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ACTUARIAL REPORT

on the

REGULAR FORCE DEATH BENEFIT ACCOUNT

as at 31 March 2016

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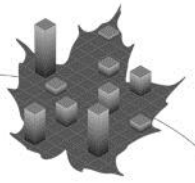
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ACTUARIAL REPORT

REGULAR FORCE Death Benefit Account
as at 31 March 2016



20 September 2017

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

Dear Minister:

Pursuant to Section 71 of the *Canadian Forces Superannuation Act*, I am pleased to submit the report on the actuarial review as at 31 March 2016 of the Regular Force Death Benefit Account established under Part II of this Act.

Yours sincerely,

A handwritten signature in cursive script that reads "Jean-Claude Ménard".

Jean-Claude Ménard, F.S.A., F.C.I.A.
Office of the Chief Actuary
Chief Actuary

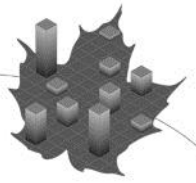
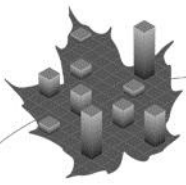


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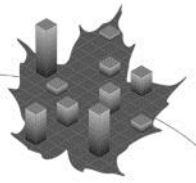
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I. Executive Summary

This actuarial report on the Regular Force Death Benefit (RFDB) Account was made pursuant to Section 71 of the *Canadian Forces Superannuation Act* (CFSA) which states that “A valuation report on the state of the Regular Force Death Benefit Account shall be prepared ... in accordance with the *Public Pensions Reporting Act* and as if the supplementary death benefit plan established by this Part were a pension plan established under an Act referred to in subsection 3(1) of that Act”.

This actuarial valuation is as at 31 March 2016 and is in respect of the death benefits and contributions defined by Part II of the CFSA.

The previous actuarial report was made as at 31 March 2013. The date of the next periodic review is scheduled to occur no later than 31 March 2019.

A. Purpose of this Actuarial Report

The purpose of this actuarial valuation is to determine the state of the RFDB 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 is achieved by providing a best-estimate long-term projection of the RFDB Account based on the projected contributions and interest credited to the account and projected death benefits debited from the account.

B. Valuation Basis

This valuation report is based on the supplementary death benefit (SDB) plan provisions enacted by legislation, summarized in Appendix 1. There have been no changes to the plan provisions since the last actuarial valuation report.

The financial data on which this valuation is based is the RFDB Account established to track contributions and benefits under the SDB plan provisions. The account data is summarized in Appendix 2.

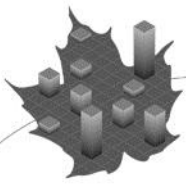
The participant data provided by the Department of National Defence (DND) and the Department of Public Services Procurement Canada (PSPC) are summarized in Appendix 3.

This valuation was prepared using accepted actuarial practices, methods and assumptions which are summarized in Appendices 4 to 6.

All actuarial assumptions used in this report are best-estimate assumptions. They are, individually and in aggregate, 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 5 and 6.

Death benefits are paid out of the Consolidated Revenue Fund of Canada and charged against the RFDB Account. Contributions made by participants and the government are credited to the RFDB Account. Based on the balance of the RFDB Account, interest credits are calculated in such manner and at such rates and credited at such times as the *Canadian Forces Superannuation Regulations* provide. Therefore, the fluctuations of



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returns observed in financial markets in recent years have no impact on the RFDB Account except insofar as long-term Government of Canada bond yields influence the interest credited by regulation.

C. Main Findings

As at 31 March 2016, the RFDB Account has an actuarial excess of \$73.1 million resulting from the difference between the account balance available for benefits of \$185.5 million and the liabilities of \$112.4 million.

The actuarial excess is projected to vanish gradually and become a shortfall during plan year¹ 2023 because, for each plan year, the projected annual benefits paid will exceed the sum of legislated contributions and projected interest credits.

For the same reason, the RFDB Account is projected to become exhausted during plan year 2033.

Figure 1 shows the ratio of the projected actuarial excess at the end of the plan year to the annual benefit payments projected for the following plan year. This ratio is expected to decrease to zero by plan year 2023 as death benefits paid continue to exceed the combined projected contributions and interest credits for all future plan years.

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.

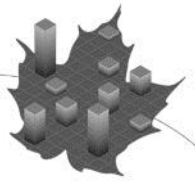
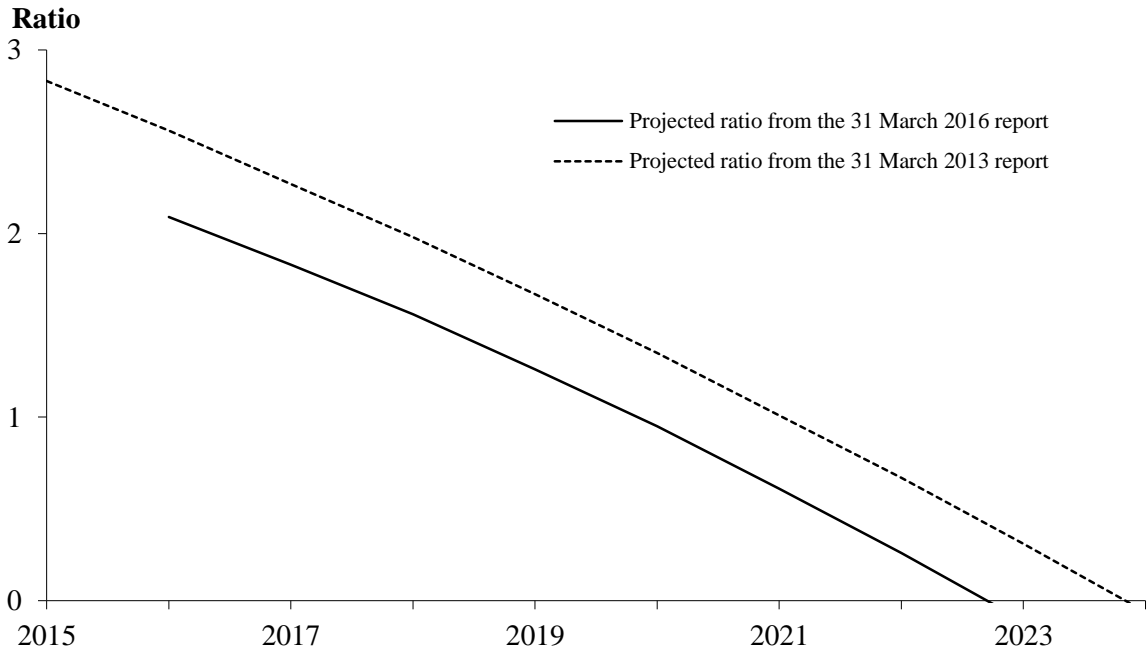
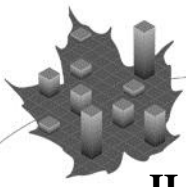


Figure 1 Projected Ratio of Actuarial Excess to Annual Benefit Payments
(Actuarial excess is measured at the end of the plan year and annual payments are those of the following plan year.)





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II. Financial Position of the Plan

A. State of Account

The following State of the Account as at 31 March 2016 was prepared using the RFDB Account balance available for benefits described in Appendix 2, the data described in Appendix 3, the methodology described in Appendix 4 and the assumptions described in Appendices 5 and 6. The results of the previous valuation are shown for comparison purposes.

Table 1 State of the Account
(\$ millions)

| | <u>31 March 2016</u> | <u>31 March 2013</u> |
|--|----------------------|----------------------|
| Recorded Balance Available for Benefits | 185.5 | 191.6 |
| Liabilities | | |
| Paid-up death benefit ¹ | 107.0 | 80.1 |
| IBNR ² | <u>5.4</u> | <u>5.5</u> |
| Total Liabilities | 112.4 | 85.6 |
| Actuarial Excess | <u>73.1</u> | <u>106.0</u> |

B. Financial Position

At 31 March 2016 the actuarial excess totals \$73.1 million, being 2.1 times the total amount of death benefits projected for plan year 2017. By comparison, the actuarial excess as at 31 March 2013 under the previous report was \$106.0 million, which was 3.4 times the amount of death benefits that were projected for plan year 2014.

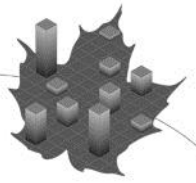
As shown in Appendix 2 and explained in section IV below, the projected contributions to the plan are less than the projected death benefits for all future plan years. This projected annual shortfall is greater than the projected annual interest credits to the RFDB Account and accordingly entails a continuously decreasing actuarial excess. The actuarial excess is therefore projected to become an actuarial shortfall during plan year 2023, while the RFDB Account is projected to become exhausted in plan year 2033.

C. Sensitivity of Valuation Results to Variations in Key Assumptions

The following supplementary estimates indicate the degree to which the valuation results depend on some of the key assumptions. These resulting differences 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.

¹ The \$5,000 portion of the basic benefit for which monthly contributions are no longer required from either the participant or the government. See Appendix 4 – F.1.

² Incurred but not reported claims. See Appendix 4 – F.2



1. Projected Interest Yields

As a measure of sensitivity, an increment of one percentage point in the projected yields would change from 2023 to 2025 the plan year during which the actuarial excess is projected to become an actuarial shortfall, as well as change from 2033 to 2035 the plan year during which the Account is projected to become exhausted.

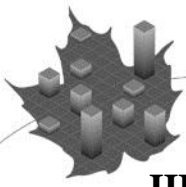
Similarly, a decrease of one percentage point in the projected yields would change from 2023 to 2022 the plan year during which the actuarial excess is projected to become an actuarial shortfall, as well as change from 2033 to 2031 the plan year during which the RFDB Account is projected to become exhausted.

2. Mortality

If the assumed improvements in longevity after the 2017 plan year were disregarded, then the monthly benefit cost rate¹ of 11.2 cents projected for 2041 would climb to 14.4 cents, an increase of 29%. The RFDB Account would become exhausted by plan year 2029 rather than 2033.

However, if the assumed improvements in longevity after the 2017 plan year were kept at the level of plan year 2017, resulting in greater improvements in longevity than those assumed in Table 25, then the monthly benefit cost rate of 11.2 cents projected for 2041 would decline to 9.6 cents, a decrease of 14%. The RFDB Account would become exhausted by plan year 2036 rather than 2033.

¹ The expression *monthly benefit cost rate* is defined as the ratio of the total expected monthly *term insurance* payments over the total amount of expected monthly term insurance benefit coverage, where coverage is expressed per thousand dollars. In this report, *term insurance benefit* means the basic benefit excluding the \$5,000 paid-up death benefit applicable from age 65.



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III. Reconciliation of Results with Previous Report

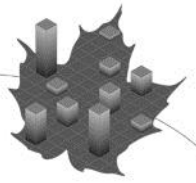
Table 2 illustrates the impact of the updated assumptions, intervaluation economic experience and population changes since the last valuation report as at 31 March 2013. The projected monthly cost for plan year 2041 fell 1.1 cents from 12.3 cents as at 31 March 2013 to 11.2 cents as at 31 March 2016.

Table 2 Reconciliation of Projected Results

| <u>Projection Year 2038</u> | Monthly Cost per \$1,000 of Term Insurance in Specified Projection Year (Cents) |
|---|--|
| Projection as at 31 March 2013 | 12.7 |
| <u>Projection Year 2041</u> | |
| Projection as at 31 March 2013 | 12.3 |
| Changes to demography of participants | (0.1) |
| Change in economic assumptions | 0.1 |
| Change in assumed mortality rates (Non-elective participants) | (0.2) |
| Change in assumed mortality rates (Elective participants) | (0.4) |
| Change in longevity improvement factors | (0.2) |
| Change in disability 3B rates ¹ | (0.4) |
| Change in withdrawal rates | 0.2 |
| Change in all other demographic assumptions | (0.1) |
| Projection as at 31 March 2016 | 11.2 |

The decrease was primarily due to the new mortality rates for elective participants and the new disability 3B incidence rates.

¹ Any condition rendering a member of the Regular Force mentally or physically unfit to perform his or her duties. A member is discharged under Q. R. & O. 15.01 Article 3B when he or she is unable to perform the duties of his or her own occupation.



IV. Legislated Contribution Rates

The aggregate amount of death benefit payments projected for plan year 2017 is \$35.0 million, which is made up of \$28.1 million in respect of the term insurance and \$6.9 million in respect of the paid-up insurance. In this report, *term insurance* means the basic coverage (two times salary rounded to next \$250) less the 10% per year reduction applicable from age 61 and less the \$5,000 paid-up insurance applicable from age 65.

A. Paid-Up Insurance

For plan year 2017, the estimated single premium at age 65 for each \$5,000 of paid-up insured benefit is \$2,433 and \$2,230 for males and females, respectively. The corresponding legislated contribution rates for each \$5,000 of paid-up insured benefit are \$310 and \$291, respectively. The legislated contributions are determined on the basis of the original \$500 of paid-up insured benefit and were not readjusted on 5 October 1992 when Part II of the CFSA was amended to increase the paid-up insured benefit from \$500 to \$5,000.

The assumed improvements in longevity cause the projected single premium for the paid-up death benefit to decrease over time. However, the projected ultimate yield of 4.70% is higher than the yield of 4.40% projected for plan year 2017. This has the effect of gradually decreasing the projected single premium over the years.

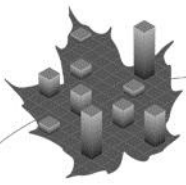
The net effect of longevity improvements and increasing projected yields resulted in a decrease in the projected single premiums at age 65 for each \$5,000 of paid-up insured benefit. A male participant's projected single premium decreases from \$2,433 for plan year 2017 to \$2,335 for plan year 2041; for a female participant the decrease is from \$2,230 to \$2,129.

B. Term Insurance

The total amount of term insurance proceeds projected to be payable during plan year 2017 is \$28.1 million. Given that the total amount of term insurance projected to be in force for plan year 2017 is \$14,939 million, the benefit cost rate projected for plan year 2017 is 15.7 cents per month per \$1,000 of term insurance.

Non-elective participants and elective participants in receipt of an immediate annuity are required to contribute monthly 20 cents per \$1,000 of salary, or 9.96¹ cents per \$1,000 of term insurance. As a minimum, the government contribution credited monthly to the RFDB Account is equal to one-twelfth of the total amount of term insurance proceeds payable during the month. For plan year 2017, the government's monthly contribution is estimated at 1.3 cents per \$1,000 of term insurance.

¹ If it were not for the rounding to the next lower multiple of \$250 of salary involved in the computation of contributions and the rounding to the next higher multiple of \$250 involved in the computation of the amount of death benefit, the legislated contribution rate would be 10 cents (i.e. 20 cents divided by two) instead of 9.96 cents.

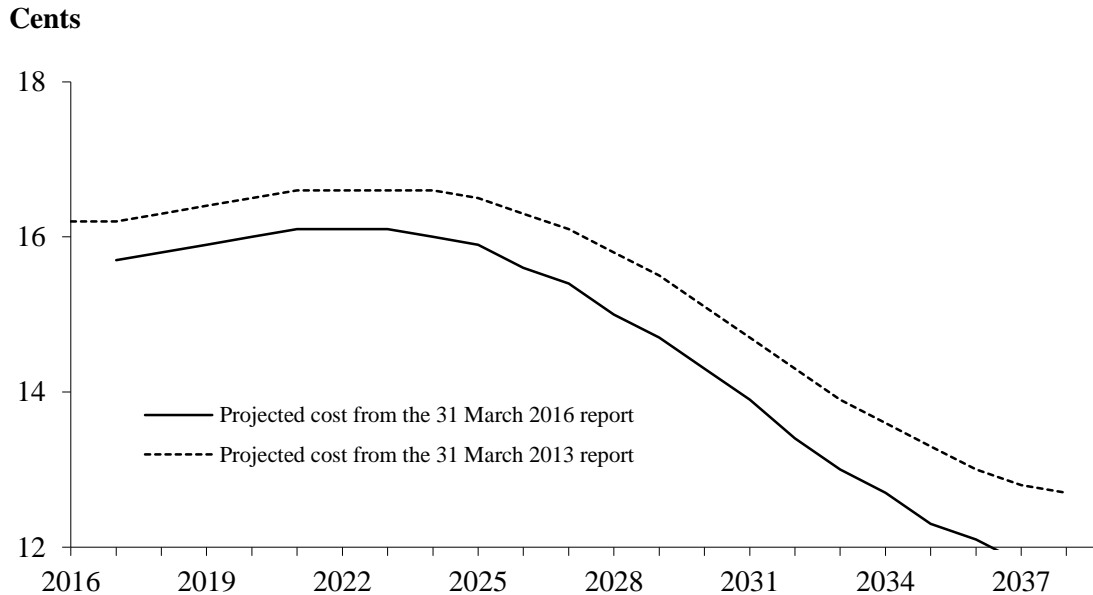


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The total amount credited to the RFDB Account resulting from participants and government contributions in plan year 2017 is therefore 11.3 cents (9.96 cents plus 1.3 cents) per month per \$1,000 of term insurance, i.e. significantly less than the estimated monthly cost of 15.7 cents per \$1,000 of term insurance for plan year 2017.

Figure 2 Projected Monthly Cost
(cents per \$1,000 of term insurance)



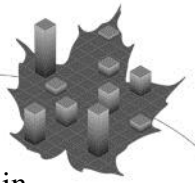
As shown in Figure 2, the monthly cost per \$1,000 of term insurance is projected to increase from 15.7 cents to 16.1 cents in 2021 and thereafter the monthly cost should decrease gradually to reach 11.2 cents by plan year 2041. In comparison, the combined contribution rate in 2041 is projected to be 10.9 cents (i.e. 9.96 cents for participants plus 0.90 cents for the government).

The following table illustrates the projected monthly costs per \$1,000 of term insurance for selected plan year and participant type.

Table 3 Projected Monthly Cost
(cents per \$1,000 of term insurance)

| Participants | 2017 | 2021 | 2026 | 2031 | 2036 | 2041 |
|--------------|------|------|------|------|------|------|
| Non-elective | 7.7 | 7.4 | 7.0 | 6.9 | 6.8 | 6.5 |
| Elective | 29.1 | 31.3 | 34.3 | 34.8 | 31.1 | 29.4 |
| All | 15.7 | 16.1 | 15.6 | 13.9 | 12.1 | 11.2 |

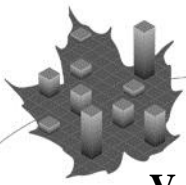
For non-elective participants, the monthly cost projected for plan year 2041 is 84% of the monthly cost estimated for plan year 2017. This results mainly from the following two factors:



- There is a reduction in cost due to the assumed lower mortality for plan year 2041 in accordance with the longevity improvement factors shown in Table 25 applied to the current mortality rates shown in Table 24.
- The distribution of non-elective participants in the plan year 2041 is weighted more heavily at the older ages than currently. This has the effect of increasing costs. However, this increase is more than offset by the effect of the assumed mortality improvements.

In respect of elective participants in receipt of an immediate annuity or an annual allowance, the monthly benefit cost rate projected for plan year 2041 is 101% of the monthly cost projected for plan year 2017. This increase is due to the expected aging of the elective population as the trend in the Regular Force towards older retirement ages continues.

For all plan participants in aggregate, the monthly cost projected for plan year 2041 is 71% of the monthly cost projected for plan year 2017.



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V. Actuarial Opinion

In our opinion, considering that this report was prepared pursuant to the *Public Pensions Reporting Act* per Section 71 of the *Canadian Forces Superannuation 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 methodology employed is appropriate for the purposes of the valuation; and
- this report has been prepared, and our opinions given, in accordance with accepted actuarial practice.

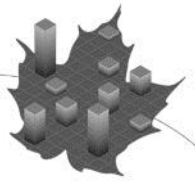
In particular, this report was prepared in accordance with the Standards of Practice (Standard of Practice – General Standards) published by the Canadian Institute of Actuaries.

To the best of our knowledge 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.

Daniel Hébert, F.S.A., F.C.I.A.
Senior Actuary

Jean-Claude Ménard, F.S.A., F.C.I.A.
Chief Actuary

Ottawa, Canada
20 September 2017



APPENDICES

Appendix 1 - Summary of Plan Provisions

Following is a summary description of the main provisions of the Supplementary Death Benefit (SDB) plan established for the members of the Regular Force under Part II - *Supplementary Death Benefits* of the *Canadian Forces Superannuation Act* (CFSA). This plan supplements benefits payable under the pension plan by providing a lump sum benefit upon the death of a plan participant.

A. Plan Participants

1. Non-Elective Participants

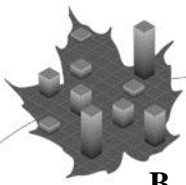
The term *non-elective participant* means a member of the Regular Force, or a member of the Reserve Force who is, with the approval of the Chief of the Defence Staff, on full-time service in a position in a Regular Force establishment or as a supernumerary to a Regular Force establishment.

2. Elective Participants

The term *elective participant* means all previously non-elective participants who have ceased to be employed in the Canadian Forces by reason of retirement or disability. A retired member entitled to an immediate annuity, 3A disability annuity (i.e. on medical grounds, being disabled and unfit to perform any duties), or 3B disability annuity (i.e. on medical grounds, being disabled and unfit to perform his own duties in his present trade or employment, and not otherwise advantageously employable under existing service policy) may opt to continue their coverage under the SDB plan. Such right is limited to members who, at the time they cease to be employed in the Canadian Forces, have completed at least five years of continuous service in the Canadian Forces or five years of membership in the SDB plan.

Elective participants entitled to a deferred annuity under the CFSA upon cessation of employment may elect to continue their coverage in the SDB plan; otherwise their membership and coverage are discontinued. This election must be made within the 13-month period running from one year before to the 30th day following cessation of employment. The basic benefit is extended for 30 days after the date of cessation whether or not a participant exercises the right of election for continuous coverage.

An elective participant who becomes a participant in the SDB plan established under Part II of the *Public Service Superannuation Act* (PSSA) automatically ceases to be a participant in the SDB plan established under the CFSA. Any such person, who subsequently ceases to be a participant in the SDB plan under the PSSA, without entitlement to an immediate annuity under the PSSA, is deemed thereupon to regain the status of elective participant in the SDB plan established under the CFSA.



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B. RFDB Account Balance Available for Benefits

The plan is financed through the RFDB Account, which forms part of the Accounts of Canada. The RFDB Account is credited with all contributions made by the participants and the government, and debited with all benefit payments as they become due. The RFDB Account is also credited with interest earnings based on interest rates applying to the Superannuation Accounts.

C. Contributions

1. Non-Elective Participants, and Elective Participants in Receipt of an Immediate Annuity

For non-elective participants as well as elective participants in receipt of an immediate annuity (disability or retirement) under Part I of the CFSA or the *Defence Services Pension Continuation Act*, the legislated contribution rate is 5 cents per month for each \$250 of salary (for this purpose the salary is in practice rounded to the next lower multiple of \$250 if not already equal to such a multiple). When these participants attain age 65, their contribution is reduced by 50 cents per month in recognition of the fact that \$5,000 of basic benefit becomes paid-up (by the government) for the remaining lifetime of the participant.

2. Elective Participants Entitled to a Deferred Annuity

For elective participants entitled to a deferred annuity, the contribution rate is set by regulation and 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. The contribution rates for selected ages are shown in the following table:

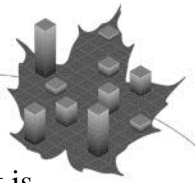
Table 4 Contribution per \$2,000 of Death Benefit

| Age Last Birthday | Annual (\$) | Monthly (\$) |
|-------------------|-------------|--------------|
| 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 |

3. Government

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

When a participant, other than one entitled to a deferred annuity, reaches age 65, the government credits to the RFDB Account a single premium for the \$5,000 paid-up insured benefit in respect of which contributions are no longer required from the participant.



The legislated amount of single premium for each such \$5,000 paid-up insured benefit is shown in the following table and corresponds to one-tenth of \$5,000 times the single premium rate for each dollar of death benefit, computed on the basis of the Life Tables, Canada, 1950-1952 and interest at 4% per annum.

Table 5 Legislated Single Premium per \$5,000 of Paid-up Benefit

| Age Last Birthday | Male (\$) | Female (\$) |
|-------------------|-----------|-------------|
| 65 | 310 | 291 |
| 66 | 316 | 298 |
| 67 | 323 | 306 |
| 68 | 329 | 313 |
| 69 | 336 | 320 |

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

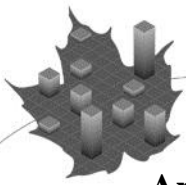
D. Amount of Basic Benefit

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 \$250 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 Canadian Forces.

The amount of basic benefit described above is reduced by 10% per year starting at age 61 until it would normally vanish at age 70. However, the amount of basic benefit cannot at any time be reduced below a basic floor value of \$5,000 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 prior to 5 October 1993, to keep their basic benefit at \$500, the floor value is \$500 instead of \$5,000. Such election is irrevocable. The plan administrator has advised OSFI that all members who have opted to reduce their paid-up coverage to \$500 will nonetheless be receiving a minimum death benefit of \$5,000 upon death.
- For elective participants entitled to a deferred annuity, there is no coverage past age 70.

Upon ceasing to be employed in the Canadian Forces, elective participants in receipt of an immediate annuity under Part I of the CFSA or the *Defence Services Pension Continuation Act* may opt to reduce their amount of basic benefit to \$5,000.



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Appendix 2 - RFDB Account Balance Available for Benefits

A. Regular Force Death Benefit Account

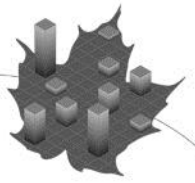
The plan is entirely financed through the RFDB Account, which forms part of the Accounts of Canada. The Account records the transactions for the plan, meaning that no formal debt instrument has been issued to the RFDB Account by the government in recognition of the amounts therein. The RFDB Account is:

- credited with all contributions made by participants 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 annual benefit payments when they become due.

Table 6 shows the reconciliation of the balance of the RFDB Account from the last valuation date to the current valuation date. Since the last valuation, the RFDB Account balance has decreased by \$6.1 million. As at 31 March 2016, the Account balance is reported at \$185.5 million. The net reduction in the Account balance is due to actual death benefit payments exceeding the total of contributions and interest earnings over the intervalation period.

Table 6 Regular Force Death Benefit Account
(\$ millions)

| Plan Year | 2014 | 2015 | 2016 | 2014 - 2016 |
|------------------------|--------------|--------------|--------------|--------------------|
| Opening balance | 191.6 | 189.3 | 187.6 | 191.6 |
| Income | | | | |
| Employee contributions | 17.4 | 17.5 | 17.7 | 52.6 |
| Employer contributions | | | | |
| - Term insurance | 2.1 | 2.0 | 1.9 | 6.0 |
| - Paid-up insurance | 0.6 | 0.8 | 0.2 | 1.6 |
| Interest earnings | <u>10.0</u> | <u>9.5</u> | <u>8.7</u> | <u>28.2</u> |
| Subtotal | 30.1 | 29.8 | 28.5 | 88.4 |
| Expenditures | | | | |
| Benefit claims | 32.4 | 31.5 | 30.6 | 94.5 |
| Closing balance | 189.3 | 187.6 | 185.5 | 185.5 |

**B. Rates of Interest**

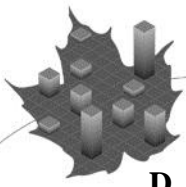
As per the *Canadian Forces Superannuation Regulations*, the following effective rates of interest on the RFDB Account by plan year were calculated using the foregoing entries.

Table 7 Rates of Interest

| Plan Year | Interest |
|-----------|----------|
| 2014 | 5.41% |
| 2015 | 5.15% |
| 2016 | 4.76% |

C. Sources of Financial Data

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



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REGULAR FORCE Death Benefit Account
as at 31 March 2016

D. Account and Liabilities Projection

The following table shows a projection of the RFDB Account and liabilities over 25 years commencing 1 April 2016.

Table 8 Account and Liabilities Projection
(\$ millions)

| Plan Year | State of the Account at the End of Plan Year | | | Ratio of Projected Actuarial Excess at the End of the Plan Year to Annual Benefit Payments Projected for the Following Plan Year |
|-----------|--|-------------|--------------------|---|
| | Account | Liabilities | Excess / Shortfall | |
| 2016 | 185.5¹ | 112.4 | 73.1 | 2.1 |
| 2017 | 179.0 | 113.9 | 65.1 | 1.8 |
| 2018 | 171.5 | 115.1 | 56.4 | 1.6 |
| 2019 | 163.0 | 116.5 | 46.5 | 1.3 |
| 2020 | 153.6 | 118.0 | 35.6 | 1.0 |
| 2021 | 143.3 | 120.0 | 23.3 | 0.6 |
| 2022 | 132.3 | 122.3 | 10.0 | 0.3 |
| 2023 | 120.7 | 125.1 | (4.4) | - |
| 2024 | 108.5 | 127.7 | (19.2) | - |
| 2025 | 96.0 | 130.5 | (34.5) | - |
| 2026 | 83.2 | 133.4 | (50.2) | - |
| 2027 | 70.3 | 136.9 | (66.6) | - |
| 2028 | 57.4 | 140.1 | (82.7) | - |
| 2029 | 44.6 | 143.0 | (98.4) | - |
| 2030 | 31.8 | 144.8 | (113.0) | - |
| 2031 | 19.1 | 145.4 | (126.3) | - |
| 2032 | 6.6 | 145.4 | (138.8) | - |
| 2033 | 0.0 | 145.4 | (145.4) | - |
| 2034 | 0.0 | 145.2 | (145.2) | - |
| 2035 | 0.0 | 144.7 | (144.7) | - |
| 2036 | 0.0 | 144.3 | (144.3) | - |
| 2037 | 0.0 | 143.6 | (143.6) | - |
| 2038 | 0.0 | 142.9 | (142.9) | - |
| 2039 | 0.0 | 141.8 | (141.8) | - |
| 2040 | 0.0 | 140.8 | (140.8) | - |
| 2041 | 0.0 | 139.9 | (139.9) | - |

¹ Bold figures denote actual experience.

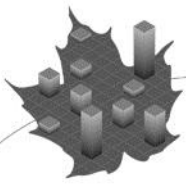


E. Income and Expenditure Projection

The following table shows a projection of the income and expenditure which served as the basis of the projection of the RFDB Account over 25 years commencing with plan year 2017.

Table 9 Income and Expenditure Projection
(\$ millions)

| Plan Year | Contributions | | | | | | | | |
|-----------|---------------|------------|---------|-------|------------------|---------|-------|------------------|-------------|
| | Participants | Government | | | Benefit Payments | | | Interest Credits | Net Credits |
| | | Term | Paid-Up | Total | Term | Paid-Up | Total | | |
| 2017 | 17.9 | 2.3 | 0.5 | 20.7 | 28.1 | 6.9 | 35.0 | 7.8 | (6.4) |
| 2018 | 18.1 | 2.4 | 0.5 | 21.0 | 28.6 | 7.0 | 35.6 | 7.2 | (7.4) |
| 2019 | 18.3 | 2.4 | 0.5 | 21.2 | 29.1 | 7.1 | 36.2 | 6.6 | (8.4) |
| 2020 | 18.6 | 2.5 | 0.6 | 21.7 | 29.8 | 7.2 | 37.0 | 5.9 | (9.4) |
| 2021 | 18.8 | 2.5 | 0.6 | 21.9 | 30.3 | 7.3 | 37.6 | 5.4 | (10.3) |
| 2022 | 19.1 | 2.6 | 0.7 | 22.4 | 30.9 | 7.4 | 38.3 | 4.9 | (11.1) |
| 2023 | 19.4 | 2.6 | 0.8 | 22.8 | 31.2 | 7.5 | 38.7 | 4.3 | (11.6) |
| 2024 | 19.6 | 2.6 | 0.8 | 23.0 | 31.5 | 7.6 | 39.1 | 3.8 | (12.3) |
| 2025 | 19.8 | 2.6 | 0.9 | 23.3 | 31.5 | 7.7 | 39.2 | 3.4 | (12.5) |
| 2026 | 20.0 | 2.6 | 0.9 | 23.5 | 31.4 | 7.8 | 39.2 | 2.9 | (12.8) |
| 2027 | 20.2 | 2.6 | 1.0 | 23.8 | 31.1 | 8.0 | 39.1 | 2.4 | (12.9) |
| 2028 | 20.4 | 2.6 | 1.0 | 24.0 | 30.7 | 8.1 | 38.8 | 2.0 | (12.8) |
| 2029 | 20.5 | 2.5 | 1.0 | 24.0 | 30.2 | 8.2 | 38.4 | 1.6 | (12.8) |
| 2030 | 20.7 | 2.5 | 0.9 | 24.1 | 29.7 | 8.3 | 38.0 | 1.2 | (12.8) |
| 2031 | 20.9 | 2.4 | 0.7 | 24.0 | 29.1 | 8.5 | 37.6 | 0.8 | (12.8) |
| 2032 | 21.2 | 2.4 | 0.6 | 24.2 | 28.6 | 8.6 | 37.2 | 0.4 | (12.6) |
| 2033 | 21.5 | 8.0 | 0.6 | 30.1 | 28.1 | 8.6 | 36.7 | - | (6.6) |
| 2034 | 21.9 | 13.9 | 0.6 | 36.4 | 27.7 | 8.7 | 36.4 | - | - |
| 2035 | 22.3 | 13.4 | 0.6 | 36.3 | 27.5 | 8.8 | 36.3 | - | - |
| 2036 | 22.7 | 13.1 | 0.6 | 36.4 | 27.5 | 8.9 | 36.4 | - | - |
| 2037 | 23.2 | 12.9 | 0.5 | 36.6 | 27.6 | 9.0 | 36.6 | - | - |
| 2038 | 23.8 | 12.5 | 0.4 | 36.7 | 27.7 | 9.0 | 36.7 | - | - |
| 2039 | 24.3 | 12.4 | 0.4 | 37.1 | 28.0 | 9.1 | 37.1 | - | - |
| 2040 | 24.9 | 12.1 | 0.4 | 37.4 | 28.2 | 9.2 | 37.4 | - | - |
| 2041 | 25.5 | 12.0 | 0.4 | 37.9 | 28.6 | 9.3 | 37.9 | - | - |



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Appendix 3 - Participant Data

A. Source of Participant Data

As it was done in the previous valuation report, the Department of National Defence (DND) provided OSFI with multiple files reflecting the summarized raw data as it exists in their system based on mutually agreed data specifications. In addition, Public Services and Procurement Canada (PSPC) again provided OSFI with data on elective participants.

In addition, for the first time, PSPC provided OSFI with extracts from the new system containing data on both non-elective and elective participants. The new extracts from PSPC enabled more accurate identification of eligible Reserve Force members. For elective participants this valuation report primarily utilized the data from the new PSPC system.

The data provided contains all required information in respect of contributors and pensioners. In particular, the data shows the historical progression of members during period from 31 March 2013 to 31 March 2016 required for reconciliation and experience studies. OSFI then validates and corrects, as necessary, the data before transforming it into a structure amenable to analysis, interpretation, and valuation.

B. Participant Data Summary

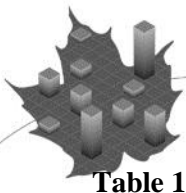
Tables 10 to 16 on the following pages show the detailed participant data upon which this valuation is based.



Table 10 Reconciliation of Contributors

| | Male | | | Female | | | Grand Total |
|---|----------------|----------------|----------------|--------------|----------------|----------------|-----------------|
| | Officer | Other Rank | Total | Officer | Other Rank | Total | |
| As at 31 March 2013 | 13,351 | 45,080 | 58,431 | 2,682 | 6,860 | 9,542 | 67,973 |
| Data Corrections (retro active data correction) | 161 | 1,263 | 1,424 | 51 | 166 | 217 | 1,641 |
| New Contributors | | | | | | | |
| New entrants | 1,681 | 7,671 | 9,352 | 343 | 1,264 | 1,607 | 10,959 |
| Rehired / Cash-out | 144 | 960 | 1,104 | 30 | 135 | 165 | 1,269 |
| Rehired / Pensioners | <u>198</u> | <u>573</u> | <u>771</u> | <u>42</u> | <u>90</u> | <u>132</u> | <u>903</u> |
| Subtotal | 2,023 | 9,204 | 11,227 | 415 | 1,489 | 1,904 | 13,131 |
| Changes of | | | | | | | |
| Activity Status | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Officers/Other Ranks | 289 | (289) | 0 | 85 | (85) | 0 | 0 |
| Service Type | <u>(90)</u> | <u>104</u> | <u>14</u> | <u>(35)</u> | <u>33</u> | <u>(2)</u> | <u>12</u> |
| Subtotal | 199 | (185) | 14 | 50 | (52) | (2) | 12 |
| Terminations | | | | | | | |
| Lump-sum payments | (67) | (192) | (259) | (15) | (26) | (41) | (300) |
| Return of contribution | (246) | (1,212) | (1,458) | (47) | (195) | (242) | (1,700) |
| Transfer value | (323) | (2,633) | (2,956) | (65) | (258) | (323) | (3,279) |
| RTA ¹ | <u>(7)</u> | <u>(10)</u> | <u>(17)</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>(17)</u> |
| Subtotal | (643) | (4,047) | (4,690) | (127) | (479) | (606) | (5,296) |
| Pensionable Terminations | | | | | | | |
| Disability (3A) | 0 | (3) | (3) | 0 | (2) | (2) | (5) |
| Disability (3B) | (477) | (3,425) | (3,902) | (125) | (753) | (878) | (4,780) |
| Other Retirement | (1,470) | (3,333) | (4,803) | (207) | (352) | (559) | (5,362) |
| Deceased | (18) | (88) | (106) | (3) | (10) | (13) | (119) |
| Subtotal | <u>(1,965)</u> | <u>(6,849)</u> | <u>(8,814)</u> | <u>(335)</u> | <u>(1,117)</u> | <u>(1,452)</u> | <u>(10,266)</u> |
| As at 31 March 2016 | 13,126 | 44,466 | 57,592 | 2,736 | 6,867 | 9,603 | 67,195 |

¹ Reciprocal Transfer Agreement



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Table 11 Reconciliation of Pensioners

| | Male | | | Female | | | Grand Total |
|--|---------------|---------------|---------------|------------|--------------|--------------|---------------|
| | Officer | Other Rank | Total | Officer | Other Rank | Total | |
| <u>Retirement Pensioners</u> | | | | | | | |
| As at 31 March 2013 | 12,055 | 38,393 | 50,448 | 700 | 2,371 | 3,071 | 53,519 |
| Data Corrections | 260 | 546 | 806 | 41 | 141 | 182 | 988 |
| New Pensioners | 1,148 | 2,086 | 3,234 | 125 | 207 | 332 | 3,566 |
| Rehired / Pensioners | (19) | (34) | (53) | (2) | (6) | (8) | (61) |
| Deceased | <u>(1)</u> | <u>(1)</u> | <u>(2)</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>(2)</u> |
| As at 31 March 2016 | 13,443 | 40,990 | 54,433 | 864 | 2,713 | 3,577 | 58,010 |
| <u>Disability Pensioners (3A)</u> | | | | | | | |
| As at 31 March 2013 | 42 | 385 | 427 | 13 | 69 | 82 | 509 |
| Data Corrections | 14 | 29 | 43 | 2 | (9) | (7) | 36 |
| New Pensioners | 0 | 4 | 4 | 0 | 2 | 2 | 6 |
| Rehired / Pensioners | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deceased | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> |
| As at 31 March 2016 | 56 | 418 | 474 | 15 | 62 | 77 | 551 |
| <u>Disability Pensioners (3B)</u> | | | | | | | |
| As at 31 March 2013 | 1,006 | 10,598 | 11,604 | 235 | 1,738 | 1,973 | 13,577 |
| Data Corrections | (160) | (675) | (835) | (31) | (161) | (192) | (1,027) |
| New Pensioners | 377 | 2,595 | 2,972 | 81 | 517 | 598 | 3,570 |
| Rehired / Pensioners | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deceased | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> |
| As at 31 March 2016 | 1,223 | 12,518 | 13,741 | 285 | 2,094 | 2,379 | 16,120 |

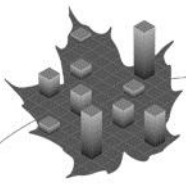


Table 12 Non-Elective Officers
As at 31 March 2016

| Age ¹ | Number | | | Basic Benefit (\$ thousands) | | |
|------------------|---------------|--------------|---------------|------------------------------|----------------|------------------|
| | Male | Female | Total | Male | Female | Grand Total |
| 15-19 | 326 | 63 | 389 | 12,894 | 2,430 | 15,324 |
| 20-24 | 1,207 | 275 | 1,482 | 94,889 | 22,157 | 117,046 |
| 25-29 | 1,910 | 456 | 2,366 | 269,737 | 68,508 | 338,245 |
| 30-34 | 2,053 | 554 | 2,607 | 361,820 | 100,134 | 461,954 |
| 35-39 | 1,976 | 514 | 2,490 | 395,649 | 102,142 | 497,791 |
| 40-44 | 1,807 | 361 | 2,168 | 388,409 | 79,105 | 467,514 |
| 45-49 | 1,644 | 263 | 1,907 | 369,646 | 58,375 | 428,021 |
| 50-54 | 1,640 | 208 | 1,848 | 383,018 | 47,753 | 430,771 |
| 55-59 | <u>563</u> | <u>42</u> | <u>605</u> | <u>133,976</u> | <u>9,816</u> | <u>143,792</u> |
| | 13,126 | 2,736 | 15,862 | 2,410,038 | 490,419 | 2,900,458 |

| | <u>Average</u> | <u>Male</u> | <u>Female</u> | <u>Total</u> |
|----------------------------|----------------------|-------------|---------------|--------------|
| As at 31 March 2013 | Age ¹ | 38.0 | 34.9 | 37.5 |
| | Service ¹ | 15.0 | 11.8 | 14.5 |
| | Basic Benefit (\$) | 179,128 | 168,955 | 177,426 |
| As at 31 March 2016 | Age ¹ | 38.1 | 35.9 | 37.7 |
| | Service ¹ | 15.1 | 12.7 | 14.7 |
| | Basic Benefit (\$) | 183,608 | 179,247 | 182,856 |

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



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Table 13 Non-Elective Other Ranks
As at 31 March 2016

| Age ¹ | Number | | | Basic Benefit (\$ thousands) | | |
|------------------|---------------|--------------|---------------|------------------------------|----------------|------------------|
| | Male | Female | Total | Male | Female | Grand Total |
| 15-19 | 961 | 54 | 1,015 | 69,729 | 3,995 | 73,724 |
| 20-24 | 6,180 | 643 | 6,823 | 579,712 | 59,738 | 639,450 |
| 25-29 | 9,558 | 1,219 | 10,777 | 1,093,428 | 132,722 | 1,226,150 |
| 30-34 | 8,663 | 1,301 | 9,964 | 1,081,207 | 155,098 | 1,236,305 |
| 35-39 | 6,619 | 1,211 | 7,830 | 869,696 | 150,499 | 1,020,195 |
| 40-44 | 4,793 | 993 | 5,786 | 659,930 | 129,357 | 789,287 |
| 45-49 | 4,013 | 792 | 4,805 | 585,903 | 108,659 | 694,562 |
| 50-54 | 3,003 | 532 | 3,535 | 453,978 | 73,822 | 527,800 |
| 55-59 | 676 | 122 | 798 | 100,627 | 16,813 | 117,440 |
| | 44,466 | 6,867 | 51,333 | 5,494,210 | 830,703 | 6,324,912 |

| | <u>Average</u> | <u>Male</u> | <u>Female</u> | <u>Total</u> |
|----------------------------|----------------------|-------------|---------------|--------------|
| As at 31 March 2013 | Age ¹ | 34.7 | 36.4 | 34.9 |
| | Service ¹ | 11.9 | 10.8 | 11.8 |
| | Basic Benefit (\$) | 122,754 | 119,851 | 122,371 |
| As at 31 March 2016 | Age ¹ | 34.6 | 36.6 | 34.9 |
| | Service ¹ | 11.7 | 10.9 | 11.6 |
| | Basic Benefit (\$) | 123,560 | 120,970 | 123,213 |

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

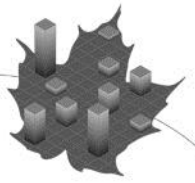
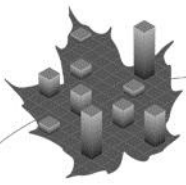


Table 14 Elective Disabled (3A) Participants
As at 31 March 2016

| Age ¹ | Number | | | Term and Paid-up Insurance (\$ thousands) | | |
|------------------|------------|-----------|------------|---|--------------|---------------|
| | Male | Female | Total | Male | Female | Grand Total |
| 25-29 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30-34 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35-39 | 1 | 0 | 1 | 111 | 0 | 111 |
| 40-44 | 1 | 1 | 2 | 90 | 90 | 180 |
| 45-49 | 13 | 6 | 19 | 1,332 | 584 | 1,916 |
| 50-54 | 60 | 22 | 82 | 5,751 | 1,968 | 7,719 |
| 55-59 | 62 | 18 | 80 | 5,746 | 1,539 | 7,285 |
| 60-64 | 38 | 16 | 54 | 2,705 | 1,205 | 3,910 |
| 65-69 | 44 | 9 | 53 | 1,084 | 296 | 1,380 |
| 70-74 | 40 | 2 | 42 | 200 | 10 | 210 |
| 75-79 | 68 | 1 | 69 | 340 | 5 | 345 |
| 80-84 | 89 | 0 | 89 | 445 | 0 | 445 |
| 85-89 | 37 | 2 | 39 | 185 | 10 | 195 |
| 90-94 | 18 | 0 | 18 | 90 | 0 | 90 |
| 95-99 | 3 | 0 | 3 | 15 | 0 | 15 |
| 100-104 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 474 | 77 | 551 | 18,094 | 5,707 | 23,800 |

| | <u>Average</u> | <u>Male</u> | <u>Female</u> | <u>Total</u> |
|----------------------------|---------------------------------|-------------|---------------|--------------|
| As at 31 March 2013 | Age ¹ | 62.9 | 56.1 | 61.8 |
| | Term and Paid-up Insurance (\$) | 49,274 | 77,217 | 53,775 |
| As at 31 March 2016 | Age ¹ | 70.7 | 58.7 | 69.0 |
| | Term and Paid-up Insurance (\$) | 38,172 | 74,116 | 43,195 |

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



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Table 15 Elective Retired and Disabled (3B) Participants
As at 31 March 2016

| Age ¹ | Number | | | Term and Paid-up Insurance (\$ thousands) | | |
|------------------|---------------|--------------|---------------|---|----------------|------------------|
| | Male | Female | Total | Male | Female | Grand Total |
| 25-29 | 20 | 2 | 22 | 2,414 | 241 | 2,655 |
| 30-34 | 249 | 49 | 298 | 31,333 | 6,510 | 37,843 |
| 35-39 | 594 | 128 | 722 | 78,162 | 17,617 | 95,779 |
| 40-44 | 1,716 | 324 | 2,040 | 245,143 | 48,503 | 293,646 |
| 45-49 | 4,785 | 786 | 5,571 | 664,539 | 106,935 | 771,474 |
| 50-54 | 10,074 | 1,568 | 11,642 | 1,315,919 | 193,592 | 1,509,511 |
| 55-59 | 11,134 | 1,609 | 12,743 | 1,416,870 | 184,335 | 1,601,205 |
| 60-64 | 7,975 | 793 | 8,768 | 818,896 | 76,447 | 895,343 |
| 65-69 | 7,990 | 402 | 8,392 | 249,461 | 14,296 | 263,757 |
| 70-74 | 7,434 | 113 | 7,547 | 37,170 | 565 | 37,735 |
| 75-79 | 7,362 | 94 | 7,456 | 36,810 | 470 | 37,280 |
| 80-84 | 5,354 | 39 | 5,393 | 26,770 | 195 | 26,965 |
| 85-89 | 2,429 | 24 | 2,453 | 12,145 | 120 | 12,265 |
| 90-94 | 880 | 20 | 900 | 4,400 | 100 | 4,500 |
| 95-99 | 166 | 4 | 170 | 830 | 20 | 850 |
| 100+ | 12 | 1 | 13 | 60 | 5 | 65 |
| | 68,174 | 5,956 | 74,130 | 4,940,922 | 649,951 | 5,590,873 |

| | <u>Average</u> | <u>Male</u> | <u>Female</u> | <u>Total</u> |
|----------------------------|---------------------------------|-------------|---------------|--------------|
| As at 31 March 2013 | Age ¹ | 62.6 | 54.2 | 62.0 |
| | Term and Paid-up Insurance (\$) | 69,934 | 104,306 | 72,518 |
| As at 31 March 2016 | Age ¹ | 64.6 | 55.8 | 63.9 |
| | Term and Paid-up Insurance (\$) | 72,475 | 109,125 | 75,420 |

Table 16 Elective Participants Entitled to a Deferred Annuity²
As at 31 March 2016

| Number | Term Insurance Benefit (\$ thousands) |
|--------|---------------------------------------|
| 99 | 13,766 |

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

² Due to their negligible effect on costs and liabilities, these participants were not taken into consideration for the purpose of this valuation.



Appendix 4 - Methodology

A. RFDB Account Balance Available for Benefits

The account balance available for benefits of the plan consists essentially of the recorded balance in the RFDB Account, which forms part of the Accounts of Canada. The account records the transactions for the plan, meaning that no debt instrument has been issued to the RFDB 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 2.

The RFDB Account balance corresponds to the cumulative historical excess of contributions and interest credits over past benefit payments. The RFDB Account balance is projected to the end of a given plan year by adding to the RFDB Account balance 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. Administration expenses are ignored because they are not debited from the RFDB Account.

B. Contributions

1. Participants

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

- the legislated annual contribution rate of 60 cents per \$250 of salary (equivalent to the monthly rate of 5 cents per \$250 of salary)

by

- the projected participants' rounded salaries for that plan year on an open-group basis, reduced by 10% per year from age 61 if applicable, (the legislation expresses the annual reduction of 10% per year on the total amount of coverage)

less

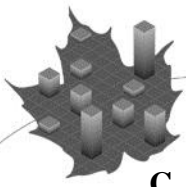
- \$6.00 annually corresponding to the \$5,000 paid-up coverage after age 65, if applicable (i.e. death benefit coverage of \$5,000 corresponds to an annual salary of \$2,500, hence an annual contribution of 60 cents per \$250 of salary would produce a contribution of \$6.00 annually).

Non-elective participants' salaries are projected for a given plan year using the assumed rates of increase described in Appendix 5 and by the assumed seniority and promotional salary increases given in Table 18. Elective participants' salaries are frozen at time of retirement or disability and are not subject to further increases.

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.



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C. Discount Rates

The rates used to calculate the present value of actuarial liabilities in respect of paid-up death benefit are the same as the yields described and shown in Appendix 5.

D. Interest Credits

Annual interest credits are projected for a given plan year as the product of the yield projected for that plan year (Appendix 5) and the projected average RFDB Account balance in that plan year.

E. Benefit Payments

The total amount of annual benefits (term and paid-up insurance) for a given plan year is projected as the sum of the participant annual benefits in force during that plan year multiplied by the mortality rates applicable to each participant during that plan year. The amount of annual benefit in force depends on the salary projected to time of death. Elective participants' salaries are frozen at time of retirement or disability and are not subject to further increases. Salaries are projected for this purpose using the assumed rates of increase in salaries and the number of participants projected on an open-group basis as described in Appendix 6.

F. Liabilities

1. Paid-up Reserve

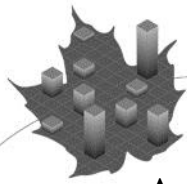
At the end of a given plan year, the liabilities associated with the individual \$5,000 paid-up death benefit in force correspond to the amount which, together with interest at the projected yields, is sufficient to pay for each individual \$5,000 paid-up death benefit projected payable on the basis of the assumed mortality rates. With the exception of elective participants entitled to a deferred annuity, this valuation assumes that the paid-up benefit of \$5,000 will be paid to all elective participants when it becomes available to them.

2. IBNR and Pending Claims Reserves

On the basis of the plan's experience, the reserve at the end of a given plan year for claims incurred but not reported (IBNR) and for pending claims is set equal to one-sixth of the projected annual death benefits paid on average during the six previous plan years.

3. Extension of Coverage

Due to the negligible financial impact of the 30-day extension of the basic benefit upon termination of coverage and to the nature of basic benefit paid for on a monthly basis, no explicit liability was calculated in respect of that basic benefit provision.



Appendix 5 - Economic Assumptions

The following economic assumptions are required for valuation purposes:

A. Increases in Average Earnings

Salary increases consist of a combination of inflation, productivity growth (i.e. real¹ increase in average employment earnings (AEE) in excess of inflation) and seniority and promotional increase. Seniority and promotion is strongly service-based and is therefore considered to be a demographic assumption rather than an economic assumption.

Price increases (inflation), as measured by changes in the Consumer Price Index (CPI), tend to fluctuate from year to year. In 2016, the Bank of Canada and the Government renewed their commitment to keep inflation between 1% and 3% until the end of 2021. However, with the level of inflation currently much lower than the 2% target, it is assumed that the level of inflation will increase from 1.6% in 2017 to its ultimate rate of 2.0% in 2018. The ultimate rate of 2.0% is unchanged from the assumed rate in the previous valuation.

The assumed increase in average employment earnings² is 2.5% for plan year 2017 and 1.3% for plan year 2018 based on approved contracts which apply to all non-elective participants. The assumed increase in average earnings² for plan year 2019 and thereafter was calculated as the sum of assumed CPI and assumed productivity growth.

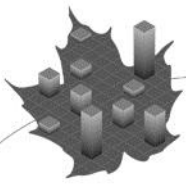
A real increase in the AEE of 0.4% is assumed for plan year 2019, and is assumed to gradually increase to the ultimate assumption of 0.8% by plan year 2024. Thus, the ultimate rate of increase in average earnings is 2.8%, resulting from a 0.8% increase in the real AEE and a 2.0% increase in the CPI. The resulting assumed increases in AEE² are shown in table 17.

B. Projected Yields on RFDB Account

These yields are required for the long-term projection of the RFDB Account balance, liabilities and excess or shortfall. The projected yields on the RFDB Account are the projected annual yields on the combined book value of the Superannuation Accounts of the Public Service, Canadian Forces and Royal Canadian Mounted Police pension plans. The methodology is unchanged from previous valuations.

¹ The real rates in this report are differentials, i.e. the difference between the effective annual rate and the inflation rate.

² Exclusive of seniority and promotional increases.



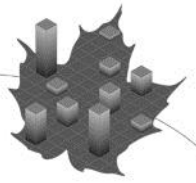
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Table 17 Summary of Economic Assumptions
(percentage)

| Plan Year | Average Employment Earnings ¹ of Non-Elective Participants | Projected Yield |
|-----------|--|-----------------|
| 2017 | 2.5 | 4.4 |
| 2018 | 1.3 | 4.2 |
| 2019 | 2.4 | 4.0 |
| 2020 | 2.5 | 3.8 |
| 2021 | 2.6 | 3.7 |
| 2022 | 2.7 | 3.6 |
| 2023 | 2.7 | 3.5 |
| 2024 | 2.8 | 3.4 |
| 2025 | 2.8 | 3.4 |
| 2026 | 2.8 | 3.3 |
| 2027 | 2.8 | 3.2 |
| 2028 | 2.8 | 3.2 |
| 2029 | 2.8 | 3.2 |
| 2030 | 2.8 | 3.1 |
| 2031 | 2.8 | 3.1 |
| 2032 | 2.8 | 3.2 |
| 2033 | 2.8 | 3.3 |
| 2034 | 2.8 | 3.4 |
| 2035 | 2.8 | 3.5 |
| 2036 | 2.8 | 3.6 |
| 2037 | 2.8 | 3.8 |
| 2038 | 2.8 | 4.1 |
| 2039 | 2.8 | 4.3 |
| 2040 | 2.8 | 4.4 |
| 2041 | 2.8 | 4.6 |
| 2048+ | 2.8 | 4.7 |

¹ Exclusive of seniority and promotional increases.



Appendix 6 - Demographic and Other Assumptions

A. Demographic Assumptions

Except where otherwise noted, all demographic assumptions were determined from the Canadian Forces- Regular Force plan's experience as was done in the past. Where applicable, assumptions of the previous valuation were updated to reflect the intervaluation experience. For detailed descriptions on each assumption, please refer to the actuarial report on the Pension Plans for Canadian Forces as at 31 March 2016.

B. Other Assumptions¹

1. Option to Reduce Coverage to \$5,000

The valuation data indicates that the proportion of elective participants opting to reduce their basic benefit to \$5,000 is negligible. Accordingly, no elective participants were assumed to make such an option.

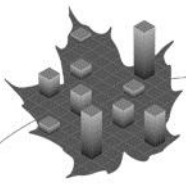
2. Non-Elective Participants Choosing to Become Elective Participants at Retirement

The assumed proportion of new retirees choosing to continue their coverage under the SDB plan was derived from the plan's own experience. These assumed proportions remain unchanged and are shown in Table 20.

3. Administrative Expenses

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

¹ New participants and Seniority and Promotional Salary Increase assumptions are derived from the Canadian Forces plan's own experience. For detailed descriptions on each assumption, please refer to the Actuarial Report on the Pension Plans for Canadian Forces as at 31 March 2016.



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**Table 18 Sample of Assumed Seniority and Promotional Salary
Increases**
(percentage)

| <u>Service</u> ¹ | <u>Officer</u> | <u>Other Rank</u> |
|-----------------------------|----------------|-------------------|
| 0 | 6.7 | 20.2 |
| 1 | 7.3 | 17.8 |
| 2 | 14.9 | 5.1 |
| 3 | 24.6 | 9.0 |
| 4 | 11.6 | 2.6 |
| 5 | 6.6 | 2.0 |
| 6 | 7.4 | 1.8 |
| 7 | 5.4 | 1.5 |
| 8 | 4.4 | 1.0 |
| 9 | 4.0 | 0.9 |
| 10 | 3.8 | 0.8 |
| 11 | 3.6 | 0.9 |
| 12 | 3.4 | 1.0 |
| 13 | 3.0 | 1.1 |
| 14 | 2.6 | 1.1 |
| 15 | 2.3 | 1.2 |
| 16 | 2.1 | 1.2 |
| 17 | 2.0 | 1.2 |
| 18 | 1.9 | 1.2 |
| 19 | 1.9 | 1.2 |
| 20 | 1.8 | 1.2 |
| 21 | 1.7 | 1.2 |
| 22 | 1.6 | 1.2 |
| 23 | 1.5 | 1.2 |
| 24 | 1.4 | 1.1 |
| 25 | 1.3 | 1.1 |
| 26 | 1.3 | 1.1 |
| 27 | 1.2 | 1.0 |
| 28 | 1.2 | 1.0 |
| 29 | 1.1 | 0.9 |
| 30 | 1.1 | 0.9 |
| 31 | 1.0 | 0.8 |
| 32 | 1.0 | 0.7 |
| 33 | 0.9 | 0.6 |
| 34 | 0.7 | 0.6 |
| 35+ | 0.5 | 0.6 |

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

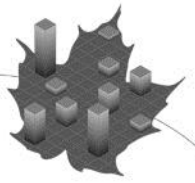
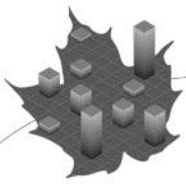


Table 19 Sample of Assumed Withdrawal Rates
(per 1,000 individuals)

| Service ¹ | Old Terms of Service | | | | New Terms of Service | | | |
|----------------------|----------------------|--------|------------|--------|----------------------|--------|------------|--------|
| | Officer | | Other Rank | | Officer | | Other Rank | |
| | Male | Female | Male | Female | Male | Female | Male | Female |
| 0 | 96 | 89 | 84 | 67 | 96 | 99 | 84 | 97 |
| 1 | 36 | 30 | 23 | 26 | 36 | 30 | 22 | 26 |
| 2 | 30 | 31 | 53 | 29 | 30 | 30 | 52 | 29 |
| 3 | 33 | 20 | 72 | 34 | 33 | 21 | 74 | 34 |
| 4 | 30 | 17 | 52 | 33 | 30 | 18 | 50 | 33 |
| 5 | 20 | 21 | 58 | 32 | 20 | 21 | 59 | 32 |
| 6 | 13 | 19 | 40 | 18 | 13 | 19 | 39 | 18 |
| 7 | 15 | 12 | 32 | 21 | 15 | 12 | 32 | 21 |
| 8 | 21 | 13 | 30 | 17 | 21 | 13 | 30 | 17 |
| 9 | 25 | 16 | 24 | 17 | 25 | 16 | 24 | 17 |
| 10 | 21 | 14 | 22 | 23 | 21 | 14 | 22 | 23 |
| 11 | 25 | 12 | 14 | 10 | 25 | 12 | 14 | 10 |
| 12 | 13 | 12 | 8 | 3 | 13 | 12 | 8 | 3 |
| 13 | 11 | 6 | 6 | 0 | 11 | 6 | 6 | 0 |
| 14 | 16 | 0 | 5 | 2 | 16 | 0 | 5 | 2 |
| 15 | 12 | 6 | 7 | 3 | 12 | 6 | 8 | 3 |
| 16 | 5 | 0 | 2 | 0 | 4 | 0 | 3 | 0 |
| 17 | 7 | 2 | 0 | 1 | 7 | 2 | 0 | 1 |
| 18 | 8 | 10 | 0 | 4 | 8 | 13 | 0 | 4 |
| 19 | - | - | - | - | 11 | 21 | 3 | 20 |
| 20 | - | - | - | - | 8 | 25 | 12 | 30 |
| 21 | - | - | - | - | 13 | 29 | 32 | 27 |
| 22 | - | - | - | - | 16 | 32 | 41 | 38 |
| 23 | - | - | - | - | 6 | 6 | 38 | 9 |

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



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Table 20 Sample of Assumed Proportions of non-elective participants choosing to become elective participants at retirement
(per 1,000 individuals)

| <u>Service</u> ² | <u>Pensionable Retirement</u> ¹ | | <u>Disability Retirement</u> | |
|-----------------------------|--|-------------------|------------------------------|-------------------|
| | <u>Officer</u> | <u>Other Rank</u> | <u>Officer</u> | <u>Other Rank</u> |
| 19 | 850 | 860 | 1,000 | 1,000 |
| 20 | 850 | 850 | 1,000 | 1,000 |
| 21 | 840 | 850 | 1,000 | 1,000 |
| 22 | 840 | 840 | 1,000 | 1,000 |
| 23 | 830 | 840 | 1,000 | 1,000 |
| 24 | 830 | 840 | 1,000 | 1,000 |
| 25 | 820 | 840 | 1,000 | 1,000 |
| 26 | 820 | 840 | 1,000 | 1,000 |
| 27 | 810 | 840 | 1,000 | 1,000 |
| 28 | 810 | 840 | 1,000 | 1,000 |
| 29 | 810 | 840 | 1,000 | 1,000 |
| 30 | 810 | 840 | 1,000 | 1,000 |
| 31 | 810 | 840 | 1,000 | 1,000 |
| 32 | 810 | 840 | 1,000 | 1,000 |
| 33 | 810 | 840 | 1,000 | 1,000 |
| 34 | 820 | 850 | 1,000 | 1,000 |
| 35+ | 820 | 850 | 1,000 | 1,000 |

¹ A pensionable retirement is a retirement resulting in either an immediate annuity for reasons other than disability or an annual allowance.

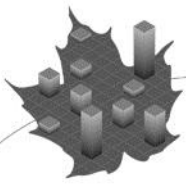
² Expressed in completed years calculated at the beginning of the plan year.



Table 21 Sample of Assumed Rates of Retirement
(per 1,000 individuals)

| <u>Service¹</u> | <u>Old Terms of Service</u> | | <u>New Terms of Service</u> | |
|----------------------------|-----------------------------|------------------------|-----------------------------|------------------------|
| | <u>Male Officer</u> | <u>Male Other Rank</u> | <u>Male Officer</u> | <u>Male Other Rank</u> |
| 19 | 43 | 24 | - | - |
| 20 | 55 | 47 | - | - |
| 21 | 56 | 53 | - | - |
| 22 | 38 | 52 | - | - |
| 23 | 34 | 60 | - | - |
| 24 | 54 | 66 | 63 | 81 |
| 25 | 65 | 60 | 66 | 66 |
| 26 | 57 | 55 | 57 | 63 |
| 27 | 53 | 46 | 53 | 45 |
| 28 | 51 | 46 | 51 | 42 |
| 29 | 60 | 72 | 60 | 78 |
| 30 | 87 | 76 | 87 | 76 |
| 31 | 108 | 76 | 108 | 74 |
| 32 | 112 | 92 | 112 | 101 |
| 33 | 131 | 118 | 128 | 89 |
| 34 | 303 | 212 | 308 | 243 |
| 35 | 341 | 268 | 339 | 263 |
| 36 | 375 | 299 | 380 | 299 |
| 37 | 492 | 464 | 407 | 324 |
| 38 | 492 | 516 | 407 | 295 |

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



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Table 22 Sample of Assumed Rates of Any Occupation Disability Retirement 3A
(per 1,000 individuals)

| <u>Age</u> ² | <u>Any Occupation (3A)</u> ¹ | |
|-------------------------|---|---------------|
| | <u>Male</u> | <u>Female</u> |
| 20 | 0.1 | 0.1 |
| 25 | 0.1 | 0.2 |
| 30 | 0.0 | 0.3 |
| 35 | 0.1 | 0.4 |
| 40 | 0.2 | 0.6 |
| 45 | 0.1 | 0.9 |
| 50 | 0.3 | 1.3 |
| 55 | 0.6 | 1.7 |
| 59 | 0.9 | 2.4 |

Table 23 Sample of Assumed Rates of Own Occupation Disability Retirement 3B
(per 1,000 individuals)

| <u>Service</u> ² | <u>Own Occupation (3B)</u> ² | | |
|-----------------------------|---|------------------------|---------------|
| | <u>Male</u> | <u>Male Other Rank</u> | <u>Female</u> |
| 1 | 1.0 | 9.1 | 12.8 |
| 5 | 9.3 | 13.4 | 22.8 |
| 10 | 8.5 | 25.8 | 31.4 |
| 15 | 10.6 | 28.6 | 40.6 |
| 20 | 16.7 | 55.5 | 49.8 |
| 25 | 21.1 | 65.2 | 78.6 |
| 30 | 28.0 | 73.1 | 110.2 |
| 35 | 80.7 | 161.2 | 133.5 |

¹ Disability 3A refers to the inability to perform any occupations while 3B refers to the inability to perform his/her own occupation.

² Expressed in completed years calculated at the beginning of the plan year.

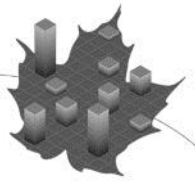
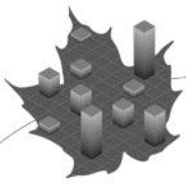


Table 24 Sample of Assumed Rates of Mortality
(per 1,000 individuals)

| Age ¹ | Elective and Non-Elective Participants | | | Elective Disabled (3A) Participants | | |
|------------------|--|------------|--------|-------------------------------------|------------|--------|
| | Male | | Female | Male | | Female |
| | Officer | Other Rank | | Officer | Other Rank | |
| 20 | 0.4 | 0.7 | 0.4 | 0.5 | 2.8 | 0.4 |
| 25 | 0.4 | 0.7 | 0.4 | 0.5 | 2.9 | 0.4 |
| 30 | 0.5 | 0.6 | 0.4 | 0.6 | 3.0 | 0.4 |
| 35 | 0.5 | 0.8 | 0.4 | 0.7 | 3.4 | 0.6 |
| 40 | 0.6 | 0.8 | 0.5 | 1.0 | 4.1 | 1.0 |
| 45 | 0.7 | 1.3 | 0.8 | 2.5 | 5.5 | 1.6 |
| 50 | 1.0 | 2.3 | 1.2 | 6.3 | 7.1 | 2.5 |
| 55 | 1.6 | 4.0 | 2.0 | 10.2 | 9.6 | 4.0 |
| 60 | 3.0 | 6.8 | 3.5 | 14.0 | 13.6 | 6.4 |
| 65 | 5.8 | 11.3 | 6.3 | 18.6 | 20.1 | 9.8 |
| 70 | 10.6 | 18.6 | 11.1 | 25.8 | 29.2 | 16.0 |
| 75 | 20.3 | 32.0 | 19.2 | 39.3 | 42.6 | 26.8 |
| 80 | 41.5 | 57.4 | 33.4 | 60.0 | 66.6 | 43.2 |
| 85 | 80.7 | 98.4 | 59.2 | 93.9 | 106.3 | 72.8 |
| 90 | 137.6 | 156.1 | 105.3 | 134.3 | 163.5 | 120.5 |
| 95 | 211.4 | 231.8 | 185.8 | 209.7 | 237.1 | 183.0 |
| 100 | 306.6 | 319.8 | 281.6 | 304.3 | 329.4 | 279.5 |
| 105 | 488.7 | 488.7 | 410.5 | 488.6 | 450.5 | 409.2 |
| 110 | 500.0 | 500.0 | 500.0 | 500.0 | 500.0 | 500.0 |

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



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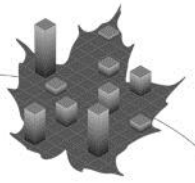
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Table 25 Sample of Assumed Longevity Improvement Factors
(effective at the end of plan year)

| Age ² | Initial and Ultimate Plan Year Mortality Reductions (%) ¹ | | | |
|------------------|--|-------|--------|-------|
| | Male | | Female | |
| | 2018 | 2033+ | 2018 | 2033+ |
| 20 | 1.86 | 0.80 | 0.43 | 0.80 |
| 25 | 1.26 | 0.80 | 1.03 | 0.80 |
| 30 | 1.72 | 0.80 | 0.98 | 0.80 |
| 35 | 1.86 | 0.80 | 1.21 | 0.80 |
| 40 | 1.73 | 0.80 | 1.30 | 0.80 |
| 45 | 1.53 | 0.80 | 0.74 | 0.80 |
| 50 | 1.31 | 0.80 | 0.64 | 0.80 |
| 55 | 1.57 | 0.80 | 1.12 | 0.80 |
| 60 | 1.97 | 0.80 | 1.56 | 0.80 |
| 65 | 2.23 | 0.80 | 1.72 | 0.80 |
| 70 | 2.41 | 0.80 | 1.69 | 0.80 |
| 75 | 2.46 | 0.80 | 1.77 | 0.80 |
| 80 | 2.37 | 0.80 | 1.82 | 0.80 |
| 85 | 2.02 | 0.80 | 1.68 | 0.80 |
| 90 | 1.48 | 0.62 | 1.36 | 0.62 |
| 95 | 0.94 | 0.42 | 0.95 | 0.42 |
| 100 | 0.61 | 0.28 | 0.63 | 0.28 |

¹ The mortality rate reduction applicable during any plan year within the 20-year select period is found by linear interpolation between the figures for plan years 2018 and 2033.

² Expressed in completed years calculated at the beginning of the plan year.



Appendix 7 - Acknowledgements

The Department of National Defence provided relevant valuation data on plan participants. Public Services and Procurement Canada provided information in respect of non-elective and elective participants.

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

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