset each other over time. Hence, it is assumed that currency variations will not have an impact on the long-term real rates of return.

Fixed Income Securities

PSPIB currently has 21% of the Plan portfolio invested in fixed income securities, including Canadian fixed income, world government bonds, world inflation-linked bonds and cash. PSPIB Policy Portfolio assumes a long-term target weight for fixed income securities of 18% (including world inflation-linked bonds). Thus, it is assumed that the proportion invested in fixed income securities will decrease in order to follow the Policy Portfolio. It is assumed that by plan year 2013, 20% of the portfolio will be invested in fixed income securities. Net cash flows (contributions less expenditures) are expected to become negative during plan year 2035 and a portion of investment income will therefore be required to pay benefits. Changes to the assumed asset mix may be required in the future to reduce funding risks and to take into account the maturity of the plan.

It is assumed that the Plan's fixed income portfolio consists of federal, provincial, corporate and inflation-linked bonds. Initially, the fixed income portfolio is assumed to consist of 30% federal bonds, 15% provincial bonds, 30% corporate bonds and 25% inflation-linked bonds. However, the bond mix is assumed to shift over the following five plan years as investments in provincial bonds increase while investments in inflation-linked bonds decrease. The fixed income portfolio is projected to reach its ultimate assumed mix of 30% federal, 30% provincial, 30% corporate and 10% inflation-linked bonds in plan year 2017.

The assumed ultimate real yield on long-term federal bonds is 2.7%. The initial spreads over the federal bond real yield are assumed to be 80 basis points for provincial bonds and 150 basis points for corporate bonds. These spreads are much higher than in the last report and reflect the current economic environment. The ultimate spreads for provincial and corporate bonds are assumed to be 45 basis points and 90 basis points, respectively, and are reached at the end of plan year 2015. Corporate bond spreads are net of the expected default rate. Real return bonds, on the other hand, have a lower real yield than long-term federal bonds, since the real return is guaranteed and will not vary with inflation. Thus, the spread on inflation-linked bonds is assumed to be -50 basis points initially and will reach its ultimate value of -40 basis points at the end of plan year 2013.

The expected real rates of return for individual bonds take into account the coupons and market value fluctuations due to the expected movement of their respective long-term yield rates. As the economy continues to strengthen (following the 2008-2009 economic downturn), the long-term federal bond yield is assumed to increase between plan years 2012 and 2016 and only stabilize at the end of 2016. Therefore, bond returns are quite low for the first five years of the projection. The assumed ultimate real rate of return for long-term federal bonds is 2.7% starting in plan year 2017. An ultimate real rate of return of 3.1% is assumed for the fixed income portfolio for 2017 and thereafter.

Equity

Most Plan assets are currently invested in equity, specifically in developed world equity and emerging markets equity. In the derivation of the real rates of return for these equity investments, consideration was given to the long-term equity risk premiums for these equity classes. The rates of return also include dividends from the equities and market value fluctuations. No distinction is made between realized and unrealized capital gains.

Since the last actuarial valuation, equity returns have been very volatile. In plan year 2009, the Fund earned a nominal return of -22.7%, but it rebounded with nominal returns of 21.5% and 14.5% in plan year 2010 and 2011, respectively.

Consistent with the assumption that risk taking must be rewarded, equity returns are developed by adding an equity risk premium to the long-term federal bond real rate of return. The historical equity risk premium over bonds for 19 countries, representing almost 90% of global stock market value, for the 111-year period starting in 1900 was 3.8% (3.7% for Canada)[1]. Historical equity risk premiums were higher than expected due to several non-repeatable factors (mainly diversification and globalization). As a result, the long-term expected equity risk premium is assumed to be lower than what was realized in the past. However, the equity risk premium is assumed to be higher in the first five years of the projection (starting at 5.0% in plan year 2012, decreasing to 4.4% in plan year 2015 and to 2.0% for plan year 2017 and thereafter), reflecting assumed low bonds return over the next five years, before reaching its ultimate rate of 2.0% for Canadian and foreign developed markets. The equity risk premium for emerging market equities is expected to be

1 Source: Elroy Dimson, Paul Marsh and Mike Staunton, Credit Suisse Global Investment Returns Yearbook 2011.

1.0% higher than for Canadian and foreign developed market equities, reflecting the additional risk inherent with investments in emerging countries. As described in the previous section, the long-term federal bond real yield and real rate of return are set at 2.7% for plan years 2017 and thereafter.

Real rates of return for developed market equity investments are projected at 4.7% (5.7% for emerging markets) throughout the projection period.

Real Return Assets

Real return assets such as real estate and infrastructure are considered to be a hybrid of debt and equity. If these assets are considered to behave 40% like debt and 60% like developed market equities, then the assumed return should be composed of 40% of the return on the fixed income portfolio and 60% of the return on developed market equities. Thus, the assumed real return for these assets increases from 3.1% in plan year 2012 to 4.1% in the long term.

Table 33 summarizes the assumed real rates of return by asset type throughout the projection period, net of transaction costs and investment management fees.

Table 33 Real Rate of Return by Asset Type
(in percentage)

Plan Year	Fixed Income Securities	Canadian Equity	U.S. and Foreign Equity	Emerging Market Equity	Real Estate & Infrastructure
2012	0.7	4.7	4.7	5.7	3.1
2013	0.7	4.7	4.7	5.7	3.1
2014	1.5	4.7	4.7	5.7	3.4
2015	1.6	4.7	4.7	5.7	3.5
2016	2.0	4.7	4.7	5.7	3.6
2017+	3.1	4.7	4.7	5.7	4.1

c) Overall Rate of Return on Fund

The best-estimate rate of return on total assets was derived from the weighted average assumed rate of return on all types of assets, using the assumed asset mix proportions as weights. The best-estimate rate of return is further reduced to reflect PSPIB operating expenses. Over the last three plan years, operating expenses have been, on average, equal to about 0.20% of average net assets. It is assumed that going forward operating expenses will remain at 0.20% of average net assets. Therefore, the rates of return described in this section are net of all investment expenses (0.30%), that is, 0.10% for transaction costs and investment management fees and 0.20% for operating expenses. The resulting nominal and real rates of return are shown in table 34.

Table 34 Rates of Return on Assets in Respect of the Pension Fund
(in percentage)

Plan Year	Nominal	Real
2012	5.5	3.5
2013	5.5	3.5
2014	5.7	3.7
2015	5.7	3.7
2016	5.8	3.8
2017	6.1	4.1
2018	6.2	4.1
2019	6.3	4.1
2020+	6.4	4.1

For Plan assets, it is assumed that the ultimate real rate of return on investments will be 4.1%, net of all investment expenses. This represents a reduction of 0.2% from the previous valuation. The real rate of return on PSPIB assets takes into account the assumed asset mix of investments as well as the assumed real rate of return for all categories of PSPIB assets. The nominal returns projected for the Fund are simply the sum of the assumed level of inflation and the real return on the Fund.

4. Transfer Value Real Interest Rate

Commuted values are calculated in accordance with the Standards of Practice published by the Canadian Institute of Actuaries. In particular, the real interest rates to be used for the computation of commuted values as at a particular date are as follows:

First 10 years: $r_7 + 0.90\%$

After 10 years: $r_L + 0.5 \text{ x } (r_L - r_7) + 0.90\%$

Where $r_7 = r_L \text{ x } (i_7/i_L)$

r_L is the long-term real-return Government of Canada bond yield, annualized

i_L is the long-term Government of Canada benchmark bond yield, annualized and

i_7 is the 7-year Government of Canada benchmark bond yield[1], annualized

The obtained rates of interest are rounded to the next multiple of 0.10%.

For example, for plan year 2012, the assumed real rates of interest are 2.5% for the first 10 years and 2.7% thereafter. These rates were derived from the assumed 2012 CPI increase and the assumed 2012 long-term Government of Canada benchmark bond yield which corresponds to the new money rate in this valuation.

[1] It was deemed to be equal to 90% of the long-term Government of Canada benchmark bond yield.

5. Summary of Economic Assumptions

The economic assumptions used in this report are summarized in the following table.

Table 35 Economic Assumptions[1]
(As a percentage)

	Inflation		Employment Earning Increases				Interest		
Plan Year	CPI Increase	Pension Indexing[2]	IAAWE	YMPE[2]	Average Pensionable Earnings[3]	Maximum Pensionable Earnings[2,4]	New Money Rate	Yield Projected on Account	Yield Projected on Fund
2012	2.0	**2.8**	**3.0**	**3.7**	**1.75**	**3.7**	3.8	6.0	5.5
2013	2.0	2.0	2.7	2.5	**1.5**	2.5	4.0	5.7	5.5
2014	2.0	2.0	2.9	2.7	**2.0**	2.7	4.2	5.5	5.7
2015	2.0	2.0	3.1	2.8	2.6	2.8	4.4	5.3	5.7
2016	2.0	2.0	3.2	2.9	2.7	2.9	4.6	5.1	5.8
2017	2.0	2.0	3.4	3.0	2.8	3.0	4.7	4.9	6.1
2018	2.1	2.0	3.5	3.1	2.9	3.1	4.8	4.8	6.2
2019	2.2	2.1	3.6	3.3	3.0	3.3	4.9	4.7	6.3
2020	2.3	2.2	3.6	3.5	3.2	3.5	5.0	4.6	6.4
2021	2.3	2.3	3.6	3.6	3.4	3.6	5.0	4.6	6.4
2025	2.3	2.3	3.6	3.6	3.5	3.6	5.0	4.4	6.4
2030	2.3	2.3	3.6	3.6	3.5	3.6	5.0	4.6	6.4
2033	2.3	2.3	3.6	3.6	3.5	3.6	5.0	4.8	6.4
2035+	2.3	2.3	3.6	3.6	3.5	3.6	5.0	5.0	6.4

For the period ending December 2010, the following table was prepared based on the Canadian Institute of Actuaries Report on Canadian Economic Statistics 1924-2010.

Period of Years Ending 2010	15	25	50
Level of Inflation	1.96%	2.45%	4.11%
Real Increases in Average Earnings	0.51%	0.34%	0.98%
Real Return on Long-Term Canada Bonds	6.04%	6.97%	3.78%
Average Real Return on Diversified Portfolios	5.52%	6.01%	4.33%

1 Bold figures denote actual experience.
2 Assumed to be effective as at 1 January.
3 Assumed to occur throughout the plan year. Exclusive of seniority and promotional increases.
4 Calendar year 2012 Maximum Pensionable Earnings is $148,000

Appendix 7 – PSSA Demographic and Other Assumptions

A. Demographic Assumptions

Given the size of the population subject to the PSSA, the plan's own experience, except where otherwise noted, was deemed to be the best model to determine the demographic assumptions. Assumptions from the previous valuation were updated to reflect past experience to the extent it was deemed credible.

1. Seniority and Promotional Salary Increases

Seniority means length of service within a classification and promotion means moving to a higher paid classification.

The experience of the last three years compares closely to the assumptions reported in the last valuation report. Partial credibility was given to the experience from 1 April 2009 to 31 March 2011. For males with 0-8 years of service and 9-30 years of service the assumption is on average 3% higher and 3% lower respectively than the rates shown in the previous valuation report. For females in the same service range, the assumption was on average 5% higher and 1.5% lower respectively than the rates shown in the previous valuation report.

Table 36 Sample of Assumed Seniority and Promotional Salary Increases
(Percentage of annual earnings)

Completed Years of Pensionable Service	Male	Female
0	5.2	5.5
1	4.7	4.9
2	4.2	4.3
3	3.9	3.9
4	3.5	3.5
5	3.2	3.2
6	2.9	2.9
7	2.7	2.7
8	2.5	2.4
9	2.3	2.3
10	2.1	2.1
15	1.6	1.7
20	1.2	1.4
25	1.0	1.3
30	0.8	1.1

2. New Contributors

It was assumed that the distribution of new participants by age and sex would be the same as that of participants with less than one year of service at the valuation date. The assumed percentage increases for each plan year are shown in the following table:

Table 37 Assumed Annual Increases in Number of Contributors

Plan Year	Percentage
2012	-1.0
2013	-1.5
2014	-1.5
2015	-2.5
2016+	0.8

The initial salary of new members in a given age-sex cell in plan year 2012 is assumed to be the same as the corresponding experience in plan year 2011 with an economic salary increase for plan year 2012. Initial salary is assumed to increase in future years in accordance with the assumption for average earnings increases.

3. Pensionable Retirement

The assumed rates of pensionable retirement were revised to reflect the intervaluation experience. Overall, Public Service contributors have delayed their retirement when given the option of an annual allowance, but a higher number of contributors chose to retire when the immediate annuity became available below the age of 60. Members between the ages of 60 and 65 also delayed their retirement, again maybe because of the economic downturn and uncertainty.

The rates assumed for the main group of contributors were reduced by an average of 2% for the age and service combination that would provide for an annual allowance below 60, and increased by an average of 10% for the age/service combination that would provide for an immediate annuity. Retirement rates between the ages of 60 and 65 were reduced by an average of 14%.

The pensionable retirement rates for the operational service group were also changed to give partial credibility to the intervaluation experience.

The following tables provide sample rates of pensionable retirement.

Table 38 Sample of Assumed Rates of Retirement - Main Group - Male
(Per 1,000 individuals)

	Completed Years of Pensionable Service						
Age[1]	1	2	10	20	29	30	35
50	50	42	13	7	9	12	52
55	74	65	23	21	233	182	478
60	122	117	98	131	247	217	409
65	235	212	244	247	287	279	405
70	435	344	327	583	318	600	386

[1] Expressed in completed years calculated at the beginning of the plan year.

Table 39 Sample of Assumed Rates of Retirement - Main Group - Female
(Per 1,000 individuals)

	Completed Years of Pensionable Service						
Age[1]	1	2	10	20	29	30	35
50	52	54	15	11	13	16	20
55	89	84	32	39	283	223	400
60	105	106	134	199	281	254	318
65	207	212	282	312	370	325	306
70	299	307	268	347	299	244	282

Table 40 Sample of Assumed Rates of Retirement - Operational Service Group
(Per 1,000 individuals)

	Completed Years of Pensionable Service						
Age[1]	1	2	10	19	20	30	35
34-47	0	0	0	4	4	70	0
48	0	0	0	10	5	112	0
50	43	34	12	11	12	147	85
55	124	95	41	41	38	227	559
60	114	112	116	163	165	236	364
65	221	212	263	283	280	302	356

4. Disability Retirement

The disability incidence rate assumptions were revised to reflect the intervaluation experience. The assumed disability incidence rates for males were on average 5% lower than in the previous valuation. The assumed disability incidence rates for females were on average 7% higher than in the previous valuation.

It is assumed that 75% of future new disability pensioners will receive a C/QPP disability pension at the onset of disability. This is unchanged from the previous valuation.

Table 41 Sample of Assumed Rates of Pensionable Disability
(Per 1,000 individuals)

Age[1]	Male	Female
25	0.15	0.05
35	0.19	0.66
45	1.19	2.18
55	3.86	5.91
58	5.21	8.53

5. Withdrawal

Withdrawal means ceasing to be employed for reasons other than death or retirement with an immediate annuity or an annual allowance.

In all previous actuarial reports, the withdrawal assumptions had been set on the basis of pensionable service accrued at time of departure. Consequently the model was subject to a wide variation of results if the age of the member was taken into account, especially

[1] Expressed in completed years calculated at the beginning of the plan year.

when considering the financial impact of the transfer of the commuted value of the member's accrued pension. A review of the experience of the last ten years has shown that our actuarial model would benefit from introducing a withdrawal assumption based on both age and service as opposed to only service.

In order to develop the new assumption based on age and service so that it would be considered appropriate given the pre- and post-2008 economic conditions, the pension plan's own experience over the last eight years was used. Overall, the withdrawal rates based on age and service are in line with the previous service based assumptions if only service is considered. However, the rates are substantially different when age is factored into the equation. For example, the assumption for males based on a service last of zero is around 203 per 1,000 individuals as compared to 207 per 1,000 individuals assumed in the previous actuarial valuation. As shown in table 42, the service zero rates vary significantly by age.

The following tables provide a sample of assumed rates of withdrawal.

Table 42 Sample of Assumed Rates of Withdrawal - Main Group - Male
(Per 1,000 individuals)

	Completed Years of Pensionable Service						
Age[1]	0	1	5	10	20	25	30
20	305	299	35	0	0	0	0
25	124	108	28	20	0	0	0
30	99	82	27	12	0	0	0
35	88	74	23	12	6	0	0
40	82	69	23	14	6	7	0
45	84	68	17	13	5	4	2
48	93	72	17	14	7	4	5
50	125	0	0	0	0	0	0
55	134	0	0	0	0	0	0
60	209	0	0	0	0	0	0

Table 43 Sample of Assumed Rates of Withdrawal - Main Group - Female
(Per 1,000 individuals)

	Completed Years of Pensionable Service						
Age[1]	0	1	5	10	20	25	30
20	290	283	45	0	0	0	0
25	113	97	22	15	0	0	0
30	98	80	19	7	0	0	0
35	94	76	21	12	5	0	0
40	96	79	23	15	7	9	0
45	111	87	22	14	6	4	4
48	128	99	24	17	9	8	4
50	159	0	0	0	0	0	0
55	182	0	0	0	0	0	0
60	228	0	0	0	0	0	0

[1] Expressed in completed years calculated at the beginning of the plan year.

Table 44 Sample of Assumed Rates of Withdrawal - Operational Group Actual
(Per 1,000 individuals)

	Completed Years of Pensionable Service					
Age[1]	0	1	5	10	15	18
20	90	76	23	0	0	0
25	39	34	8	23	0	0
30	36	30	16	16	11	0
35	40	31	12	10	6	6
40	57	53	15	10	4	4
45	68	57	67	15	5	5
48	51	48	37	31	4	3
50	45	0	0	0	0	0
55	117	0	0	0	0	0
60	82	0	0	0	0	0

Table 45 Sample of Assumed Rates of Withdrawal - Operational Group Deemed
(Per 1,000 individuals)

	Completed Years of Pensionable Service						
Age[1]	0	1	5	10	20	25	30
20	90	76	23	0	0	0	0
25	39	34	8	23	0	0	0
30	36	30	16	16	0	0	0
35	40	31	12	10	6	0	0
40	57	53	15	10	4	6	0
45	68	57	67	15	0	0	0
48	51	48	37	31	0	0	0
50	45	0	0	0	0	0	0
55	117	0	0	0	0	0	0
60	82	0	0	0	0	0	0

6. Proportions of Terminating Contributors Opting for a Deferred Annuity

A contributor with at least two years of service and less than 50 years of age upon termination can opt for a deferred annuity payable at age 60 or for the commuted value of the deferred annuity to age 60. In the last report it was assumed that approximately two-thirds of these terminating contributors elected the commuted value rather than the deferred annuity to age 60. These proportions were based on age and service at time of termination without distinction of gender. The assumed proportions of contributors opting for a deferred annuity were revised to reflect the intervaluation experience and to account for the different behaviour between males and females.

For the main group of contributors, the proportions opting for a deferred annuity at age 60 were reduced on average by 3% and 2% respectively for male and female contributors. After reviewing the experience of the operational group, the proportions of terminating members opting for a deferred annuity are unchanged from the previous valuation.

[1] Expressed in completed years calculated at the beginning of the plan year.

The following tables provide a sample of the proportions of terminating contributors opting for a deferred annuity to age 60.

Table 46 Sample of Proportions Opting for a Deferred Annuity - Main Group - Male
(Per 100 individuals)

	Completed Years of Pensionable Service						
Age[1]	1	5	10	15	20	25	30
20	4	0	0	0	0	0	0
25	13	50	0	0	0	0	0
30	16	50	41	0	0	0	0
35	15	48	50	37	0	0	0
40	16	43	40	34	48	0	0
45	15	45	55	41	50	46	0
48	15	50	55	36	36	30	11

Table 47 Sample of Proportions Opting for a Deferred Annuity - Main Group - Female
(Per 100 individuals)

	Completed Years of Pensionable Service						
Age[1]	1	5	10	15	20	25	30
20	11	26	0	0	0	0	0
25	15	51	17	0	0	0	0
30	19	55	37	17	0	0	0
35	19	52	44	32	14	0	0
40	20	52	45	38	33	17	0
45	18	61	47	43	41	37	11
48	21	58	46	42	39	32	30

Table 48 Sample of Proportions Opting for a Deferred Annuity - Operational Service Group
(Per 100 individuals)

	Completed Years of Pensionable Service						
Age[1]	1	5	10	15	20	25	30
20	17	52	0	0	0	0	0
25	17	52	33	0	0	0	0
30	21	57	33	33	0	0	0
35	22	72	43	34	27	0	0
40	24	56	44	34	32	33	0
45	22	73	43	39	38	33	22
48	24	55	42	43	37	31	24

7. Mortality

The mortality rate assumptions were created by giving partial credibility to projected mortality rates from the previous report and partial credibility to the intervaluation experience.

For contributors and retirement pensioners, the new base year mortality rates are lower at most ages. In particular, at ages 30-40 the assumed mortality rates declined by an

1 Expressed in completed years calculated at the beginning of the plan year.

average of 15% for males and 5% for females. For ages 65-75 the assumed mortality rates declined by an average of 14% for males and 7% for females.

The assumed mortality rate for disability pensioners was lowered at almost all ages. Between the ages of 30 and 80 the assumed mortality rates were lowered by an average of 8% for males and 6% for females.

The assumed mortality rates for spouse survivors were also revised based on intervaluation experience. The most significant changes occurred between ages 60 and 75 for widows, with an average reduction of 18%, while for widowers the ages most significantly impacted were those between 70 and 90, with an average reduction of 13%. Considering all ages, the mortality rates were reduced on average by 8% and 3% respectively for widows and widowers.

Table 49 Sample of Assumed Rates of Mortality
For Plan Year 2012
(Per 1,000 individuals)

	Contributors and Retirement Pensioners		Disability Pensioners		Surviving Spouses	
Age[1]	Male	Female	Male	Female	Male	Female
30	0.5	0.3	7.1	6.0	1.2	0.4
40	0.7	0.4	12.5	7.0	2.6	0.9
50	1.9	1.3	15.5	9.0	4.5	2.6
60	5.6	4.1	22.9	13.9	8.3	5.4
70	17.5	11.9	41.3	24.0	20.8	12.8
80	56.0	37.4	90.3	63.3	62.7	35.4
90	160.2	120.1	196.9	168.1	156.2	110.1
100	345.1	304.1	468.1	455.9	353.4	317.5
110	500.0	500.0	500.0	500.0	500.0	500.0

As shown in the 25th Actuarial Report on the Canada Pension Plan, life expectancy in Canada has been increasing constantly over the years. This trend is also observed in the PSSA plan population, as supported by analysis of past mortality experience. Mortality rates are reduced in the future in accordance with the same longevity improvement assumption used in the 25th Actuarial Report on the Canada Pension Plan. For both males and females, the improvement factors are higher than those used in the previous valuation except at advanced ages. Factors shown in the 25th Actuarial Report of the Canada Pension Plan are based on calendar years. These factors have been interpolated to obtain plan year longevity improvement factors.

The ultimate longevity improvement factors for plan years 2031 and thereafter were established by analysing the trend by age and sex of the Canadian experience over the period 1921 to 2006. Improvement factors for plan year 2012 are assumed to be those experienced on average over the 15-year period from 1991 to 2006. After plan year 2012, the factors are assumed to reduce gradually to their ultimate level by plan year 2031.

A sample of assumed longevity improvement factors is shown in the following table.

1 Expressed in completed years calculated at the beginning of the plan year.

Table 50 Sample of Assumed Longevity Improvement Factors
(applicable at the end of the plan year)

	Initial and Ultimate Plan Year Mortality Reductions (%)			
	Male		Female	
Age[1]	2012	2031+	2012	2031+
30	2.77	0.80	1.55	0.80
40	2.11	0.80	1.32	0.80
50	1.83	0.80	1.26	0.80
60	2.30	0.80	1.37	0.80
70	2.49	0.80	1.46	0.80
80	2.01	0.70	1.45	0.70
90	1.15	0.44	0.68	0.44
100	0.35	0.30	0.11	0.30
110+	0.02	0.30	0.02	0.30

8. Family Composition

The assumptions regarding spouse survivors were revised based on the intervaluation experience. The assumptions regarding the probability of leaving, upon death, a spouse eligible for a survivor pension were marginally reduced between the ages of 45 and 80 for males, and marginally increased for females. The assumption regarding the age of both widows and widowers relative to the deceased member were kept the same as in the previous report.

Table 51 Assumptions for Survivor Spouse Allowances[2]

	Male		Female	
Age[1]	Probability of an Eligible Spouse at Death of Member	Spouse Age Difference	Probability of an Eligible Spouse at Death of Member	Spouse Age Difference
30	0.43	(1)	0.53	1
40	0.57	(2)	0.54	2
50	0.69	(3)	0.58	2
60	0.73	(4)	0.53	2
70	0.72	(3)	0.40	1
80	0.62	(4)	0.19	(1)
90	0.41	(7)	0.04	(5)
100	0.10	(10)	0.00	-

The assumptions regarding the average number of eligible children were revised based on the intervaluation experience. For male members between the ages of 30 and 54 the average number children assumed to be eligible for a survivor allowance decreased on average by 5%, while between the ages of 55 and 70, the average number of children was reduced by an average of 13%.

[1] Expressed in completed years calculated at the beginning of the plan year.
[2] Survivor pensions are not payable if the deceased member has less than two years of pensionable service.

For female members between the ages of 30 and 60, the average number children assumed to be eligible for a survivor allowance increased on average by 4%.

The assumption regarding the average age of eligible children was increased on average by one year for both male and female members. As in the previous valuation, to determine the value of pensions payable to eligible children, the rates of pension termination were assumed to be zero prior to age 17 and 16% per annum thereafter until expiry of the benefit on the 25th birthday.

The revision to family composition assumptions has a negligible impact on the valuation results.

Table 52 Assumptions for Survivor Children Allowances

Age Last Birthday at Death	Male		Female	
	Average Number of Children	Average Age of Children	Average Number of Children	Average Age of Children
30	0.72	3	0.69	3
40	0.94	10	0.84	12
50	0.66	16	0.34	17
60	0.09	18	0.03	-
70	0.01	-	0.00	-

B. Other Assumptions

1. Pension Benefits Division/Optional Survivor Benefit/Leave Without Pay

The division of pension benefits has almost no effect on the valuation results because the liability is reduced, on average, by approximately the amount paid to the credit of the former spouse. Consequently, no future pension benefits divisions were assumed in estimating the current service cost and liability. However, past pension benefits divisions were fully reflected in the liability. Two other provisions, namely the optional survivor benefit and the suspension of membership while on leave without pay, were also treated like pension benefits divisions for the same reason.

2. Minimum Post-Retirement Death Benefit

This valuation does not take into account the minimum death benefit described in Note 14 of Appendix 1D, with respect to deaths occurring after retirement. The resulting understatement of the accrued liability and current service cost is not material since the majority of the relatively few pensioners who die in the early years of retirement leave an eligible survivor.

3. Administrative Expenses

In the previous report, the Public Service Pension Investment Board (PSPIB) operating expenses were implicitly recognized through a reduction in the real return on the Fund. In this report, the operating expenses of the PSPIB are still recognized implicitly.

As in the previous report, it is assumed that administrative expenses will be 0.4% of pensionable payroll as corroborated by an analysis of the administrative expenses over the last three years.

The analysis has also shown that the proportions of total administrative expenses by plan year being charged to the Fund is increasing at an annual rate of 2.8% in accordance with the assumption used in the previous report. Expenses expected to be debited to the Account in the future have been capitalized and are shown as a liability on the balance sheet, whereas the expenses to the Fund are shown on an annual basis as they occur.

As mentioned in the previous report, the PWGSC "Pension Modernization" project is still expected to be completed by March 2012. This project's cost continues to be charged directly against both Account and Fund. This valuation recognizes the present value of the expected remaining administration expenses associated with the realization of this project. A total of $27 million and $13 million is earmarked and charged against the Account and the Fund respectively.

4. Financing of Elected Prior Service

The assumed future government credits in respect of prior service elections vary according to the rate paid by the contributor (i.e. single or double) and the vehicle into which the contributions are deposited (i.e. Account or Fund). The government matches member contributions made to the Superannuation Account for prior service elections; however, it makes no contributions if the member is paying the double rate. Government credits to the Pension Fund in respect of elected prior service are as described for current service; however, the government contributes only 0.75 of the member contribution if the member is paying the double rate.

5. Outstanding Terminations

Amounts paid from 1 April 2011 onward for terminations that occurred prior to that date were estimated from actual payments made from 1 April 2011 onward using PWGSC historical information provided as at November 2011. After reviewing the information from PWGSC, the amount for outstanding terminations was marginal and consequently no amount for outstanding payments was set aside for this valuation.

6. Disability Incidence Rates for Pensioners Under Age 60

Both deferred pensioners and pensioners receiving an annual allowance while under age 60 were assumed to have a 0% disability rate. The resulting understatement of liability and current service cost is negligible.

7. Recovery Rates for Disability Pensioners

No recoveries are assumed for disability pensioners. The resulting overstatement of liability and current service cost is negligible.

8. Sex of Surviving Spouses

Each eligible surviving spouse is assumed to be of the opposite sex.

Appendix 8 – RCA Valuation Methodology and Assumptions

A. Valuation of the Amounts Available for Benefits

The amounts available for benefits in respect of the RCA comprise the recorded balance in the Retirement Compensation Arrangements (RCA No. 1 and RCA No. 2), Accounts, which forms part of the Accounts of Canada, as well as a tax credit (CRA refundable tax). Each calendar year, a debit is made from the RCA Account such that in total roughly half the recorded balance in the Account is held as a tax credit (CRA refundable tax).

Interest is credited every three months in accordance with the actual average yield on a book value for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces – Regular Force and Royal Canadian Mounted Police pension plans. The actuarial asset value is equal to the book value.

B. Valuation of Liabilities

Described in this Appendix are the liability valuation methodologies used and any differences in economic assumptions from those used in the PSSA valuation.

1. Terminally Funded RCA Benefits

The following RCA benefits are being terminally funded (i.e. not prefunded but on an occurrence basis):

- Early Retirement Incentive (ERI) program
- pre-retirement survivor benefits
- minimum death benefit
- elective service.

Except for the now-closed ERI program, the above benefits are terminally funded because they are uncommon or of little financial significance. For example, the pre-retirement survivor benefit becomes payable only when the average salary is less than 1.4 times the YMPE. As well, the minimum death benefit is expected to occur only with deaths at younger ages where the probability of death is small.

2. RCA No. 1 Post-retirement Survivor Benefits

The limit on the amount of spousal annual allowance that can be provided under the PSSA decreases at the same time the member’s pension is reduced due to the C/QPP offset, which usually occurs at age 65.

This benefit was valued conservatively by assuming the plan limit is always reduced by the C/QPP offset. The liability overstatement is minor because the probability of the former contributor dying prior to age 65 is small. (This overstatement tends to be offset by the understatement of accrued liability caused by terminally funding the pre-retirement survivor benefit.) The projected accrued benefit cost method was used to estimate the liabilities and normal costs for this RCA No. 1 benefit.

3. RCA No. 1 Continued Benefit Accrual for Former Deputy Heads

All former deputy heads that have accrued or are accruing benefits are included. For those accruing benefits, it was assumed that they would cease to do so when first eligible to an immediate annuity.

4. RCA No. 1 Excess Pensionable Earnings

The projected accrued benefit cost method (described in details in section B of Appendix 5 was used to estimate plan liability and current service costs for retirement benefits in excess of the Maximum Pensionable Earnings (MPE).

5. Administrative Expenses

To compute the liability and current service costs, no provision was made regarding the expenses incurred for the administration of both RCA No. 1 and RCA No. 2 Accounts. These expenses, which are not debited from the RCA No. 1 and RCA No. 2 Accounts, are borne entirely by the government and are combined with all other government expenses.

C. Actuarial Assumptions

The valuation economic assumptions are those described in Appendix 6 and shown in Table 35, except that the interest discount rate used to determine the liability of the RCA No. 1 and RCA No. 2 , and the current service cost of RCA No. 1 is one-half of the yield projected on the combined Superannuation Accounts.

D. Valuation Data

Pension benefits in payments to be debited from the RCA No. 1 and RCA No. 2 were provided as at 31 March 2011. RCA No. 1 and RCA No. 2 benefits expected to be paid in respect of contributors and accrued spousal allowances of current retired members were all derived from the membership data described in Appendix 4 and shown in Appendix 12.

Appendix 9 – Superannuation Account Projection

Prior to 1 April 2000, the PSSA was entirely financed through the Public Service Superannuation Account. The Account is now debited only with benefit payments made in respect of service earned before that date and administrative expenses; and it is credited with prior service and leave without pay contributions related to elections made prior to 1 April 2000 and interest earnings.

The results of the following projection were computed using the amounts available for benefits described in Appendix 3, the data described in Appendices 4 and 12, the methodology described in Appendix 5 and the assumptions described in Appendices 6 and 7.

The projection shows the expected cash flows and balance of the Superannuation Account if all assumptions are realized. If the Account balance exceeds 110% of the liability, an actuarial excess reduction is triggered to bring the balance down to 110% and is reflected in this projection. Emerging experience, differing from the corresponding assumptions, will result in gains or losses to be revealed in subsequent valuation reports. Based on the assumptions of this report, the Superannuation Account is expected to start decreasing during plan year 2016.

Table 53 Superannuation Account Projection
($ millions)

Plan Year	Beginning Account Balance	Actuarial Excess Reduction	Net Payments	Interest Earnings[1]	Beginning Liability[2]	Beginning Actuarial Excess
2012	95,927	0	4,821	5,613	93,057	2,870
2013	96,719	0	4,983	5,373	93,634	3,085
2014	97,110	0	5,105	5,203	93,814	3,296
2015	97,207	0	5,220	5,015	93,701	3,506
2016	97,003	0	5,327	4,813	93,289	3,714
2017	96,488	0	5,424	4,597	92,568	3,920
2018	95,661	0	5,506	4,461	91,538	4,123
2019	94,616	0	5,574	4,317	90,289	4,327
2020	93,360	0	5,634	4,166	88,826	4,533
2025	84,559	0	5,807	3,594	78,894	5,665
2030	72,428	577	5,654	3,203	65,843	6,584
2035	57,237	531	5,179	2,734	52,034	5,203
2040	42,437	455	4,440	2,012	38,579	3,858
2045	28,673	358	3,490	1,347	26,066	2,607
2050	17,324	251	2,450	806	15,749	1,575

[1] The actuarial excess reduction is calculated using the liabilities and Account balance at the end of the plan year.
[2] Benefit payments plus administrative expenses minus prior service contributions.

Appendix 10 – Pension Fund Projection

Starting 1 April 2000, the PSSA is financed through the Public Service Pension Fund. The Fund is credited with employer and employee contributions, investment earnings and with prior service contributions for elections since 1 April 2000. The Fund is debited with benefit payments made in respect of service earned since that date and administrative expenses.

The results of the following projection were computed using the data described in Appendices 4 and 12, the methodology described in Appendix 5 and the assumptions described in Appendices 6 and 7.

The projection shows the expected growth of the Pension Fund if all assumptions are realized. According to the projection, cash flows are expected to be positive until plan year 2034. Emerging experience, differing from the corresponding assumptions, will result in gains or losses to be revealed in subsequent valuation reports.

Table 54 Pension Fund Projection
($ millions)

Plan Year	Expected Unrecognized Investment (Gains)/Losses	Present Value of Prior Service Contributions	Beginning Market Value of Assets	Contributions[1]	Payments[2]	Investment Earnings	Special Payment at end of Pan Year	Beginning Actuarial Liabilities
2012	(765)	660	42,530	4,190	888	2,429	0	46,848
2013	(1,541)	590	48,261	4,301	1,057	2,742	397	52,710
2014	(1,936)	527	54,643	4,411	1,248	3,204	397	58,845
2015	(581)	471	61,406	4,514	1,457	3,586	397	65,365
2016	0	419	68,447	4,654	1,685	4,055	397	72,155
2017	0	369	75,868	4,864	1,940	4,716	397	79,321
2018	0	323	83,905	5,105	2,217	5,290	397	87,102
2019	0	279	92,479	5,374	2,513	5,915	397	95,414
2020	0	236	101,653	5,660	2,833	6,595	397	104,315
2021	0	194	111,471	5,959	3,186	7,222	397	113,850
2022	0	156	121,862	6,274	3,571	7,884	397	123,946
2023	0	122	132,847	6,602	3,987	8,585	397	134,623
2024	0	94	144,443	6,942	4,435	9,323	397	145,900
2025	0	69	156,671	7,299	4,913	10,102	397	157,794
2026	0	50	169,556	7,675	5,420	10,923	397	170,330
2027	0	35	183,131	8,074	5,959	11,787	397	183,538
2028	0	24	197,430	8,492	6,538	12,697	0	197,454
2030	0	11	227,471	9,386	7,862	14,606	0	227,482
2040	0	1	418,431	14,652	18,681	26,653	0	418,431
2050	0	0	684,780	22,895	33,261	43,499	0	684,780

[1] Total current service cost plus prior service contributions.
[2] Benefit payments and administrative expenses.

Appendix 11 – Uncertainty of Results

A. Introduction

The financial status of the Plan depends on many demographic and economic factors, including new contributors, average earnings, inflation, the level of interest rates and investment returns. The projected long-term financial status of the Plan is based on best-estimate assumptions; the objective of this section is to present alternative scenarios. The alternatives presented illustrate the sensitivity of the long-term projected financial position of the Plan to changes in the future economic outlook. In this appendix, any references to assets, liabilities, surplus/(deficit), annual special payments and service cost relates to the Pension Fund.

Section B examines the sensitivity of the Plan to different asset allocations. Five alternative investment portfolios are described, along with the volatility of each portfolio and the resulting impact on the Plan's financing ratio and current service cost. The impact of financial market volatility on the financial status of the Plan is explored in section C, where severe one-time financial shocks are applied to three investment portfolios with the purpose of quantifying the impact on the financing ratio over the short term.

B. Sensitivity of Investment Policy

A major risk all pension plans face is funding risk – the risk that assets backing the liabilities are insufficient to meet pension obligations. If funding deficiencies or surpluses continue for an extended period of time, risk is transferred from one generation to another and may ultimately take the form of an increase or a decrease in the contribution rate.

The PSSA represents a long-term obligation to pay pension benefits. Thus, a long-term approach must be taken to fund these obligations. Long-term Government of Canada bonds are considered risk-free and their yields are considered low. The real yield on long-term federal bonds was around 1.8% in March 2011. This is significantly below the required real return on assets of 4.1% that is needed to sustain the plan at the current contribution rate.

By investing solely in risk-free long-term federal bonds, all funding risk could be eliminated with an excessive cost and at the detriment of current and future contributors, who will have to contribute more unless benefits were decreased. If PSPIB were to switch from the current portfolio of fixed and variable income securities to a portfolio that consists only of long-term Government of Canada bonds, the current service cost of the plan would have to increase substantially in order to maintain the current funding status or benefits would have to be reduced. Neither of these is a desirable option. The Government created the PSPIB to invest amounts equal to the Plan's contributions in excess of benefits with the purpose of maximizing investment returns without undue risk of loss. The current service cost is less than it would have been if the investment policy had been restricted to long-term government bonds. Diversifying the portfolio into a mix of fixed and variable income securities accomplishes this.

The current service cost can be reduced by investing in securities that offer a higher rate of return than risk-free long-term federal bonds, but that also have a higher degree of risk or volatility. That is, funds can be invested in a mix of investments, such as equities and bonds, with the expected rate of return equal to the yield required to meet the plan's funding requirements. By investing in riskier assets, investors hope to realize the equity risk premium as their reward for taking on additional risk. An equity risk premium is the difference between the expected return on the risky asset (equity) and the expected return on a risk-free asset, such as the Government of Canada long-term bond mentioned above.

Of course, these higher returns are expected but not guaranteed, creating the very real possibility that the market will not perform as expected and liabilities will grow at a faster rate than investments for an extended period of time. This is known as market risk. Since investing solely in risk-free long-term federal bonds will not produce a return sufficient to maintain the plan at the status quo, it is necessary to take some risk in order to increase the probability of earning a sufficient return. Even if investment returns materialize as expected, other assumptions may not, causing liabilities to grow at a faster rate than assets. For example, salaries or inflation may increase at a higher rate than expected. The amount of risk assumed by the plan sponsor depends on many factors, including the current funding status and economic outlook, among other things. Thus, the investment policy must balance the Plan's desire for a high real rate of return with the sponsor's tolerance or capacity for taking risk.

The following table shows the impact that various asset mixes would have on the financing ratio and the long-term service cost, as well as their relative volatility.

Table 55 Investment Policy Impact on Liability Financing

	Assets Mixed							
	Fixed Income	Equity	Real Return	Ultimate Real Rate of Return	1 year Standard Deviation	Pension Assets Financing Ratio as at 31 March 2011	Current Service Cost (2017)	Annual Special Payment ($ millions)
Portfolio n°1	100%	0%	0%	2.7%	9.0%	69%	28.4%	1,964
Portfolio n°2	100%	0%	0%	3.1%	8.1%	76%	25.7%	1,414
Portfolio n°3	80%	15%	5%	3.4%	8.1%	81%	23.9%	1,043
Portfolio n°4	50%	35%	15%	3.8%	9.9%	87%	21.8%	635
Best-Estimate Portfolio	20%	55%	25%	4.1%	12.9%	91%	20.3%	397
Portfolio n°5	0%	100%	0%	4.5%	18.0%	98%	18.6%	22

Although the riskiest portfolio leads to the highest expected return, the highest financing ratio and the lowest required current service cost, its volatility is significantly higher which may lead to significant additional contribution requirements.

Portfolio #1 is invested in long-term federal bonds. This portfolio does not result in a feasible scenario due to its prohibitive cost; however, its volatility is low when compared to the other portfolios considered. Portfolio #2 is invested in a marketable bond portfolio consisting of federal, provincial, corporate and real return bonds. This diversification increases the real rate of return earned on the portfolios and reduces its volatility compared to the first portfolio since the four bond asset categories are not perfectly correlated. Although this portfolio produces a higher real rate of return compared to Portfolio #1, it is still not sufficient to ensure the plan remains fully funded while maintaining an acceptable current service cost. This is also a low risk, low return portfolio. Thus, a portfolio with greater diversification in variable income assets is required in order to keep funding cost to a reasonable level.

The following portfolios are diversified portfolios that combine equity and real return assets, such as real estate and infrastructure, to fixed income securities. Portfolio #3 and portfolio #4 are more diversified than the first two portfolios and are invested 15% and 35%, respectively, in equity. This diversification increases the real rate of return earned on these portfolios and keeps their volatility comparable to the first two portfolios since the three broad asset categories are not perfectly correlated. However, despite an increased real return and similar risk, these portfolios are still not sufficient to maintain the current funded ratio. Thus, an increase in the plan's current service cost would be required with both portfolios. Since this is not desirable, it is necessary to invest in a slightly more risky portfolio.

Portfolio #5 is considered a more risky portfolio because it is entirely invested in equity, which has much more volatile returns than bonds. This portfolio is likely to result in higher than necessary returns, resulting in either an improvement to the plan's funding ratio or a decrease to the current service cost. However, the volatility of this portfolio is quite high. By investing in a less risky portfolio, a reasonable current service cost can still be achieved along with lower volatility, and therefore, a lower probability of significant losses and large unforeseen additional contributions.

The best-estimate portfolio is invested 20% in fixed income securities, 55% in equity and 25% in real return assets in the long-term, which is very close to PSPIB's current long term asset-mix objective. Such a portfolio produces an ultimate annual real return of 4.1% net of all investment expenses (transaction costs, investment management fees and operating expenses, together assumed to total 0.30% of assets) with a standard deviation of 12.9%. By observing the volatility of each of the portfolios in table 55, it can be concluded that a certain degree of risk must be undertaken in order to earn a sufficient return. Thus, an asset allocation such as the best-estimate portfolio shows that an average real return of 4.1% can be achieved with some degree of risk. More risky portfolios, such as portfolio #5, may produce a higher real return, on average, but with a higher degree of risk.

C. Financial Market Tail Events

This section focuses on the volatility present in the best-estimate portfolio and the extreme outcomes that could result. During plan year 2009, the nominal return on Plan assets was -22.7% due to the economic slowdown. Such an event could be characterized as low probability (also referred to as a "tail event"). However, when these events do occur, the impact on the financing ratio is significant. This section analyzes the impacts that tail events in portfolio returns will have on the Plan's financing ratio. To illustrate this, portfolio returns other than the best-estimate are assumed to occur in plan year 2014. Two alternative portfolios were selected from section B to show the potential variation in tail returns of a less risky (Portfolio 4: 35% equity, 15% real estate and infrastructure, 50% fixed income) and a more risky (Portfolio 5: 100% equity) portfolio in relation to the best estimate portfolio.

It is assumed that the returns of the three portfolios follow a normal distribution. The mean and standard deviation for each portfolio is given in table 55 in section B. Two probability levels were selected for analysis: 1/10 and 1/50. These levels can be thought of as the probabilities of earning a given return once every 10 and 50 years, respectively. Since the normal distribution has two tails, a left tail and a right tail, both were examined. The left tail event is the occurrence of a nominal return such that the probability of earning that return or less is equal to 1/10 (or 1/50). The right tail event is the occurrence of a nominal return such that the probability of earning that return or more is equal to 1/10 (or 1/50).

For each portfolio a nominal return is calculated for plan year 2014 at the two probability levels. The nominal returns are given in the following table.

Table 56 Tail Event Portfolio Returns

Probability of return[1]	Tail	Portfolio 4: 35% Equities/ 50% Fixed Income/ 15% Real Estate & Infrastructure Nominal Return	Best-Estimate Portfolio: 55% Equities/ 20% Fixed Income/ 25% Real Estate & Infrastructure Nominal Return	Portfolio 5: 100% Equities Nominal Return
1/10	Left	-6.9%	-10.4%	-16.6%
	Right	18.5%	22.6%	29.6%
1/50	Left	-14.5%	-20.4%	-30.5%
	Right	26.1%	32.6%	43.5%

Table 57 shows the impact on the projected Surplus/(Deficit) as at 31 March 2014 (the expected date of the next actuarial review) if the nominal return for plan year 2014 happens to be equal to the returns presented in table 56 for the best-estimate scenario. Following the various portfolio returns in plan year 2014, it is assumed that the return will revert back to its best-estimate value for plan year 2015.

Table 57 Sensitivity of the Projected Surplus/(Deficit) as at 31 March 2014
($ millions)

Assumption(s) Varied	Present Value of Prior Service Contributions	Beginning Market Value of Assets	Liability	Surplus/ (Deficit)	Annual Special Payments[2]
None (i.e. current basis)	471	61,407	65,365	(3,487)	385
Investment return					
- Left Tail event at 1/10th probability	471	53,020	65,365	(11,874)	1,313
- Right Tail event at 1/10th probability	471	70,405	65,365	-	-
- Left Tail event at 1/50th probability	471	46,916	65,365	(17,978)	1,987
- Right Tail event at 1/50th probability	471	74,841	65,365	-	-

1 The probability of earning the positive returns in the table corresponds to the probability that the annual return is greater than or equal to the indicated return. Similarly, the probability of earning a negative portfolio return corresponds to the probability of earning the indicated return or less.

2 Equal annual special payments to amortize the deficit over the next 15 years starting 31 March 2016

Appendix 12 – Detailed Information on Membership Data

Table 58 Male Contributors (Main Group)
Number and Average Annual Earnings[1] as at 31 March 2011

Age[2]	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service[2]
<25	2,691	22							2,713
	$48,155	$61,438							$48,263
25-29	8,595	1,529	23						10,147
	$57,571	$67,348	$65,035						$59,061
30-34	7,388	5,609	1,408	11					14,416
	$62,138	$73,375	$77,996	$78,079					$68,071
35-39	5,266	5,291	4,320	476	19				15,372
	$64,812	$76,077	$82,194	$82,989	$85,114				$74,162
40-44	4,424	4,026	4,038	2,768	1,193	30			16,479
	$67,350	$76,590	$83,265	$88,128	$83,426	$93,781			$78,209
45-49	4,315	3,751	3,446	2,868	4,488	1,722	136		20,726
	$68,661	$76,816	$81,852	$85,909	$85,663	$82,160	$77,129		$79,575
50-54	3,093	2,771	2,750	2,039	3,706	4,855	2,770	225	22,209
	$70,940	$77,048	$79,372	$83,376	$85,478	$88,532	$80,089	$78,962	$81,382
55-59	1,824	1,819	1,833	1,391	2,357	3,204	2,840	730	15,998
	$73,857	$76,595	$78,062	$81,349	$82,919	$90,035	$88,520	$79,832	$82,752
60-64	815	941	882	670	1,040	1,066	1,003	667	7,084
	$77,424	$78,406	$77,098	$80,830	$82,418	$87,140	$92,783	$88,884	$83,285
>65	193	254	249	202	270	243	230	251	1,892
	$84,149	$80,551	$83,075	$82,119	$82,377	$89,137	$95,356	$99,513	$87,096
All Ages	38,604	26,013	18,949	10,425	13,073	11,120	6,979	1,873	127,036
	$63,529	$75,422	$80,993	$84,853	$84,585	$87,872	$85,790	$85,589	$76,165

	31 March 2011	31 March 2008
Average age[2]:	45.1 years	44.7 years
Average pensionable service[2]:	12.6 years	12.7 years
Annualized pensionable payroll[3]:	$9,675,709,960	$8,651,912,485
Total PBDA[4] indexed reduction to basic annuity:	$13,736,006	$13,739,112
Total PBDA[4] indexed reduction adjustment:	$3,017,159	$3,096,143

1 As defined in Note 1, section D of Appendix 1.
2 Expressed in completed years calculated at the beginning of the plan year.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.
4 PBDA means the *Pension Benefits Division Act*.

Table 59 Female Contributors (Main Group)
Number and Average Annual Earnings[1] as at 31 March 2011

Age[2]	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service[2]
<25	3,974	24							3,998
	$47,888	$55,701							$47,935
25-29	11,634	2,085	28						13,747
	$56,426	$64,652	$65,995						$57,693
30-34	9,187	7,462	2,021	4					18,674
	$59,162	$69,362	$71,434	$71,905					$64,569
35-39	6,564	6,509	5,850	797	39				19,759
	$60,016	$70,832	$76,200	$75,483	$68,302				$69,011
40-44	5,298	5,051	5,050	3,503	2,331	58			21,291
	$59,066	$68,442	$76,031	$79,229	$73,838	$70,862			$70,281
45-49	4,730	4,488	4,375	3,289	5,528	3,220	423		26,053
	$58,667	$66,568	$70,601	$75,956	$76,881	$72,947	$69,162		$70,015
50-54	3,322	3,484	3,728	2,778	3,928	4,957	4,439	620	27,256
	$58,672	$65,722	$66,927	$71,510	$75,119	$78,025	$69,917	$68,245	$69,950
55-59	1,739	2,058	2,448	1,977	2,676	2,672	2,097	778	16,445
	$60,531	$63,916	$64,711	$67,828	$69,632	$75,717	$75,491	$70,073	$68,761
60-64	660	797	980	824	1,071	788	542	381	6,043
	$61,160	$62,327	$63,378	$64,768	$67,023	$71,041	$70,708	$75,249	$66,238
>65	118	161	194	157	224	180	117	117	1,268
	$62,679	$61,740	$61,214	$64,590	$63,432	$63,894	$70,448	$68,328	$64,116
All Ages	47,226	32,119	24,674	13,329	15,797	11,875	7,618	1,896	154,534
	$57,651	$67,852	$71,602	$73,829	$73,886	$75,416	$71,474	$70,408	$67,257

	31 March 2011	31 March 2008
Average age[2]:	44.0 years	43.4 years
Average pensionable service[2]:	12.2 years	11.6 years
Annualized pensionable payroll[3]:	$10,393,451,360	$9,251,343,562
Total PBDA[4] indexed reduction to basic annuity:	$2,571,712	$1,993,468
Total PBDA[4] indexed reduction adjustment:	$681,020	$568,613

1 As defined in Note 1, section D of Appendix 1.
2 Expressed in completed years calculated at the beginning of the plan year.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.
4 PBDA means the *Pension Benefits Division Act*.

Table 60 Male Contributors (Operational Group)
Number and Average Annual Earnings[1] as at 31 March 2011

Age[2]	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service[2]
<25	138	1							139
	$55,769	$73,780							$55,899
25-29	609	66	3						678
	$59,637	$67,902	$74,450						$60,507
30-34	602	352	115						1,069
	$61,709	$70,060	$71,595						$65,522
35-39	426	393	607	38					1,464
	$62,027	$69,866	$73,451	$73,622					$69,169
40-44	278	204	445	222	102	1			1,252
	$61,036	$70,543	$73,541	$76,585	$75,223	$71,180			$70,951
45-49	204	46	167	170	344	96	2		1,029
	$61,243	$67,318	$72,716	$74,240	$75,804	$76,963	$66,850		$71,869
50-54	107	31	48	75	238	211	131		841
	$60,581	$67,575	$70,769	$72,853	$73,968	$77,960	$77,329		$73,272
55-59	60	22	23	20	88	123	125	1	462
	$66,457	$64,690	$67,339	$75,950	$71,608	$78,613	$78,978	$67,660	$74,435
60-64	18	4	10	5	20	20	35		112
	$67,038	$67,180	$63,440	$59,198	$71,970	$78,318	$77,014		$72,384
>65	6	1	1		4	1	5		18
	$75,438	$58,330	$67,080		$66,418	$68,540	$82,098		$73,486
All Ages	2,448	1,120	1,419	530	796	452	298	1	7,064
	$60,939	$69,649	$72,980	$74,904	$74,573	$77,906	$77,993	$67,660	$69,129

	31 March 2011	31 March 2008
Average age[2]:	41.4 years	40.6 years
Average pensionable service[2]:	11.4 years	13.1 years
Annualized pensionable payroll[3]:	$488,325,050	$367,489,402
Total PBDA[4] indexed reduction to basic annuity:	$834,112	$934,578
Total PBDA[4] indexed reduction adjustment:	$213,383	$255,178

1 As defined in Note 1, section D of Appendix 1.
2 Expressed in completed years calculated at the beginning of the plan year.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.
4 PBDA means the *Pension Benefits Division Act*.

Table 61 Female Contributors (Operational Group)
Number and Average Annual Earnings[1] as at 31 March 2011

Age[2]	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service[2]
<25	146	1							147
	$55,728	$47,700							$55,673
25-29	596	63	1						660
	$60,251	$66,395	$47,300						$60,818
30-34	521	306	85						912
	$61,912	$70,012	$69,777						$65,363
35-39	354	291	475	64	1				1,185
	$59,935	$69,460	$74,053	$75,180	$67,080				$68,763
40-44	231	127	290	197	87	1			933
	$60,113	$70,841	$72,746	$75,092	$73,364	$46,900			$69,884
45-49	188	54	134	139	206	113	12		846
	$59,871	$59,587	$71,406	$72,962	$73,562	$75,463	$70,447		$69,397
50-54	91	32	28	58	135	145	73		562
	$61,216	$62,085	$64,490	$73,168	$70,350	$81,231	$69,670		$71,118
55-59	49	18	26	12	57	60	51		273
	$61,092	$59,490	$58,907	$56,221	$69,021	$77,195	$76,943		$68,720
60-64	21	3	5	5	13	11	5		63
	$71,476	$69,677	$71,686	$55,338	$67,477	$61,311	$61,508		$66,735
>65	5			1		3			9
	$69,682			$48,300		$59,077			$63,771
All Ages	2,202	895	1,044	476	499	333	141		5,590
	$60,434	$68,545	$72,331	$73,508	$71,968	$77,586	$72,077		$67,413

	31 March 2011	31 March 2008
Average age[2]:	40.3 years	38.3 years
Average pensionable service[2]:	10.3 years	10.8 years
Annualized pensionable payroll[3]:	$376,838,150	$255,413,016
Total PBDA[4] indexed reduction to basic annuity:	$43,736	$50,848
Total PBDA[4] indexed reduction adjustment:	$12,784	$15,038

1 As defined in Note 1, section D of Appendix 1.
2 Expressed in completed years calculated at the beginning of the plan year.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.
4 PBDA means the *Pension Benefits Division Act*.

Table 62 Contributors on leave Without Pay and Non-active Contributors
Number and Average Annual Earnings[1] as at 31 March 2011

Age[2]	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	All Years of Service[2]
<25	409	8							417
	$45,042	$49,164							$45,121
25-29	1,816	570	10						2,396
	$55,119	$62,638	$62,018						$56,936
30-34	2,073	2,345	526						4,944
	$59,452	$68,344	$69,086						$64,695
35-39	1,203	1,622	1,238	83	5				4,151
	$60,873	$69,605	$73,378	$69,020	$51,922				$68,166
40-44	586	768	745	361	164	5			2,629
	$57,287	$66,643	$71,581	$74,559	$68,808	$53,290			$67,153
45-49	497	530	513	300	426	166	25		2,457
	$53,025	$63,209	$64,907	$70,858	$70,192	$66,326	$62,252		$63,849
50-54	417	421	387	269	370	391	299	25	2,579
	$51,057	$58,109	$60,471	$62,620	$67,477	$72,879	$68,812	$65,317	$62,688
55-59	264	301	331	243	361	319	207	53	2,079
	$54,389	$57,305	$59,434	$60,865	$66,254	$72,178	$72,428	$72,824	$63,427
60-64	154	190	174	142	191	125	80	32	1,088
	$49,298	$54,271	$57,247	$61,184	$66,320	$65,501	$76,557	$74,911	$60,597
>65	47	34	27	18	7	8	5	3	149
	$45,768	$47,429	$54,218	$51,085	$64,141	$78,315	$77,730	$52,840	$52,146
All Ages	7,466	6,789	3,951	1,416	1,524	1,014	616	113	22,889
	$56,296	$65,927	$68,066	$67,192	$67,878	$70,623	$70,839	$71,224	$63,729

	31 March 2011	31 March 2008
Average age[2]:	41.6 years	41.3 years
Average pensionable service[2]:	10.1 years	10.0 years
Annualized pensionable payroll[3]:	$1,458,704,080	$1,198,968,107
Total PBDA[4] indexed reduction to basic annuity:	$607,316	$603,043
Total PBDA[4] indexed reduction adjustment:	$152,829	$154,048

1 As defined in Note 1, section D of Appendix 1.
2 Expressed in completed years calculated at the beginning of the plan year.
3 The aggregate pensionable earnings of all contributors with less than 35 years of pensionable service.
4 PBDA means the *Pension Benefits Division Act*.

Table 63 Male Retirement Pensioners
Number, Average Annual Pension[1] as at 31 March 2011

			RCA No. 1		RCA No. 2	
Age[2]	Number (#)	Pension ($)	Number (#)	Pension ($)	Number (#)	Pension ($)
<25	261	475	-	-	0	$0
25-29	487	2,549	-	-	0	0
30-34	1,017	4,148	-	-	0	0
35-39	1,174	5,650	1	133	0	0
40-44	1,194	7,456	7	3,528	0	0
45-49	1,434	9,976	18	4,437	0	0
50-54	1,995	15,525	41	5,363	0	0
55-59	10,100	40,235	347	6,303	0	0
60-64	20,865	36,713	882	5,441	2,144	10,075
65-69	20,725	26,374	733	4,401	4,028	7,569
70-74	17,669	26,094	368	2,692	287	4,630
75-79	14,935	25,254	125	1,871	2	666
80-84	10,856	24,636	16	1,262	0	0
85-89	7,924	25,460	3	203	0	0
90-94	2,982	25,125	-	-	0	0
95-99	473	24,459	-	-	0	0
100-104	34	26,016	-	-	0	0
All Ages	114,125	27,866	2,541	4,637	6,461	8,268

	31 March 2011	31 March 2008
Average age last birthday	69.7 years	69.5 years
Average age last birthday at retirement	56.3 years	56.3 years
Total annual pensions payable from		
PS Superannuation Account	$2,809 million	$2,481 million
PS Pension Fund	$371 million	$155 million
RCA No. 1 Account	$12 million	$8 million
RCA No. 2 Account	$53 million	$53 million

1 Include deferred annuity to age 60, annual allowance adjustments, PBDA reductions and C/QPP offsets whether or not they are in effect at the valuation date.
2 Expressed in completed years calculated at the beginning of the plan year.

Table 64 Female Retirement Pensioners
Number, Average Annual Pension[1] as at 31 March 2011

			RCA No. 1		RCA No. 2	
Age[2]	Number (#)	Pension ($)	Number (#)	Pension ($)	Number (#)	Pension ($)
<25	336	341	-	-	0	$0
25-29	626	2,471	-	-	0	0
30-34	1,268	3,988	-	-	0	0
35-39	1,504	5,116	-	-	0	0
40-44	1,581	7,252	6	1,693	0	0
45-49	1,876	9,265	11	7,966	0	0
50-54	2,943	14,897	26	3,932	0	0
55-59	11,214	33,050	183	6,438	0	0
60-64	15,882	26,546	262	6,419	1,421	8,489
65-69	12,281	15,016	126	5,288	2,557	6,563
70-74	9,201	13,816	47	4,904	133	3,999
75-79	7,369	12,787	4	918	0	0
80-84	5,506	12,774	-	-	0	0
85-89	4,357	12,898	-	-	0	0
90-94	1,936	12,968	-	-	0	0
95-99	498	13,007	-	-	0	0
100-104	69	11,199	-	-	0	0
105+	5	8,091	-	-	0	0
All Ages	78,452	18,406	665	5,956	4,111	7,146

	31 March 2011	31 March 2008
Average age last birthday	66.4 years	66.8 years
Average age last birthday at retirement	55.1 years	55.1 years
Total annual pensions payable from		
PS Superannuation Account	$1,148 million	$823 million
PS Pension Fund	$296 million	$105 million
RCA No. 1 Account	$4 million	$2 million
RCA No. 2 Account	$29 million	$29 million

1 Include deferred annuity to age 60, annual allowance adjustments, PBDA reductions and C/QPP offsets whether or not they are in effect at the valuation date.
2 Expressed in completed years calculated at the beginning of the plan year.

Table 65 Male Disabled Pensioners
Number, Average Annual Pension[1] as at 31 March 2011

			RCA No. 1	
Age[2]	Number (#)	Pension ($)	Number (#)	Pension ($)
25-29	1	2,714	0	0
30-34	8	6,077	0	0
35-39	10	8,185	0	0
40-44	55	11,178	0	0
45-49	169	12,967	1	404
50-54	501	16,008	0	0
55-59	975	17,801	5	261
60-64	1,201	16,456	0	0
65-69	871	15,050	1	254
70-74	872	15,128	0	0
75-79	712	14,979	0	0
80-84	447	14,569	0	0
85-89	288	15,766	0	0
90-94	77	15,211	0	0
95-99	5	24,373	0	0
100-104	3	8,782	0	0
All Ages	6,195	15,725	7	281

	31 March 2011	31 March 2008
Average age last birthday	67.1 years	66.2 years
Average age last birthday at retirement	50.9 years	50.5 years
Total annual pensions payable from		
PS Superannuation Account	$87 million	$88 million
PS Pension Fund	$10 million	$5 million
RCA Account	$0 million	$0 million

[1] Include deferred annuity to age 60, annual allowance adjustments, PBDA reductions and C/QPP offsets whether or not they are in effect at the valuation date.
[2] Expressed in completed years calculated at the beginning of the plan year.

Table 66 Female Disabled Pensioners
Number, Average Annual Pension[1] as at 31 March 2011

			RCA No. 1	
Age[2]	Number (#)	Pension ($)	Number (#)	Pension ($)
25-29	1	13,307	0	0
30-34	15	5,361	0	0
35-39	67	8,130	0	0
40-44	183	10,310	0	0
45-49	470	11,561	0	0
50-54	1,081	15,278	1	1,839
55-59	1,496	15,923	1	581
60-64	1,337	14,029	5	1,539
65-69	798	10,812	0	0
70-74	742	10,185	0	0
75-79	539	9,404	0	0
80-84	343	9,812	0	0
85-89	195	10,339	0	0
90-94	76	9,372	0	0
95-99	20	8,779	0	0
All Ages	7,363	12,845	7	1,445

	31 March 2011	31 March 2008
Average age last birthday	62.9 years	62.6 years
Average age last birthday at retirement	49.8 years	49.3 years
Total annual pensions payable from		
PS Superannuation Account	$76 million	$65 million
PS Pension Fund	$19 million	$7 million
RCA Account	$0 million	$0 million

1 Include deferred annuity to age 60, annual allowance adjustments, PBDA reductions and C/QPP offsets whether or not they are in effect at the valuation date.
2 Expressed in completed years calculated at the beginning of the plan year.

Table 67 Surviving Spouses
Number and Average Annual Allowance as at 31 March 2011

	Number			RCA No. 1 Allowance on Service Since 1992		RCA No. 1 Maximum Earnings Limit on Service Since 1994	
Age[1]	Widower	Widow	Allowance	Number	Allowance	Number	Allowance
25-29	-	1	962	1	2,450	0	$0
30-34	5	16	3,619	17	1,885	0	$0
35-39	17	40	4,162	41	2,987	0	$0
40-44	45	99	5,108	83	3,381	0	$0
45-49	129	343	6,941	268	3,273	0	$0
50-54	281	795	9,314	457	2,481	0	$0
55-59	442	1,546	11,175	719	1,470	1	$775
60-64	642	2,683	12,585	1,082	798	3	$2,068
65-69	623	3,485	12,877	1,150	494	3	$9,304
70-74	697	4,891	12,709	862	376	2	$1,600
75-79	695	7,170	12,255	516	270	1	$805
80-84	678	9,842	12,003	179	232	0	$0
85-89	518	10,723	11,944	37	242	0	$0
90-94	223	5,426	11,532	6	265	0	$0
95-99	35	1,351	11,105	-	-	0	$0
100-104	3	165	11,572	-	-	0	$0
105+	3	20	5,868	-	-	0	$0
All Ages	5,036	48,596	11,968	5,418	1,006	10	$3,890

	31 March 2011	31 March 2008
Male average age last	71.8 years	70.8 years
Female average age last	79.6 years	78.5 years
Total annual allowances payable from		
PS Superannuation Account	$632 million	$611 million
PS Pension Fund	$10 million	$4 million
RCA Account	$5 million	$3 million

[1] Expressed in completed years calculated at the beginning of the plan year.

Appendix 13 – Acknowledgements

The Superannuation Directorate of the Department of Public Works and Government Services Canada provided the data on plan members.

The co-operation and able assistance received from the above-mentioned data provider deserve to be acknowledged.

The following individuals assisted in the preparation of this report:

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