



Office of the Superintendent of
Financial Institutions Canada

Office of the Chief Actuary

Bureau du surintendant des
institutions financières Canada

Bureau de l'actuaire en chef

Actuarial report

15th

on the Public Service Death Benefit Account

as at 31 March 2023

Canada 

Office of the Chief Actuary

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

Dear Minister:

Pursuant to Section 59 of the *Public Service Superannuation Act*, I am pleased to submit the report on the actuarial review as at 31 March 2023 of the Public Service Death Benefit Account established under Part II of this Act.

Yours sincerely,

Assia Billig, FCIA, FSA
Chief Actuary

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1 Highlights of the report

Main findings for actuarial report on the Public Service Death Benefit Account as at 31 March 2023	
	Public Service Death Benefit Account
Financial position	<ul style="list-style-type: none"> ➤ As at 31 March 2023, the Account balance is \$4,131 million, the actuarial liability is \$1,203 million, resulting in an actuarial excess of \$2,928 million.
Ratio of actuarial excess to annual benefit payments	<ul style="list-style-type: none"> ➤ The actuarial excess totalling \$2,928 million is 13.2 times the total amount of death benefits projected for plan year^a 2024.
Term insurance monthly cost and contribution per \$1000 of coverage for plan year 2024	<ul style="list-style-type: none"> ➤ The monthly cost rate projected for plan year 2024 is 17.2 cents per month per \$1,000 of term insurance. ➤ Participants contributions are 15 cents per \$1,000 of term insurance. ➤ Government contributions are equal to one-twelfth of the total amount of term insurance proceeds payable during the year. It is estimated to be 1.6 cents per \$1,000 of term insurance for plan year 2024.
Paid-up death benefit	<ul style="list-style-type: none"> ➤ The legislated contribution rates per \$10,000 of paid-up death benefit for age 65 are \$310 for males and \$291 for females. ➤ The estimated single premiums per \$10,000 of paid-up death benefit for age 65 in plan year 2024, are \$5,344 for males and \$5,086 for females.

a. 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 Introduction

This actuarial report on the Public Service Death Benefit Account was made pursuant to Section 59 of the *Public Service Superannuation Act (PSSA)*.

This actuarial valuation is as at 31 March 2023 and is in respect of death benefits and contributions defined by Part II of the PSSA.

In this report, *paid-up* insurance refers to the \$10,000 portion of the benefit for which monthly contributions are no longer required from either the participant or the government. The contribution for the paid-up benefit is generally made at age 65.

In this report, *term insurance* refers to the basic coverage (two times salary) less 10% reduction per year from age 66 and less \$10,000 paid-up insurance.

The previous actuarial report was prepared as at 31 March 2020. The date of the next periodic review is scheduled to occur no later than 31 March 2026.

2.1 Purpose of this actuarial report

The purpose of this actuarial valuation is to determine the state of the Account as well as to assist the President of the Treasury Board in making informed decisions regarding the financing of the government's death benefit obligation. This report may not be suitable for another purpose.

2.2 Structure of the report

Section 3 presents a general overview of the valuation basis used in preparing this actuarial report and section 4 presents the financial position of the plan, the cost of the term and paid-up insurance, a reconciliation of the main results as well as a sensitivity analysis of those results to variations in key assumptions.

Finally, section 5 provides the actuarial opinion for the current valuation.

The various appendices provide a summary of the plan provisions, a description of data, methodology and assumptions employed.

Numbers shown in the tables throughout this report may not add up due to rounding.

3 Valuation basis

3.1 Valuation inputs

This valuation report is based on the supplementary death benefits (SDB) plan provisions enacted by the Legislation, summarized in Appendix A.

No amendments were made to the PSSA since the previous valuation. Minor amendments were applied to the *Public Service Superannuation Regulations* since the previous valuation. Those amendments did not have any impact on the actuarial valuation of the SDB.

The financial data on which this valuation is based relate to the Account established to track contributions and benefits under the SDB plan provisions. The Account data is summarized in Appendix B.

The membership data is summarized in Appendix C.

The valuation was prepared using accepted actuarial practice in Canada, methods and assumptions which are summarized in Appendices D to F.

All actuarial assumptions used in this report are best-estimate assumptions. They are independently reasonable and appropriate in aggregate for the purposes of the valuation at the date of this report. The 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 E and F.

The following tables present summaries of the ultimate economic and of the demographic assumptions used in this report and a comparison with those used in the previous report.

Table 1 Ultimate best-estimate economic assumptions

	31 March 2023	31 March 2020
Increase in average earnings	2.5%	2.7%
Projected yield on the Public Service Death Benefit Account	4.0%	4.1%

Table 2 Demographic assumptions

	31 March 2023	31 March 2020
Promotional and seniority rate of increase		
Male	0.6 - 6.1%	0.6 - 5.9%
Female	0.7 - 6.3%	0.7 - 6.1%
Cohort life expectancy at age 65 ^a		
Male	22.5 years	22.4 years
Female	24.1 years	24.1 years
Average retirement age		
Group 1	60.3 years	60.1 years
Group 2	62.2 years	62.1 years

a. Life expectancy of non-disabled members with assumed future mortality improvements.

3.2 Subsequent events

The *Pay Equity Act*, which came into force on 31 August 2021, applies to all federally regulated employers with 10 employees or more. On 19 August 2024, the Pay Equity Commissioner has granted Treasury Board Secretariat the requested extension of 3 years to post a final pay equity plan for employees of Core Public Administrations by 31 August 2027. Since federal employers are at various steps of the pay equity process, the details of the expected changes to compensation are not known, and the impact of the implementation of the *Pay Equity Act* has not been considered in this report.

As of the date of the signing of this report, we were not aware of any other subsequent events that may have a material impact on the results of this valuation.

4 Valuation results

4.1 State of the account

The state of the account as at 31 March 2023 was prepared using the Account balance described in Appendix B, the data described in Appendix C, the methodology described in Appendix D, and the assumptions described in Appendices E and F.

The following table presents the state of the Account as at 31 March 2023. The results of the previous valuation are also shown for comparison purposes.

	31 March 2023	31 March 2020
Account balance	4,131	3,880
Liabilities		
Paid-up death benefit	1,099	965
IBNR and outstanding payments ^a	104	31
Total liabilities	1,203	996
Actuarial excess	2,928	2,884

a. Incurred but not reported claims and death benefit payments that are still outstanding. See Appendix D.3.2.

4.2 Actuarial excess over estimated benefits

The estimated benefits consist of death benefit payments from term and paid-up insurance.

At 31 March 2023, the ratio of actuarial excess over estimated benefits is 13.2. By comparison, this ratio was 14.4 under the previous report. Both ratios are presented in the following table.

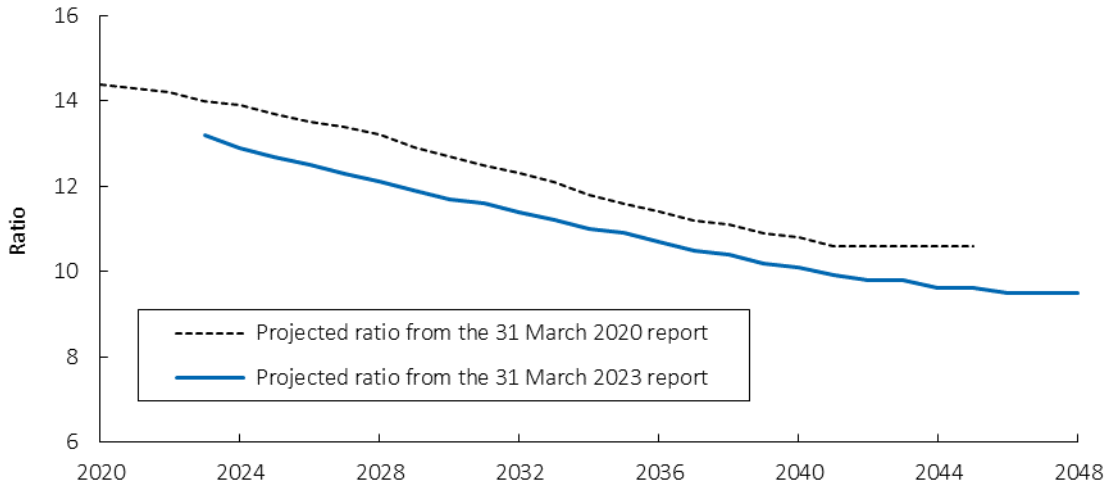
	31 March 2023	31 March 2020
Actuarial excess (A)	2,928	2,884
Estimated benefits for next plan year		
Term Insurance	175	156
Paid-up death benefit	47	44
Total estimated benefits for next plan year (B)	222	200
Ratio of the actuarial excess over estimated benefits for next plan year (A/B)	13.2	14.4

The actuarial excess is projected to reach \$5,070 million at the end of plan year 2048 mainly due to the growth in the interest credits made.

Chart 1 shows the ratio of projected actuarial excess at the end of the plan year to annual benefit payments projected for the following plan year. This ratio is expected to decrease from the current level of 13.2 to 9.5 by the end of plan year 2048 as the cost continues to exceed the contributions throughout the period. This ratio is expected to be 12.5 by the end of plan year 2026.

Chart 1 Projected ratio of actuarial excess to annual benefit payments

(Actuarial excess is measured at the end of plan year and annual payments are those of the following plan year)



4.3 Term insurance

The monthly cost is defined as the ratio of the expected monthly term benefit payments over the amount of expected monthly term insurance benefit coverage, where coverage is expressed per thousand dollars.

The projected monthly cost for plan year 2024 is 17.2 cents per \$1000 of term insurance. The amounts of insurance coverage and benefits payable for plan year 2024 are projected to be \$84,683 million and \$175 million, respectively.

Non-elective participants and elective participants in receipt of an immediate annuity or an annual allowance are required to contribute 15 cents per \$1,000 of term insurance monthly. As a minimum, the government contribution credited monthly to the Account is equal to one-twelfth of the total amount of term insurance proceeds payable during the month.

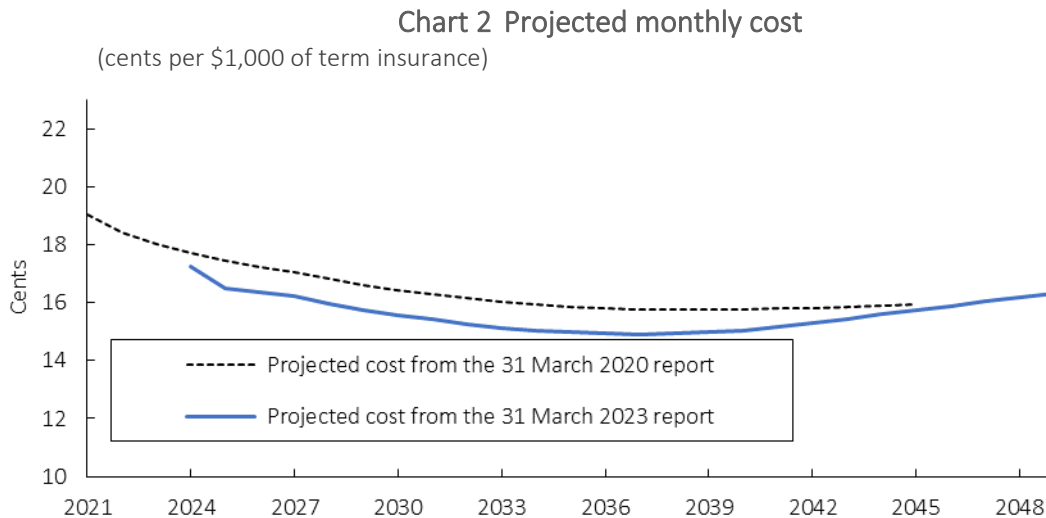
The following table presents the monthly contribution and the cost rates for plan year 2024. It shows that contributions are 0.6 cents less than the monthly cost.

Table 5 Monthly cost and contributions per \$1,000 of coverage for plan year 2024 (cents)

	Contribution			Total Cost
	Participant	Government	Total	
	15	1.6	16.6	

As shown in Chart 2, the projected monthly cost in the 31 March 2023 report is generally lower than in the previous valuation. This is mainly due to:

- a change in the mortality improvement rates,
- changes in demography, for example, the number of non-elective participants increased by about 68,000 participants.



The following table shows the projected monthly costs per \$1,000 of term insurance by participant type for selected plan years.

Participants	2024	2028	2033	2038	2043	2048
Non-elective	9.2	8.6	8.3	8.1	8.5	8.8
Elective	56.4	53.8	50.5	47.3	46.4	48.3
All	17.2	16.0	15.1	14.9	15.4	16.2

The monthly cost per \$1,000 of term insurance is projected to gradually decrease to 14.9 cents in 2038 and then to increase to 16.2 cents by plan year 2048. In plan year 2048, the total contribution rate is projected to be 16.5 cents (15 cents from the participants and 1.5 cents from the government). The decrease in the monthly cost is mainly due to lower mortality rates in accordance with the mortality improvement rates shown in Table 36 applied to the current mortality rates shown in Table 35. The increase in the cost is due to changes of demographic assumptions other than mortality. For example, the average age of the non-elective participants increases.

4.4 Paid-up insurance

The estimated single premiums¹ and the legislated contribution rates² at age 65 for each \$10,000 of paid-up insured benefit are shown in the table below.

	Single premiums at age 65 (\$)	Legislated contribution (\$)
Male	5,344	310
Female	5,086	291

The assumed mortality improvements and the projected increase in yield from 3.1% in plan year 2024 to 4.0% ultimately are expected to cause the projected single premium for the paid-up death benefit to decrease over time. The projected single premium for male and female in plan year 2048 are \$4,244 and \$4,012, respectively.

¹ The single premium is the present value of the paid-up death benefit for a member aged 65.

² The contribution rates are equal to the legislated single premium indicated in the Schedule II of the PSSA.

4.5 Reconciliation as at 31 March 2023

The following table illustrates the impact of the updated assumptions, intervaluation economic and demographic assumptions changes since the last valuation report as at 31 March 2020.

In the intervaluation period, the non-elective population grew significantly more than expected. The higher proportion of non-elective members compared to the elective group resulted in a lower monthly cost than anticipated. The monthly cost is expected to lower over time because of the mortality improvement factors.

The main revision to economic assumptions is the change of interest rates. The main revision to the demographic assumption is a change to IBNR and outstanding payments' assumption.

Table 8 Previous valuation results for plan year 2021 and 2024

	Monthly cost by \$1,000 of term insurance	Actuarial excess (beginning of plan year) to benefit payments ratio
Previous valuation as at 31 March 2020 for plan year 2021	19.0	14.4
Previous valuation as at 31 March 2020 for plan year 2024	17.7	14.0

Table 9 Reconciliation of results for plan year 2024

	Monthly cost by \$1,000 of term insurance	Actuarial excess (beginning of plan year) to benefit payments ratio
Previous valuation as at 31 March 2020	17.7	14.0
Demographic changes	(0.8)	(0.2)
Changes in assumptions		
Revision of economic assumptions	0.1	0.0
Revision of demographic assumptions	0.2	(0.6)
Valuation as at 31 March 2023	17.2	13.2

4.6 Sensitivity of valuation results

The following supplementary estimates indicate the degree to which the valuation results depend on some of the key assumptions. The table below presents the effects on valuation results when key assumptions are varied.

Table 10 Sensitivity of valuation results to variations in key assumptions

Assumption(s) varied	Actuarial liability	Effect	Actuarial excess to benefit payments ratio	Effect
	1,203		13.18	
Projected interest yields				
+1%	1,074	(129)	13.76	0.58
-1%	1,360	157	12.48	(0.70)
Mortality improvement				
No mortality improvement	1,225	22	13.08	(0.10)
Constant at plan year 2024	1,194	(9)	13.22	0.04

Differences between these results 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 indeed linear.

4.7 Sensitivity of projected monthly cost

Chart 3 below shows that lower (no mortality improvement – top dotted line) or higher (2024 constant mortality improvement – bottom dotted line) mortality improvement factors would have a significant impact on the monthly cost per \$1,000 of term insurance.

Chart 3 Sensitivity of projected monthly cost to different mortality improvement assumptions

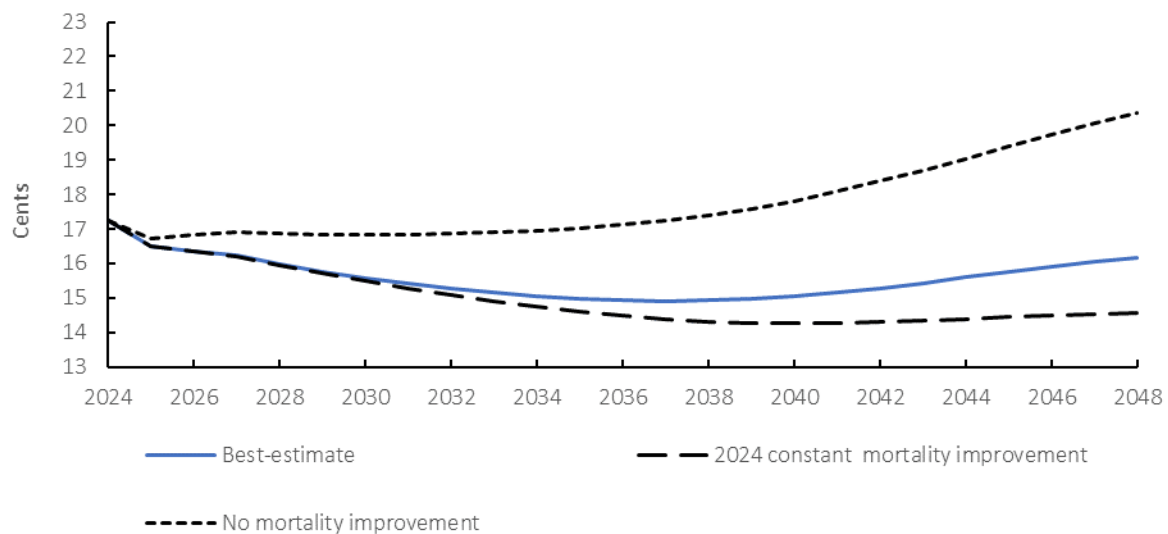
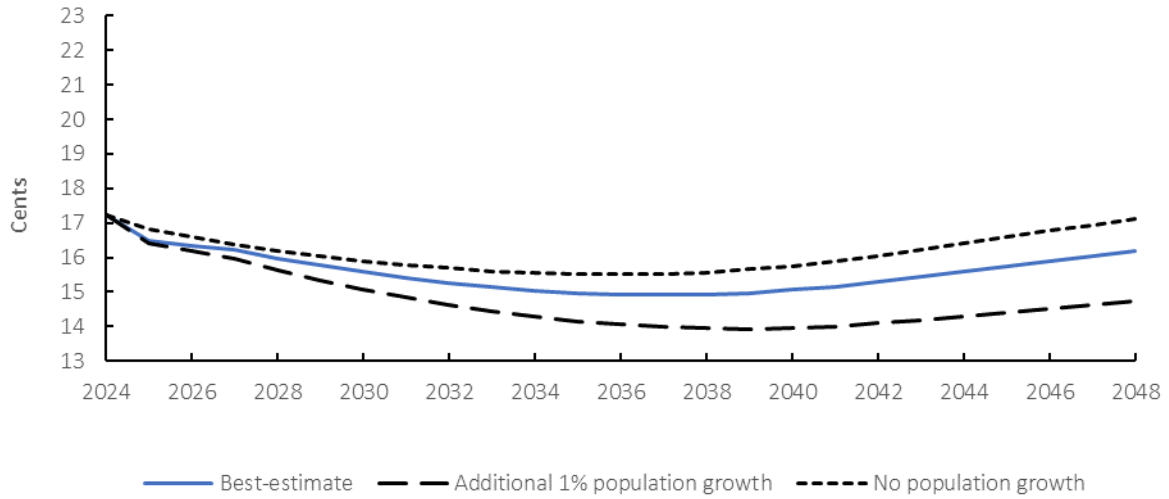


Chart 4 below shows that lower (no population growth – top dotted line) or higher (additional 1% population growth – bottom dotted line) population growth assumptions would also have an impact on the monthly cost per \$1,000 of term insurance.

Chart 4 Sensitivity of projected monthly cost to different population growth assumptions



5 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 used are individually reasonable and appropriate in aggregate for the purposes of the valuation; and
- the methods employed are appropriate for the purposes of the valuation.

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) published by the Canadian Institute of Actuaries.

The subsequent event described in section 3.2 was not considered in this valuation since the details were not available at the time the report was prepared. To the best of our knowledge, after discussion with Public Services and Procurement Canada and the Treasury Board of Canada Secretariat, there were no other subsequent events between the valuation date and the date of this report that would have a material impact on the results of this valuation.

Assia Billig, FCIA, FSA
Chief Actuary

Alexandre Larose, FCIA, FSA

Annie St-Jacques, FCIA, FSA

Ottawa, Canada
27 September 2024

Appendix A — Summary of plan provisions

The following is a summary description of the main provisions of the SDB plan established for public servants under Part II of the PSSA. This plan supplements benefits payable under the pension plan for the Public Service of Canada (PSPP) by providing a lump sum benefit upon the death of a plan participant.

A.1 Plan participants

A.1.1 Non-elective participants

The term *non-elective participant* means all contributors to the PSPP who are employed in the Public Service except employees of Crown corporations covered under other group life insurance plans.

A.1.2 Elective participants

The term *elective participant* means all participants who have ceased to be employed in the Public Service following disability or retirement and have opted to continue their coverage under the SDB plan. Such right is limited to participants who, at the time they cease to be employed in the Public Service, have completed at least two years of continuous service in the Public Service or two years of participation in the SDB plan.

A non-elective participant who ceases employment and becomes entitled to an immediate annuity or an annual allowance in the PSPP automatically becomes an elective participant. During the first 30 days as an elective participant, an individual has the right to opt out of the plan, effective on the 31st day.

A.2 Contributions

A.2.1 Non-elective participants and elective participants in receipt of an immediate annuity or an annual allowance

For non-elective participants as well as elective participants in receipt of an immediate annuity (disability or retirement) or an annual allowance under the PSPP, the rate of contribution is 15 cents per month for each \$1,000 of death benefit. When these participants attain age 65 (or complete two years of service, if later), their contribution is reduced by \$1.5 per month in recognition of the fact that \$10,000 of basic benefit becomes paid-up (by the government) for the remaining lifetime of the participant.

A.2.2 Elective participants entitled to a deferred annuity

For elective participants entitled to a deferred annuity under the PSPP, the contribution rate set in the legislation³ varies in accordance with the attained age of the participant, and the corresponding contributions become chargeable on the 30th day immediately following cessation of employment.

³ Contributions for elective participants entitled to a deferred annuity are disclosed in Schedule I of the *Supplementary Death Benefit Regulations*.

The contribution rates for selected ages are shown in the following table:

Table 11 Contribution per \$2,000 of death benefit (cents)

Age	Annually ^a	Monthly ^b
25	9.70	0.82
30	11.42	0.97
35	13.58	1.15
40	16.29	1.39
45	19.72	1.67
50	24.11	2.05
55	29.80	2.53
60	37.65	3.20

a. For elective participants entitled to a deferred annuity during deferral period.

b. For elective participants who were entitled to a deferred annuity once and are currently in payment.

A.2.3 Government

The government credits monthly to the Account an amount equal to one-twelfth of the total amount of death benefits paid in the month.

Crown corporations and public boards whose employees are participants in the plan contribute at the rate of four cents per month for each \$1,000 of death benefit.

When a participant, other than one entitled to a deferred annuity, reaches age 65 (or completes two years of service, if later), the government credits to the Account a single premium for the individual \$10,000 paid-up portion of basic benefit in respect of which contributions are no longer required from the participant.

The legislated amount of single premium⁴ for each such \$10,000 paid-up portion of basic benefit is shown in the following table and corresponds to one-twentieth of the single premium rate for \$10,000 dollars of death benefit, computed on the basis of the Life Tables, Canada, 1950-1952 and interest at 4% per annum.

Table 12 Legislated single premium per \$10,000 of basic benefit (\$)

Age	Male	Female
65	310	291
66	316	298
67	323	306
68	329	313
69	336	320
70	343	328
71	349	335
72	356	342
73	362	349
74	369	356
75	375	363

⁴ The legislated single premiums per \$10,000 of Basic Benefit are disclosed in Schedule II of the PSSA.

Under the statutes, if for whatever reason the Account were to become exhausted, the government would then credit special contributions to the Account in an amount at least equal to the basic benefits then due but not paid by reason of such cash shortfall.

A.3 Amount of basic benefit

Subject to the applicable reductions described below, the lump sum benefit payable upon the death of a participant is equal to twice the participant's current salary, the result being rounded to the next higher multiple of \$1,000 if not already equal to such a multiple. For this purpose, the current salary of an elective participant is defined as the annual rate of pay at the time of cessation of employment in the Public Service.

The amount of basic benefit described above is reduced by 10% per year starting at age 66 until it would normally vanish at age 75. However, the amount of basic benefit cannot at any time be reduced below a basic floor value of \$10,000 subject to the following exceptions:

- For those elective participants who had, upon cessation of employment prior to 5 October 1992, made an election to reduce their basic benefit to \$500 and further had made a second election, within one year thereafter, to keep their basic benefit at \$500, the floor value is \$500 instead of \$10,000. Such election is irrevocable.
- For non-elective participants, the amount of basic benefit cannot be reduced below the multiple of \$1,000 equal to or next above one-third of the participant's annual salary, even if the resulting amount is higher than \$10,000.
- For elective participants entitled to a deferred annuity, there is no coverage past age 75.

Upon ceasing to be employed in the Public Service, elective participants in receipt of an immediate annuity or in receipt of an annual allowance under the PSPP may opt to reduce their amount of basic benefit to \$10,000.

Appendix B — Account balance

B.1 Reconciliation of the Public Service Death Benefit Account

The Account, which forms part of the Public Accounts of Canada, records the transactions for the plan. No formal debt instrument has been issued to the Account by the government in recognition of the amounts therein. The Account is:

- credited with all contributions made by participants, Crown corporations and the government;
- credited with interest earnings every three months on the basis of the actual average yield for the same period on the combined Superannuation Accounts of the Public Service, Canadian Forces and Royal Canadian Mounted Police pension plans. These accounts generate 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; and
- debited with basic benefit payments when they become due.

Table 13 shows the reconciliation of the balance of the Account from the last valuation date to the current valuation date. Since the last valuation, the Account balance has grown by \$251 million (a 6% increase) to \$4,131 million as at 31 March 2023. The net growth in the Account balance is to a large extent the result of interest credits made.

Table 13 Public Service Death Benefit Account (\$ millions)				
Plan year	2021	2022	2023	2021-2023
Opening balance as at 1 April of the previous year	3,880.2	3,976.9	4,063.5	3,880.2
Income				
Employee contributions				
Active members				
Public Service employees	88.6	97.3	104.2	290.1
Public Service corporations	6.5	6.8	6.7	20.0
Retired employees	<u>27.6</u>	<u>28.0</u>	<u>28.7</u>	<u>84.3</u>
Total employee contributions	122.7	132.1	139.6	394.4
Employer contributions				
Public Service corporations	1.7	1.8	1.8	5.3
Death benefit - general	11.5	12.8	13.8	38.1
Death benefit - single premium \$10,000	3.2	3.3	3.4	9.8
Interest	<u>133.5</u>	<u>131.9</u>	<u>128.1</u>	<u>393.5</u>
Total income	272.6	281.9	286.7	841.1
Expenditures				
Benefits payments				
General	138.2	153.6	165.5	457.3
Life coverage for \$10,000	37.7	41.7	53.4	132.8
Other death benefit payments	<u>0.0</u>	<u>0.0</u>	<u>0.1</u>	<u>0.1</u>
Total expenditures	175.9	195.3	219.0	590.2
Closing balance as at 31 March of the plan year	3,976.9	4,063.5	4,131.1	4,131.1

B.2 Rates of interest

The following rates of interest on the Account by plan year were calculated using the foregoing entries.

Table 14 Rates of interest	
Plan year	Interest
2021	3.5%
2022	3.3%
2023	3.2%

B.3 Sources of the financial data

The Account entries shown previously were taken from the Public Accounts of Canada.

Appendix C — Participant data

C.1 Source of participant data

The valuation input data required in respect of contributors (both active and non-active) and pensioners are extracted from master computer files maintained by the Department of Public Services and Procurement Canada (PSPC).

The main valuation data file supplied by PSPC contained the historical status information on all participants up to 31 March 2023.

C.2 Validation of participant data

The participant data were validated with respect to the Actuarial Report on the Pension Plan for the Public Service of Canada as at 31 March 2023. Details of the data validation can be found in Appendix D of that report.

C.3 Participant data summary

Tables 15 to 21 on the following pages show the detailed participant data upon which this valuation is based.

Table 15 Reconciliation of non-elective participants

	Male	Female	Total
As at 31 March 2020	143,955	185,593	329,548
Data corrections	1,159	1,651	2,810
Eligibility change	40	35	75
New non-elective from			
New participants	47,242	68,828	116,070
Rehired from cash-outs	1,472	2,240	3,712
Rehired from pensioners	<u>862</u>	<u>1,395</u>	<u>2,257</u>
Subtotal	49,576	72,463	122,039
Non-elective terminations			
Disabled pensioners	(601)	(1,245)	(1,846)
Deferred retired pensioners	(3,666)	(4,444)	(8,110)
Retired pensioners in pay	(11,781)	(13,911)	(25,692)
Death (no survivors)	(247)	(257)	(504)
Death (with survivors)	(428)	(311)	(739)
ROC or TV ^a	<u>(8,909)</u>	<u>(11,059)</u>	<u>(19,968)</u>
Subtotal	(25,632)	(31,227)	(56,859)
As at 31 March 2023	169,098	228,515	397,613

a. Termination of membership in the public service pension plan resulting in a refund of pension contributions or a payment of transfer value of accumulated pension benefit.

Table 16 Reconciliation of elective participants

	Male	Female	Total
As at 31 March 2020	98,714	93,842	192,556
Data corrections	150	208	358
New from non-elective	12,239	14,968	27,207
Elective terminations			
Non-elective	(30)	(52)	(82)
Death	<u>(9,827)</u>	<u>(5,488)</u>	<u>(15,315)</u>
Subtotal	<u>(9,857)</u>	<u>(5,540)</u>	<u>(15,397)</u>
As at 31 March 2023	101,246	103,478	204,724

Table 17 Non-elective participants
As at 31 March 2023

Age	Number ^a			Basic benefits (\$ thousands)		
	Male	Female	Total	Male	Female	Total
15-19	100	96	196	10,214	9,597	19,811
20-24	4,757	6,649	11,406	571,773	778,653	1,350,426
25-29	16,049	24,079	40,128	2,365,717	3,486,657	5,852,374
30-34	19,945	29,309	49,254	3,275,184	4,633,315	7,908,498
35-39	21,846	31,162	53,008	3,922,276	5,311,739	9,234,015
40-44	24,188	34,877	59,065	4,644,204	6,281,697	10,925,901
45-49	23,801	33,474	57,275	4,788,788	6,305,947	11,094,735
50-54	22,247	29,020	51,267	4,577,128	5,523,368	10,100,496
55-59	18,781	22,591	41,372	3,841,368	4,149,213	7,990,581
60-64	11,818	12,369	24,187	2,342,088	2,127,542	4,469,630
65-69	4,221	3,830	8,051	702,572	553,218	1,255,790
Above 69	1,345	1,059	2,404	77,073	53,891	130,964
Total	169,098	228,515	397,613	31,118,384	39,214,836	70,333,221

a. Includes Correctional Services Canada employees and members from participating Crown corporations and public boards.

Table 18 Non-elective participants - Summary

	Average	Male	Female	Total
As at 31 March 2020	Age ^a	46.5	44.8	45.6
	Service ^a	14.0	12.9	13.4
	Basic benefit (\$)	173,733	160,719	166,386
As at 31 March 2023	Age ^a	45.0	43.7	44.3
	Service ^a	12.7	11.7	12.1
	Basic benefit (\$)	184,026	171,607	176,889

a. Expressed in rounded years calculated at the beginning of the plan year. Averages are calculated on a dollar-weighted basis.

Table 19 Elective participants in receipt of a disability pension
As at 31 March 2023

Age	Number			Basic benefits (\$ thousands)		
	Male	Female	Total	Male	Female	Total
To 34	8	10	18	1,150	1,298	2,448
35- 39	35	87	122	4,705	12,016	16,721
40- 44	79	286	365	11,270	38,833	50,103
45- 49	193	607	800	28,906	83,445	112,351
50- 54	372	929	1,301	56,156	127,698	183,854
55- 59	691	1,513	2,204	101,185	202,727	303,912
60- 64	905	2,149	3,054	121,197	263,912	385,109
65- 69	844	1,797	2,641	78,287	152,547	230,833
70- 74	791	1,199	1,990	23,994	34,305	58,298
75- 79	567	709	1,276	5,670	7,090	12,760
80- 84	375	441	816	3,750	4,410	8,160
85- 89	240	268	508	2,400	2,680	5,080
90- 94	81	89	170	810	890	1,700
95- 99	16	15	31	160	150	310
Above 99	4	8	12	40	80	120
Total	5,201	10,107	15,308	439,680	932,080	1,371,760

Table 20 Elective participants in receipt of a disability pension - Summary

	Average	Male	Female	Total
As at 31 March 2020	Age ^a	59.9	58.1	58.7
	Basic benefit (\$)	80,020	91,711	87,539
As at 31 March 2023	Age ^a	59.7	58.5	58.9
	Basic benefit (\$)	84,538	92,221	89,611

a. Expressed in rounded years calculated at the beginning of the plan year. Averages are calculated on a dollar-weighted basis.

Table 21 Elective retired participants
(In Receipt of an Immediate Annuity or an Annual Allowance)
As at 31 March 2023

Age	Number ^a			Basic benefits (\$ thousands)		
	Male	Female	Total	Male	Female	Total
To 49	5	7	12	992	1,327	2,319
50- 54	162	208	370	34,966	37,881	72,847
55- 59	3,635	5,442	9,077	756,297	999,933	1,756,230
60- 64	12,438	17,542	29,980	2,353,799	2,830,699	5,184,498
65- 69	19,338	24,041	43,379	2,678,423	2,832,580	5,511,003
70- 74	21,428	20,986	42,414	1,067,978	893,212	1,961,190
75- 79	18,355	13,176	31,531	183,550	131,760	315,310
80- 84	10,985	6,520	17,505	109,850	65,200	175,050
85- 89	5,759	3,119	8,878	57,590	31,190	88,780
90- 94	2,975	1,564	4,539	29,750	15,640	45,390
95- 99	840	632	1,472	8,400	6,320	14,720
Above 99	125	134	259	1,250	1,340	2,590
Total	96,045	93,371	189,416	7,282,846	7,847,082	15,129,927

a. Participants entitled to a deferred annuity were not taken into account for valuation purposes. Their impact is considered negligible

Table 22 Elective retired participants - Summary

	Average	Male	Female	Total
As at 31 March 2020	Age ^a	65.5	64.2	64.9
	Basic benefit (\$)	79,471	89,973	84,453
As at 31 March 2023	Age ^a	65.8	64.8	65.3
	Basic benefit (\$)	75,827	84,042	79,877

a. Expressed in rounded years calculated at the beginning of the plan year. Averages are calculated on a dollar-weighted basis.

Appendix D — Methodology

D.1 Account balance

The balance of the Account forms part of the Public Accounts of Canada. The Account records the transactions for the plan, meaning that no debt instrument has been issued to the Account by the government in recognition of the amounts therein. The recorded balance is shown at the book value of the underlying notional bond portfolio described in Appendix B.

The Account balance corresponds to the cumulative historical excess of contributions and interest credits over basic benefit payments. The Account balance is accordingly projected to the end of a given plan year by adding to the Account at the beginning of that plan year the net income (i.e. the excess of contributions and interest credits over benefits) projected as described below for that plan year.

In the projection of the Account, no assumption was made regarding the expenses incurred for the administration of the plan. These expenses, which are not debited to the Account, are commingled with all other government charges.

D.2 Contributions

D.2.1 Participants

Participants' annual contributions are projected for a given plan year by multiplying:

- the legislated annual contribution rate of \$1.8 per \$1,000 of coverage (equivalent to the monthly rate of 15 cents per \$1,000 of coverage),
by
- the aggregate of two times the salaries of participants projected for that plan year on an open-group basis,
less
- 10% per year reduction from age 65, and
- 10,000 paid-up coverage after age 65.

Non-elective participants' salaries are projected for a given plan year using the assumed rates of increase described in Appendix E and the assumed seniority and promotional salary increases described in Table 24. Elective participants' salaries are frozen at the time of retirement or disability and are not subject to further increases.

D.2.2 Government

The government's annual contribution is projected for a given plan year as the sum of:

- one-twelfth of the amount of term insurance death benefits projected to be paid during that plan year,
and
- the legislated single premiums in respect of relevant participants 65 years of age (or participants completing two years of service, if older).

D.2.3 Crown corporations and public boards

Crown corporations' and public boards' annual contributions are projected for a given plan year by multiplying:

- the legislated annual contribution rate of \$0.48 per \$1,000 of coverage (equivalent to the monthly rate of 4 cents per \$1,000 of coverage),
by
- the aggregate of two times the salaries of each participant who is employed by the Crown corporation or public board projected for that plan year on an open-group basis, less
- 10% per year reduction from age 65, and
- 10,000 paid-up coverage after age 65.

D.2.4 Interest credits

Annual interest credits are projected for a given plan year as the product of the yield projected for that plan year (shown in Appendix E) and the projected average Account balance in that plan year.

D.2.5 Basic benefit payments

The total amount of basic benefits (term and paid-up insurance) for a given plan year is projected as the total amount of insurance in force during that plan year multiplied by the mortality rates assumed to apply during that plan year. The amount of basic benefit in force depends on the salary projected to time of death. Salaries are projected for this purpose using the assumed rates of increase in salaries and the number of participants is projected on an open-group basis as described in Appendix F.

D.3 Liabilities

D.3.1 Paid-up reserve

At the end of a given plan year, the liabilities associated with the individual \$10,000 paid-up death benefit in force correspond to the amount which, together with interest at the projected yields, is sufficient to pay for each individual \$10,000 paid-up death benefit projected payable on the basis of the assumed mortality rates.

D.3.2 IBNR and outstanding payments

On the basis of the plan's experience, at the end of a given plan year, the liabilities for deaths incurred but not reported (IBNR) are set equal to 1% of the expected payments of the plan year. The IBNR deaths are assumed to be reported the following plan year.

Outstanding payments are liabilities related to deaths reported, but still unpaid at the end of a given plan year. They are determined by taking the difference between 97% of the expected payments and the payments already disbursed for the deaths that have already occurred. The 97% assumption was developed based on the actual percentage of payments made from prior years according to the data provided.

In the previous valuation, the reserve at the end of a given plan year for claims incurred but not reported (IBNR) and for pending claims was set equal to one-sixth of the projected annual death benefits paid on average during the six previous plan year.

Appendix E — Economic Assumptions

The following economic assumptions are required for valuation purposes:

E.1 Employment earnings increases

Average earnings increases are exclusive of seniority and promotional increases, which are considered under a separate demographic assumption. Except for the first two years which reflect the current collective agreements, the annual increase in pensionable earnings is assumed to be 0.5% higher than the corresponding increase in CPI. This corresponds to an increase in average pensionable earnings of 2.6 % for plan year 2026 and 2027, and 2.5% for plan year 2028 and thereafter (2.7% in the previous valuation for plan year 2029 and thereafter).

E.2 Projected yields on SDB Account

These yields are required for the long-term projection of the SDB Account balance, liabilities, and excess. The methodology used to determine the projected yields on the Superannuation Account is described in Appendix F of the Report on the Pension Plan for the Public Service of Canada as at 31 March 2023 prepared by Office of the Chief Actuary. The projected yield on the Account is 3.1% in plan year 2024. It is projected to reach a low of 2.6% in 2036 and to reach its ultimate value of 4.0% in 2050.

E.3 Summary of economic assumptions

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

Table 23 Summary of economic assumptions
(percentages)

<u>Plan year</u>	<u>Average earnings increase of non- elective participants</u>	<u>Projected yield on Account</u>
2024	3.5	3.1
2025	2.3	3.0
2026	2.6	2.9
2027	2.6	2.9
2028	2.5	2.8
2029	2.5	2.7
2030	2.5	2.7
2031	2.5	2.6
2032	2.5	2.6
2033	2.5	2.6
2035	2.5	2.6
2040	2.5	3.1
2045	2.5	3.8
2050+	2.5	4.0

Appendix F — Demographic and other assumptions

All contributors to the pension plan for the Public Service of Canada are covered by a supplementary death benefit as defined under Part II of the PSSA. Hence, given the size of the population subject to the PSSA, except where otherwise noted, the demographic assumptions are the same as those used in the Actuarial Report on the Pension Plan for the Public Service of Canada as at 31 March 2023.

Details on these assumptions can be found in Appendix G of that report.

F.1 Demographic assumptions

F.1.1 Seniority and promotional salary increases

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

The following table shows a sample of the assumed seniority and promotional salary increases.

Table 24 Sample of assumed seniority and promotional salary increases
(Percentage of annual earnings)

Years of pensionable service	Male	Female
0	6.1	6.3
1	5.6	5.8
2	5.0	5.3
3	4.4	4.7
4	3.8	4.1
5	3.4	3.6
6	3.0	3.3
7	2.8	3.0
8	2.5	2.8
9	2.4	2.7
10	2.2	2.5
15	1.6	1.9
20	1.2	1.5
25	1.0	1.2
30	0.8	1.1

F.1.2 New participants

As the active population of the plan is expected to grow, new participants are projected to replace members that cease to be active as well as increase the number of participants over time.

The assumed percentage increases in the number of participants for each plan year are shown in the following table:

Table 25 Assumed annual increases in number of contributors

Plan Year	Percentage
2024	3.8
2025 to 2026	-1.0
2027 to 2031	0.7
2032 and after	0.6

It is assumed that the distribution of new members by age, gender, service, and salary level (which is adjusted by the economic increases) will be on average the same as those of members with less than one year of service at each of the three years preceding the valuation date.

F.1.3 Pensionable retirement

The following tables show a sample of the assumed rates of pensionable retirement.

Table 26 Sample of assumed rates of retirement – Main group 1 – Male
(Per 1,000 individuals)

Age	Years of pensionable service						
	2	5	10	20	29	30	35
50	55	35	25	15	20	20	0
55	50	45	30	20	130	280	275
60	90	75	100	165	275	320	335
65	160	135	245	250	235	325	335
70	220	310	250	325	315	330	530

Table 27 Sample of assumed rates of retirement – Main group 1 – Female
(Per 1,000 individuals)

Age	Years of pensionable service						
	2	5	10	20	29	30	35
50	90	45	15	10	15	15	0
55	65	45	30	30	200	325	550
60	115	70	130	200	360	375	400
65	205	230	240	290	240	300	395
70	300	415	270	275	300	280	495

Table 28 Sample of assumed rates of retirement – Main group 2 – Male
(Per 1,000 individuals)

Age	Years of pensionable service						
	2	5	10	20	29	30	35
55	40	40	30	19	25	28	0
60	85	65	75	57	162	301	332
65	160	135	245	250	235	325	335
70	220	310	250	325	315	330	530

Table 29 Sample of assumed rates of retirement – Main group 2 – Female
(Per 1,000 individuals)

Age	Years of pensionable service						
	2	5	10	20	29	30	35
55	55	35	25	16	21	23	0
60	95	70	95	76	233	355	585
65	205	230	240	290	240	300	395
70	300	415	270	275	300	280	495

Table 30 Sample of assumed rates of retirement – Operational service
(Per 1,000 individuals)

Age	Years of pensionable service						
	2	5	10	20	25	30	35
40	0	0	0	0	0	0	0
45	0	0	0	5	20	0	0
50	15	15	15	10	125	100	0
55	20	20	20	15	100	225	350
60	100	100	100	125	250	250	500
65	300	300	300	300	450	300	500

F.1.4 Disability retirement

The following table shows a sample of the assumed rates of disability retirement.

Table 31 Sample of assumed rates of pensionable disability
(Per 1,000 individuals)

<u>Age</u>	<u>Male</u>	<u>Female</u>
25	0.00	0.00
30	0.15	0.10
35	0.40	0.85
40	0.70	1.65
45	1.40	2.65
50	2.45	4.45
55	4.00	6.25
59	4.50	6.55
60 to 64 ^a	2.00	6.00
65 and above	0.00	0.00

a. Rates for ages 60 and above are nil for Group 1.

F.1.5 Withdrawal

Withdrawal with less than two years of service includes termination of employment for any reason. Withdrawal with two or more years of service means termination of employment for reasons other than death, disability or retirement with an immediate annuity or an annual allowance. Tables 32 to 34 provide samples of the assumed rates of withdrawal.

Table 32 Sample of assumed rates of withdrawal – Main group – Male
(Per 1,000 individuals)

<u>Age</u>	<u>Years of pensionable service</u>						
	<u>0</u>	<u>1</u>	<u>2</u>	<u>5</u>	<u>10</u>	<u>15</u>	<u>21 and after+</u>
20	420	250	80	0	0	0	0
25	150	120	70	40	0	0	0
30	99	85	50	28	14	0	0
35	88	75	50	28	14	10	0
40	90	76	50	28	14	10	0
45	96	78	50	28	14	10	0
50	115	91	50	28	14	10	0
54	133	105	50	28	14	10	0
60	190	158	0	0	0	0	0
65	259	196	0	0	0	0	0

Table 33 Sample of assumed rates of withdrawal – Main group – Female
(Per 1,000 individuals)

Age	Years of pensionable service						
	0	1	2	5	10	15	21 and after+
20	350	200	100	0	0	0	0
25	130	110	60	23	0	0	0
30	94	82	50	23	13	0	0
35	88	71	50	23	13	10	0
40	92	72	50	23	13	10	0
45	102	77	50	23	13	10	0
50	129	97	50	28	15	10	0
54	156	112	50	30	20	15	0
60	223	164	0	0	0	0	0
65	312	220	0	0	0	0	0

The assumed rates of withdrawal are the same for actual operational contributors as well as for deemed operational contributors.

Table 34 Sample of assumed rates of withdrawal – Operational group
(Per 1,000 individuals)

Years of pensionable service	Unisex
0	50
1	40
2	30
3	22
4	17
5	14
10	9
15	9
19	7
20 and after+	0

F.1.6 Elective participants entitled to a deferred annuity

Due to their negligible impact on costs and liabilities, actual and future deferred annuitants are not taken into consideration for the purpose of this valuation.

F.1.7 Mortality

The following table provides samples of the assumed mortality rates.

Table 35 Sample of assumed rates of mortality
For Plan Year 2024
(Per 1,000 individuals)

Age	Non-elective participants and elective retired participants		Elective disabled participants	
	Male	Female	Male	Female
30	0.3	0.2	5.5	3.2
40	0.5	0.3	8.6	4.9
50	1.2	1.0	10.7	7.6
60	3.6	2.6	19.5	11.7
70	11.2	9.3	34.6	23.4
80	37.7	27.9	77.3	54.8
90	139.9	112.6	186.4	154.7
100	360.0	330.0	421.0	435.1
110	500.0	500.0	500.0	500.0

Mortality rates are expected to reduce over time. A sample of assumed mortality improvement rates is shown in the following table.

Table 36 Sample of assumed mortality improvement rates
(applicable at the beginning of the plan year)

Age	Initial and ultimate plan year mortality improvement rates (%)			
	Male		Female	
	Male at plan year 2025	Male at plan year 2040 and after+	Female at plan year 2025	Female at plan year 2040 and after+
40	0.60	0.80	0.79	0.80
50	1.34	0.80	1.27	0.80
60	1.73	0.80	1.53	0.80
70	1.65	0.80	1.27	0.80
80	1.54	0.80	1.04	0.80
90	1.48	0.62	1.34	0.62
100	0.67	0.28	0.75	0.28
110 and above	0.00	0.00	0.00	0.00

F.2 Election proportions

A rate of 100% is assumed for the non-elective participants who opt to continue their coverage under the SDB plan at retirement. This is derived from the plan's own recent experience.

A non-elective participant who becomes disabled is also assumed to always opt to continue the coverage.

F.3 Other assumptions

F.3.1 Option to reduce coverage to \$10,000

The valuation data indicates that the proportion of elective participants opting to reduce their basic benefit to \$10,000 is negligible. Accordingly, no elective participants were assumed to make such an option.

F.3.2 Option to reduce 10% coverage annually from age 61

Bill C-78 introduced this option to participants effective 1 October 1999. Election of this option by participants would have a positive effect on the plan's actuarial excess. The valuation data indicates that participants that have opted for this option have already passed age 75.

Accordingly, no non-elective participants were assumed to make such an election anymore in the future.

Appendix G — Acknowledgements

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The following individuals assisted in the preparation of this report:

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