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Actuarial Report on

British Columbia Teachers' Pension Plan

Actuarial Valuation
as at December 31, 2014

Vancouver, British Columbia

September 21, 2015

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Contents

Actuarial Report Highlights

BC Teachers' Pension Plan
December 31, 2014

An actuarial valuation of the Teachers' Pension Plan was completed as at December 31, 2014. Its purpose was to determine the financial position of the Plan as at December 31, 2014 and to report on the adequacy of the member and employer contribution rates.

Scope of the Valuation

The main valuation focuses on the Basic Account and the funding of the Basic, non-indexed benefits. It excludes liabilities for:

- Future indexing funded via fixed contributions to the Inflation Adjustment Account (IAA).

Furthermore, it ignores the limits imposed by the *Income Tax Act* ("*ITA*") on benefits provided from registered pension plans - such excess benefits are paid on a current cash basis through the Supplemental Benefits Account, which is maintained at a zero balance.

We have, however, performed supplementary valuations as follows:

- For basic and indexed benefits, on the assumption that indexed benefits are to be fully funded, in advance, as for basic benefits; and
- Limiting benefits to those permitted under the *ITA*; this is done both for basic benefits only, and for basic plus indexed benefits.

Key Plan Changes Included in the Valuation

- Effective July 1, 2013, the employer contribution rate to the Basic Account was increased from 13.7% to 15.0% (integrated with YMPE); and
- Effective July 1, 2013, the member contribution rate to the Basic Account was increased from 9.7% to 11.0% (integrated with YMPE).

There were no benefit changes that had a material financial impact on the plan.

Actuarial Methods and Assumptions

The actuarial liabilities include the value of benefits accrued by members as at December 31, 2014, as well as the future benefits expected to be earned by existing members. Asset values are based on smoothed market values (limited to not more than 110%, nor less than 90%, of market value), plus projected future contributions based on entry-age normal contribution rates and, where relevant, the existing amortization rates.

The contribution rates are tested on the entry-age contribution method. Under this method, a long-term entry-age rate, which would fully fund benefits for future new entrants to the Plan, is calculated. The surplus (unfunded liability) is then amortized according to the requirements of the Board's Funding Policy. This approach is designed to maintain costs at a level percentage of payroll over an extended period. The resulting contribution rate is then tested against the going-concern requirements of the *BC Pension Benefits Standards Act* ("*PBSA*") as required by the Joint Trust Agreement.

Key Long-term Assumptions Used Include:

- Annual Investment Return - 6.50% (unchanged from the previous valuation);
- Annual Salary Increase - 3.75% plus seniority (unchanged from the previous valuation); and
- Annual Indexing - 0.00% for basic benefits, 3.00% for indexed benefits (unchanged from the previous valuation)

Actuarial Position

The valuation shows an improvement in the actuarial position of the Basic Account on the entry-age normal contribution basis. A surplus of $449 million has emerged since the December 31, 2011 valuation:

Basic Benefits Only ($000's)	2014	2011
Assets without previously scheduled amortization	21,223,039	18,331,368
Liabilities	22,431,968	20,691,072
Surplus (Unfunded Liability) without previously established amortization	(1,208,929)	(2,359,704)
Present value of previously established amortization	1,657,720	2,359,704[1]
Surplus (Unfunded Liability) with previously established amortization	448,791	0

[1] Including amortization amount of $854,999,000 established at the 2011 valuation.

The supplementary valuation results are:

Basic and Indexed Benefits ($000's)	2014	2011
Assets without previously scheduled amortization	26,594,292	23,123,945
Liabilities	30,637,346	28,501,889
Surplus (Unfunded Liability) without previously established amortization	(4,043,054)	(5,377,944)
Present value of previously established amortization	1,657,720	2,359,704[1]
Surplus (Unfunded Liability) with previously established amortization	(2,385,334)	(3,018,240)

When the *ITA* maximums are recognized, the above surpluses (unfunded liabilities) change marginally to:

Benefits Limited to *ITA* Maximums ($000's)		2014	2011
Surplus (Unfunded Liability) with previously established amortization amounts	Basic Benefits only	454,374	1,241[1]
	Basic and Indexed Benefits	(2,373,451)	(3,016,503)[1]

Main Reasons for Changes in Actuarial Position

The main reasons for the improvement in the actuarial position are:

- Smoothed investment returns higher than assumed; and
- Actual salary increases lower than previously assumed;

Partially offset by

- Actual contributions lower than previously assumed; and
- Changes in the demographic assumptions, most importantly changes in the mortality assumptions.

Member and Employer Contribution Rates - Basic Non-Indexed Benefits

Members currently contribute 11.0% of salaries, less 1.50% of salaries up to the YMPE, for basic non-indexed benefits; employers contribute 15.0% of salaries, less 1.50% of salaries up to the YMPE, for a total contribution rate of 26.0% integrated.

The long term cost for future service (i.e. the entry-age, normal actuarial cost) is 16.59% integrated or 9.41% of salaries lower than the current combined member and employer contributions.

[1] After allowing for the $854,999,000 amortization requirement established at the 2011 valuation.

The funded position of the plan on the entry-age rate basis has improved and a gain of $449 million has emerged since the December 31, 2011 valuation. As a result, the current combined contribution rate is 3.93% of salaries higher than the minimum rate required by the *PBSA*.

Under the transitional funding arrangements of the Joint Trust Agreement, contribution rate decreases are first allocated to reduce the employer's contribution rate to the Basic Account by 2% (with a concurrent and corresponding 2.0% increase in the employer's contribution rate to the IAA). Contribution rate decreases are then used to rebalance the employer's and member's contribution rates to the Basic Account, by reducing the employer's contribution rate to the Basic Account by a further 2.0%. Therefore the permitted 3.93% contribution rate decrease is to be allocated to employer, with a decrease of 3.93% of salaries to the Basic Account, for a total Basic Account contribution rate of 22.07% integrated, and an increase of 2% of salaries to the IAA contribution rate, for a total IAA contribution rate of 6.13%.

Combined Basic Plus IAA Contribution Rates

When the Basic Account contribution rate reduction is combined with the IAA contribution rate increase, all for the employers, the revised totals become:

	Member	Employer	Total
Current Basic	11.00%[1]	15.00%[1]	26.00%[2]
Minus Basic Account reduction	0.00%	(3.93%)	(3.93%)
Total Minimum Required Basic Rate	**11.00%[1]**	**11.07%[1]**	**22.07%[2]**
Current IAA	3.00%	1.13%	4.13%
Plus new IAA	0.00%	2.00%	2.00%
Total	**14.00%[1]**	**14.20%[1]**	**28.20%[2]**

These rates comply with the going-concern requirements of the provincial pension standards legislation (i.e. the *PBSA*).

The *ITA* requires that individual member contributions not exceed the lesser of 9% of salaries or $1,000 plus 70% of the pension credit, though this condition may be waived by the Minister of Finance provided members do not contribute more than half of the cost of benefits. The required contributions exceed 9% of salaries so it will be necessary to apply to the Minister for an exemption. The employer contributions of 14.20% exceed the member contributions of 14.00% and therefore the requirement that the member contributions will not exceed half of the amount required to fund the aggregate benefits is met. The plan has applied for and been granted the waiver at each valuation since 2005.

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[1] Integrated i.e. less 1.5% of salaries up to YMPE.

[2] Integrated i.e. less 3.0% of salaries up to YMPE.

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I. Scope of the Valuation

In accordance with Article 10 of the Joint Trust Agreement (the "JTA") and on the instructions of the Teachers' Pension Board of Trustees (the "Board of Trustees"), we completed an actuarial valuation of the Basic Account of the Teachers' Pension Plan (the "Plan") as at December 31, 2014 and are pleased to submit this report thereon. The primary purpose of this valuation is to determine the financial position of the Basic Account as at December 31, 2014 and to report on the adequacy of the member and employer contribution rates.

The main valuation focuses on the Basic Account and the funding of the Basic, non-indexed benefits. It excludes liabilities for future indexing funded via fixed contributions to the Inflation Adjustment Account ("IAA"). Furthermore, it ignores the limits on benefits imposed by the Income Tax Act ("ITA") on registered pension plans - such excess benefits are paid on a current cash basis through the Supplemental Benefits Account, which is maintained at a zero balance.

We have, however, performed supplementary valuations as follows:

- For basic and indexed benefits, on the assumption that indexed benefits are to be fully funded, in advance, as for basic benefits; and
- Limiting benefits to those permitted under the *ITA*; this is done both for basic benefits only, and for basic plus indexed benefits.

The intended users of this report are The Board of Trustees, the Financial Institutions Commission of British Columbia ("FICOM") and Canada Revenue Agency ("CRA"). This report is not intended or necessarily suitable for other purposes than those listed above.

II. Changes in Plan

The last valuation of the Plan, prepared as at December 31, 2011 and included in our report dated October 3, 2012, determined the financial position of the Plan as amended to December 31, 2011. Since then, a number of changes have been made to the Plan rules. The major changes affecting its financing include:

- Effective July 1, 2013, the employer contribution rate to the Basic Account was increased from 13.7% to 15.0% (integrated with YMPE); and
- Effective July 1, 2013, the member contribution rate to the Basic Account was increased from 9.7% to 11.0% (integrated with YMPE).

There were no benefit changes that had a material financial impact on the Plan.

The changes, and the main provisions of the Plan, are described in Appendix A.

III. Actuarial Methods and Assumptions

1. Financing Method and Adequacy of Contribution Rates

(a) Funding Criteria

In any pension system, the rates of member and employer contribution should be such that:

- The present value of all future contributions at those rates
- **Equals** the present value of all future benefits
- **Minus** the funds on hand.

There are numerous financing methods that will satisfy this equation. At one end is the pay-as-you-go or current disbursement method; under this method, contributions are limited to those necessary to finance current benefit disbursements, so that no assets are accumulated. At the other end is the achievement of full funding within a reasonable period; this results in the accumulation of substantial assets.

The general criteria we use in establishing the appropriate level of contributions to the Teachers' Pension Plan include the following:

(i) **Benefit security** – the probability of fulfilling the present benefit promises provided in the Plan depends on a mixture of political, economic and financial factors; but, whatever the probability, obviously benefit security is enhanced by a larger accumulation of assets.

(ii) **Stability of contributions** – the financing system should result in contribution rates that are relatively stable over an extended period of time.

(iii) **Allocation of costs** – as far as is practicable, pension costs should be allocated to the generation that incurs them; there is no assurance that future generations will assume the burdens transferred to them by prior generations.

The Board has adopted a formal funding policy (most recently revised on June 14, 2012) in which it identified benefit security as its primary funding objective and contribution stability as an important secondary objective. We have taken this into account in carrying out this valuation.

(b) Indexing Treatment

The current financing provisions are described in Appendix A. Member and employer contributions are at rates set out in the Plan rules. A larger part of these contributions is allocated to the Basic Account, and a smaller portion to the IAA. The future indexing of pensions is based on funds available in the IAA, which derives its funds primarily from these allocated contributions, from excess investment earnings on pensioner reserves in the Basic Account, and from investment earnings within the IAA itself.

In a sense, the IAA operates akin to a defined contribution or money-purchase account in that the value of indexing benefits is limited to the assets in the IAA. Future cost-of-living adjustments are not guaranteed, but are granted at the discretion of the Board, subject to the availability of funds in the IAA. Where there are sufficient monies in the IAA, full CPI indexing is provided; alternatively, if the monies in the IAA cannot provide full CPI indexing, then the amount of indexing is limited to the monies available. In either case, the mechanics are such that the capitalized value of the indexing granted is transferred from the IAA to Basic each time indexing is granted. Thus, the system will limit indexing, if necessary, so that the granting of any increases for indexing should not create (or increase) an unfunded liability, or reduce an actuarial surplus. Accordingly, we did not consider any future indexing in determining the financial status of the Basic Account.

However, we also show supplementary results on the assumption that the assets of, and future contributions to, the Basic Account and the IAA are combined, with benefits to be fully indexed and funded in advance, as for basic benefits.

(c) Basic Account Valuation

We determined the financial status of the Plan for the Basic Account only (i.e. ignoring the indexing granted after December 31, 2014). The methods used are described in Appendix B.

(d) Funding Requirements

The approach taken in this valuation (set out in the following sections) has taken into account the requirements of the Board's funding policy, as well as the requirements of the Joint Trust Agreement.

(e) Normal Cost and Amortization of Surplus or Unfunded Liability

An entry-age funding approach is used. As a first step, contributions are calculated as the level, long term rate of pay required to finance the benefits of new entrants to the Plan over their working lifetimes, so that their projected benefits are fully secured by equivalent assets by the time they retire (the "normal cost rate" or the "entry-age rate"). Thus, to the extent actuarial assumptions are realized, the addition of new entrants to the Plan should generate neither unfunded liabilities nor surpluses.

Next, the funded position of the plan at the valuation date is considered. The liability takes into account benefits earned to the valuation date as well as benefits expected to be earned for future service by existing members. Asset values are taken at smoothed market values for existing assets, plus projected future contributions in respect of the existing members at the entry-age normal rates, plus the value of the amortization amounts established at previous valuations. The resulting net financial position may be either an actuarial surplus or an unfunded actuarial liability.

This surplus or unfunded liability is amortized over a specified period as outlined in the funding policy, e.g. 25 or 15 years. Contributions, expressed as a percentage of payrolls, revert to the normal cost rate after the unfunded liability or surplus has been amortized.

(f) PBSA Requirements

The *Pension Benefits Standards Act* ("*PBSA*") imposes certain minimum funding requirements on pension plans registered in British Columbia. These include the determination of a plan's financial position on a solvency basis as well as the more usual going-concern basis, the amortization of unfunded actuarial liabilities over a maximum of 15 years, and special rules regarding the treatment of surplus. While the Teachers' Pension Plan is one of a number of British Columbia public sector plans that are exempt from these provisions, the current joint trusteeship arrangement requires that the Plan's financing comply with the *PBSA* requirements for a going-concern valuation. This report therefore complies with the going concern valuation requirement of the *PBSA*.

(g) Test Contribution Adequacy

Under the *PBSA* going-concern requirements, the employers and the members must contribute the full normal actuarial cost (e.g. the "entry-age rate" described in (e) above). In addition, any previously identified

unfunded liabilities must be amortized over not more than the remaining portion of their respective 15 year amortization periods and any "new" unfunded liabilities must be amortized over not more than 15 years.

Surpluses may be applied to reduce the contribution requirements from the previously set level. With respect to the employer share of the requirements, the rate may only be reduced below the normal actuarial cost after a surplus margin of 5% of liabilities has been set aside, with the remaining surplus to be amortized over not less than 5 years. The Board set out its policy with regard to amortization of surplus in its funding policy.

Accordingly, we have calculated theoretical contribution requirements as follows:

- Calculate the "normal cost rate" (i.e. the "entry-age rate");
- Calculate the surplus (or unfunded liability) using this rate, after taking into account the value of additional contributions required to amortize unfunded liabilities identified at previous valuations;
- If there is an unfunded liability, amortize the balance over 15 years from the current valuation date. If there has been a gain since the last valuation, i.e. the currently scheduled amortization rates applied for the balance of the previously established amortization periods are more than sufficient to amortize the previously identified unfunded liabilities; we apply the gain to amortize or reduce the previously identified unfunded liabilities, starting with the oldest established. This results in a reduction in the required amortization rates, with the revised rates in effect for the previously established periods; and
- If, after removing all previously established amortization amounts there is a surplus, we amortize it over 25 years and test whether the transitional arrangements in the Joint Trust Agreement can be met.

The JTA rules require any contribution rate increases to be shared equally by the Plan members and the employers. The employer Basic contribution rate is currently 4% higher than the member rate. Contribution rate decreases are first allocated to the employer (with a portion of the initial decreases being reallocated to the IAA) until the member and the employer rates are equal. The intent is that once the Basic and IAA contribution rates are rebalanced after a transitional period, future costs will be shared equally between members and employers (the employers will continue to pay a small 0.13% rate differential to the IAA). Thus, we express the future cost requirements as a combined member-plus-employer amount.

2. Actuarial Assumptions

The rates of investment return, salary increase, indexing, mortality, withdrawal, disability and retirement experienced by members of the fund were examined for the three year period ending on the valuation date,

together with corresponding experience for earlier periods and with other assumptions affecting the valuation results. We discussed the implications of the assumptions, and changes to them, with the Board.

Following these discussions, we left the economic assumptions unchanged. We made some adjustments to the demographic and other assumptions. The assumptions are described in Appendix B; the key economic assumptions are summarized below.

- Annual Investment Return - 6.50% (unchanged from the previous valuation);
- Annual Salary Increase - 3.75% plus seniority, (unchanged from the previous valuation); and
- Annual Indexing - 0.00% for basic benefits, 3.00% for indexed benefits (unchanged from the previous valuation)

Emerging experience differing from the assumptions will result in gains or losses that will be revealed in future valuations.

3. Membership Data

Data as of December 31, 2014 were prepared by the Pension Corporation. The data are described in detail in Appendix B and numerically summarized in Appendices C, D and E.

4. Benefits Excluded

No benefits have been excluded for the valuation.

IV. Results of Actuarial Investigations

1. Basic Account - Actuarial Position

Schedule 1 shows a statement of the actuarial position of the Plan as at December 31, 2014. This statement ignores liabilities for future indexed supplemental pensions granted after the valuation date, and their financing, and assumes that member and employer contribution rates for basic pensions will be made at the entry-age normal cost rate.

Schedule 1 - Statement of Actuarial Position as at December 31, 2014

Basic Account - Non-Indexed Benefits – Entry-age Normal Cost

	($000's)	
Assets	**2014**	**2011**
Market Value of Basic Fund	18,690,709	13,851,522
Asset Smoothing Adjustment	(1,869,071)	216,462
Smoothed Value of Fund	**16,821,638**	**14,067,984**
Actuarial present values of:		
▪ Future contributions at entry-age rates	4,401,401	4,263,384
▪ Present value of existing amortization		
(i) 3.05% to 2017	229,867	456,042
(ii) 2.93% to 2020	424,976	632,676
(iii) 1.50% to 2023	314,193	415,987
(iv) 2.56% to 2026	688,684	854,999
Total Assets	**22,880,759**	**20,691,072**
Liabilities		
Actuarial present values for:		
▪ Pensions being paid	10,640,001	9,067,940
▪ Inactive members	580,722	526,942
▪ Active members	11,074,126	10,989,338
▪ Future expenses	137,108	106,835
Voluntary contribution balance	11	17
Total Liabilities	**22,431,968**	**20,691,072**
Surplus (Unfunded Liability)	**448,791**	**0**[1]
Funded Ratio: Total Assets ÷ Total Liabilities	**102.0%**	**100.0%**[2]

[1] The 2011 report showed a $854,999 thousand unfunded liability. When amortized over 15 years (to 2026) this resulted in an amortization requirement of 2.56%. Showing the amortization requirement as an asset reduces the unfunded liability to zero.

[2] Prior to allowance for the 2011 amortization requirement of 2.56%, the funded ratio for 2011 was 95.9%.

2. Change in Actuarial Position

The statement of actuarial position included in Schedule 1 indicates that a surplus of $449 million has emerged since December 31, 2011. The $449 million surplus is the net result of a number of items, the most significant being higher than assumed investment returns and lower than assumed salary increases, offset by lower than assumed contributions and changes in the valuation assumptions.

Schedule 2 - Change in Actuarial Position

	Approximate effect ($ millions)
1. Surplus (Unfunded liability) at December 31, 2011	0
2. Actual income from investments higher than 6.5% assumed rate (on smoothed values)	653
3. Actual contributions lower than previously assumed[1]	(423)
4. Actual salary increases to December 31, 2014 lower than previously assumed	635
5. Changes in valuation assumptions	(434)
6. Other factors (a net gain) including changes in plan membership and other differences between actuarial assumptions and actual experience during the inter-valuation period	18
7. Surplus (Unfunded liability) at December 31, 2014	**449**

The $434 million loss due to changes in actuarial assumptions (shown in item (5)) is the net result of the following (the assumption changes are described in Appendix B):

[1] This arises for two reasons. Firstly, the contribution rate increase calculated in the 2011 valuation is assumed to occur at the valuation date, while in fact it occurs 18 months after the valuation. Secondly, the amortization payments received since the last valuation are lower than expected due to the payroll increases being lower than assumed.

Change in Actuarial Position Arising From Change in Actuarial Assumptions

Assumption change	Approximate effect ($ millions)
Pre-retirement mortality	(1)
Disability incidence rate	0
Disability recovery rate	(2)
Withdrawal rates	0
Retirement rates	45
Post-retirement mortality	(407)
Post-retirement mortality for disabled pensioners	(31)
Percentage of part time members	(38)
Total gain/(loss) from change in valuation assumptions	**(434)**

3. Adequacy of Contribution Rates

As discussed in Section III, the required contribution rate consists of the normal cost plus an adjustment to amortise any surplus or unfunded liability. The results in this regard are discussed in more detail below.

(a) Normal Cost Rate

The current service contribution, inclusive of contributions by members, required to finance the basic pensions of new entrants (i.e. the normal actuarial cost) has increased from 15.96% of salaries as at December 31, 2011 to 16.59% of salaries as at December 31, 2014. The 0.63% increase in normal cost rate is developed in Appendix F and is the net result of a number of items, the most significant being:

- the change in the mortality assumption (cost increase of 0.70%); and
- the change in the administration expense assumption (cost increase of 0.10%); offset by
- the change in the retirement assumption (cost decrease of 0.11%); and
- the change in the termination assumption (cost decrease of 0.10%).

(b) PBSA Minimum Rate

The valuation shows a surplus of $448,791,000 including the present value of the existing amortization requirements established at previous valuations, which total $1,657,720,000. The surplus is not sufficient to allow the existing amortization requirements to be eliminated entirely, but the *PBSA* allows the surplus to be used to reduce the existing amortization rates, starting with the oldest established.

The following table shows the permitted reduction in the existing amortization payments:

Permitted Reduction in Amortization Payments					
Existing amortization rates	**Present Value of existing amortization ($000's)**	**Permitted Reduction in rates %**	**Present Value of Permitted Reduction**	**Remaining Minimum PSBA Amortization %**	**Present Value of revised minimum amortization**
3.05% to 2017	229,867	(3.05)	(229,867)	-	-
2.93% to 2020	424,976	(1.51)	(218,924)	1.42	206,052
1.50% to 2023	314,193	-	-	1.50	314,193
2.56% to 2026	688,684	-	-	2.56	688,684
Total	**1,657,720**	**(4.56)**	**(448,791)**	**5.48**	**1,208,929**

As shown above, the surplus of $448,791,000 can first be used to eliminate the oldest established amortization requirements identified in 2002 of 3.05% of salaries until 2017, which has a present value of $229,867,000. The remaining surplus can then be used to reduce the amortization requirements identified in 2005 of 2.93% of salaries until 2020. The revised amortization rate after allowing for the remaining surplus is 1.42% of salaries. The other existing amortization requirements of 1.50% of salaries until 2023 and 2.56% of salaries until 2026 remain in place. The total resulting amortization requirement is 5.48% of salaries.

The minimum *PBSA* requirement is then equal to the normal cost of 16.59%, plus the amortization requirement of 5.48% for a total contribution rate of 22.07% of salaries (integrated).

The current contribution rates, the contribution rates for current service (on an entry-age basis, i.e. the normal actuarial cost) and the amortization of the resulting unfunded liability are summarized in Schedule 3. Any increase in contribution rates must be shared equally between members and employers; any decreases are initially allocated to employers, subject to certain transitional arrangements.

Schedule 3 - Current and Required Basic Contribution Rates

	Based on valuation results as at December 31	
	2014 (%)	**2011 (%)**
Current contribution rates		
Member[1]	11.00	9.70
Employer[1]	15.00	13.70
Combined member/employer[1]	**26.00**	**23.40**
Required contribution rates		
Entry-age normal cost rate[1]	16.59	15.96
Amortization of unfunded liability (surplus)		
▪ 25 year amortization	2.52	4.78
▪ 15 year amortization	3.73	7.06
▪ *PBSA* amortization		
to 2017	-	3.05
to 2020	1.42	2.93
to 2023	1.50	1.50
to 2026	2.56	2.56
Total *PBSA* amortization	**5.48**	**10.04**
Total contribution rate[1]		
▪ 25 year amortization	19.11	20.74
▪ 15 year amortization	20.32	23.02
▪ *PBSA* rate	22.07	26.00
Total required contribution rate[1]	**22.07**	**26.00**
Change in contribution rate	(3.93)	2.60

The above results indicate a total required contribution rate of 22.07% of salaries, compared to the current rate of 26.00% of salaries (the required rate following the 2011 valuation), i.e. the current rate can be decreased by 3.93% of salaries.

4. Revised Contribution Rates

Section 10.3 of the JTA requires that the Plan's financing comply with the *PBSA* requirements for a going-concern valuation. The required contribution rate for basic, non-indexed benefits indicated by this valuation

[1] Less 1.5% of salary up to the YMPE (for each of the members and the employers) and exclusive of contributions required for indexed supplementary pensions.

is 22.07% of salaries (integrated). This compares to a current contribution rate of 26.00% of salaries (integrated). Thus the current rates can be decreased by 3.93% of salaries.

Under the Joint Trust Agreement, contribution rate decreases are first allocated to the employer (with the initial 2% decrease being reallocated to the IAA) until the member and the employer rates are equal. Therefore the 3.93% Basic contribution rate decrease is to be allocated to employer, for a total Basic contribution rate of 22.07% integrated, and the employer IAA contribution increases by 2% of salaries, for a total IAA contribution rate of 6.13%.

The revised Basic contribution rates and IAA contribution rates become:

Schedule 4 - Current and Required Total Contribution Rates

	Member	Employer	Total
Current Basic	11.00%[1]	15.00%[1]	26.00%
Minus new Basic	(0.00%)	(3.93%)	(3.93%)
Total Basic Rate	**11.00%[1]**	**11.07%[1]**	**22.07%**
Current IAA Rate	3.0%	1.13%	4.13%
Plus new IAA	0.0%	2.00%	2.00%
Total Contribution Rate	**14.00%[1]**	**14.20%[1]**	**28.20%**

Under the *ITA*, there is a requirement that individual member contributions may not exceed the lesser of:

a) 9% of salary, or

b) $1,000 plus 70% of the member's pension credit

although these conditions may be waived by the Minister of Finance provided that the contributions are "determined in a manner acceptable to the Minister and it is reasonable to expect that, on a long-term basis, the aggregate of the regular current service contributions made under the provision by all members will not exceed 1/2 of the amount that is required to fund the aggregate benefits in respect of which those contributions are made."

The required contribution rate of 12.50% of salary up to the YMPE and 14.00% of salary above the YMPE exceeds this limit, so it is necessary to apply to the Minister for exemption. The employer contributions of 14.20% exceed the member contributions of 14.00% and therefore the requirement that the member contributions will not exceed half of the amount required to fund the aggregate benefits is met. A similar exemption was required, and obtained, following the last three valuations.

[1] Integrated, i.e. less 1.5% of salaries up to the YMPE.

5. Other Plan Changes

Since the valuation does not produce a contribution rate reduction large enough to fully rebalance the member and employer contribution rates, the Board may not consider any of the other contribution or benefit changes contemplated during the transitional funding period under the JTA.

6. Accrued Benefits - Funded Ratio

Another index of funding that some readers of the report may want to examine is the funded ratio. The funded ratio is calculated by dividing the Basic Account assets by the total liability for benefits accrued in respect of service to the valuation date. The asset/liability comparison is analogous to that in Schedule 1, except that contributions and benefits in respect of future service to be worked by existing members are excluded from the comparison. The results are shown below.

Schedule 5 - Accrued Benefits - Funded Ratio at December 31, 2014

Basic Account - Non-Indexed Benefits

	($000's)	
	2014	**2011**
Fund (Basic Account): Smoothed value of assets	**16,821,638**	**14,067,984**
Accrued Liabilities		
▪ Pensions being paid	10,640,001	9,067,940
▪ Inactive members	580,722	526,942
▪ Active members	6,305,192	6,342,988
▪ Voluntary contributions	11	17
Total Accrued Liabilities	**17,525,926**	**15,937,887**
Surplus (Unfunded Liability): accrued service only	**(704,288)**	**(1,869,903)**
Funded Ratio: Fund ÷ Total accrued liabilities	**96%**	**88%**

The above schedule indicates that the funded ratio for accrued benefits has improved from 88% in 2011 to 96% in 2014. This is largely for reasons similar to the items in the analysis in Schedule 2, excluding those items related to future contribution rates.

7. Sensitivity Analysis

Sensitivity Analysis under Standards of Practice

The Canadian Institute of Actuaries Practice-Specific Standards for Pension Plans require disclosure of the effect of using a discount rate (investment return) 1.0% lower than that used for the valuation on:

(a) The actuarial present value, at the calculation date, of projected benefits allocated to periods up to the calculation date, and

(b) The service cost or the rule for calculating the service cost between the calculation date and the next calculation date.

The table below shows the impact on the accrued liability as required by (a) and the entry-age normal cost as required by (b) as at December 31, 2014 of a one percentage point drop in the discount rate assumption. All other assumptions were kept unchanged.

Sensitivity – Impact of 1% drop in investment return on Accrued Benefits and Normal Cost

Impact on liabilities of 1% drop in discount rates	Going Concern 6.5% ($,000's)	Going Concern 5.5% ($,000's)	Increase ($,000's)
Active members	6,305,192	7,531,878	1,226,686
Disabled members	276,235	317,948	41,713
Terminated members	304,487	336,500	32,013
Pensioners and beneficiaries	10,640,001	11,585,787	945,786
Total increase in liabilities			**2,246,198**

Impact on normal cost rate of 1% drop in discount rates	Going Concern 6.5%	Going Concern 5.5%	Increase
Current service cost rate	16.59%	20.52%	3.93%

Sensitivity Analysis for Plan Funding

Given that the plan is funded on the entry-age basis, we have also considered the impact of a one percentage point drop in the investment return assumption on the Basic Account non-indexed benefits consistent with Schedule 1. These figures are summarized in the table below:

Sensitivity – Impact of 1% drop in investment return on Plan Funding

	($000's)		
	6.5%	**5.5%**	**Increase**
Smoothed Value of Fund	16,821,638	16,821,638	0
Actuarial present values of:			
▪ Future contributions at entry-age rates	4,401,401	6,042,153	1,640,752
▪ Present value of existing amortization	1,657,720	1,724,413	66,693
Total Assets	**22,880,759**	**24,588,204**	**1,707,445**
Total Liabilities	**22,431,968**	**26,182,440**	**3,750,472**
Surplus/(Unfunded liability) on entry-age basis	448,791	(1,594,236)	(2,043,027)
Entry Age Normal Cost	16.59%	20.52%	3.93%
PBSA Amortization	5.48%	14.64%	9.16%
PBSA Minimum rate – Schedule 3	22.07%	35.16%	13.09%

8. Supplementary Valuations

Results analogous to those in Schedules 1, 3 and 5 are shown in Appendix G, on the following bases:

- For basic and indexed benefits combined, on the assumption that indexed benefits are to be fully funded, in advance, as for basic benefits;
- For basic only, and basic plus indexed benefits, including only benefits accrued to the valuation date; and
- Limiting benefits to those permitted under the *Income Tax Act*; this is done both for:
  - Basic benefits only; and for
  - Basic plus indexed benefits.

The adjustments to the assumptions are discussed in Appendix B. In the indexing calculations, we included the total employer contributions to the IAA of 1.13% because the allocation to the non-pension benefits was removed.

The key results are summarized below:

Schedule 6 - Indexed Benefits (without tax limits)

Funded position	Basic Only ($000's)	Basic + Indexed ($000's)
Smoothed Value of Fund	16,821,638	20,419,685
Actuarial present values of:		
▪ Future contributions at entry-age rates	4,401,401	6,174,607
▪ Present value of existing amortization requirements		
(i) 3.05% to 2017	229,867	229,867
(ii) 2.93% to 2020	424,976	424,976
(iii) 1.50% to 2023	314,193	314,193
(iv) 2.56% to 2026	688,684	688,684
Total Assets	**22,880,759**	28,252,012
Total Liabilities	22,431,968	30,637,346
Surplus (Unfunded Liability) including existing amortization	**448,791**	**(2,385,334)**
Present value of existing amortization	(448,791)[1]	(1,657,720)
Surplus (Unfunded Liability) to be amortized over 15 years	**0**	**(4,043,054)**
Contribution Rates (Integrated)		
Member – revised, as shown in Schedule 4	11.00%	14.00%
Employer – revised, as shown in Schedule 4	11.07%	14.20%
Total – revised, as shown in section 4	**22.07%**	**28.20%**
Entry-age normal cost	16.59%	22.43%
Amortization[2]	5.48%	12.48%
Total – entry-age	**22.07%**	**34.91%**

If assets and liabilities are restricted to accrued service only, i.e. analogous to Schedule 5 earlier, the 2014 unfunded liability and funded ratio change as follows:

[1] After allowing for reductions to existing amortization.

[2] Basic amortization is as required by the *PBSA*; Basic + Indexed amortization is over 15 years.

Schedule 7 – Indexed Accrued Benefits (without tax limits) – Funded Ratio at December 31, 2014

	($000's)	
	Basic Only	**Basic + Indexed**
Assets	16,821,638	20,419,685
Liabilities	17,525,926	23,844,331
Surplus (Unfunded Liability)	(704,288)	(3,424,646)
Funded Ratio	96%	86%

Benefits Limited to ITA Maximums

When the income tax limits on benefits are recognized, the above 2014 surplus/unfunded liabilities change marginally. The normal cost and amortization rates change marginally for basic only. The normal cost does not change for basic and indexed but the amortization rates change marginally. The key results are summarized below.

Schedule 8 – Benefits Limited to ITA Maximums – Basic Only

Basic Only	**Without Tax Limit**	**With Tax Limit**
Surplus (Unfunded Liability)	**$000's**	**$000's**
Entry Age Basis (including scheduled amortization)	448,791	454,374
Accrued Service Only (no scheduled amortization)	(704,288)	(698,905)
Contribution Rate	**%**	**%**
Entry-age normal cost	16.59%	16.58%
PSBA Amortization	5.48%	5.44%
Total	**22.07%**	**22.02%**

Schedule 9 – Benefits Limited to ITA Maximums – Indexed Benefits

Basic and Indexed	**Without Tax Limit**	**With Tax Limit**
Surplus (Unfunded Liability)	**($000's)**	**($000's)**
Entry Age Basis (including scheduled amortization)	(2,385,334)	(2,373,451)
Entry Age Basis (excluding scheduled amortization)	(4,043,054)	(4,031,171)
Accrued Service Only (no scheduled amortization)	(3,424,646)	(3,417,202)
Contribution Rate	**%**	**%**
Entry Age Normal Cost	22.43%	22.43%
15 year Amortization	12.48%	12.44%
Total	**34.91%**	**34.87%**

9. Test Maximum Surplus and Contributions for Tax Purposes

Section 147.2(2) of the *Income Tax Act* limits employer contributions that may be made to a plan if there is a surplus and it exceeds a certain amount - the plan becomes revocable if contributions are made when such surplus exists. Since the Plan has an unfunded liability excluding the present value of existing amortization payments, this restriction does not apply.

The tax rules also require that employer contributions not exceed the normal cost rate plus amounts necessary to amortize an unfunded liability.

Subsection (c) of Section 147.2(2) of the *Income Tax Act* also provides that the benefits taken into account for the purposes of a contribution recommendation "may include anticipated cost-of-living and similar adjustments where the terms of a pension plan do not require that those adjustments be made but it is reasonable to expect that they will be made".

Indexing at full CPI has been provided since January 1, 1982 under the present Plan terms, and for many years before that under earlier Plan provisions. As discussed earlier, indexing is currently financed on a mixture of a pay-as-you-go basis (from a combined 3%/1.13% member/employer contribution for active members), an excess investment return basis (investment return in excess of the valuation assumption is transferred each year from Basic to IAA in respect of pensioner liabilities), and a "terminally-funded" basis (each year the full capitalized cost of any indexing granted is transferred from IAA to Basic). Thus, it may be considered appropriate for purposes of testing the *ITA* 147.2(2) limits to recognize, in advance, the future indexing of pensions for the present Plan membership. On this basis, the valuation results on the fully indexed basis, recognizing the income tax limits on benefits, would apply.

Thus, while the recommended rate of 28.20% is higher than the 22.43% fully indexed normal cost rate (as shown in Schedule 9), on the premise that it is appropriate for the Plan to recognize future indexing for the purposes of testing the *ITA* contribution limits there is a significant unfunded liability. Amortizing this unfunded liability over 15 years results in a contribution rate of 34.87% (22.43% Entry Age Normal Cost + 12.44% 15-year amortization, as shown in Schedule 9). Contributions at this rate, 34.87%, would be acceptable for *ITA* purposes, and in fact for *ITA* purposes the unfunded liability could be amortized even faster, resulting in an even higher acceptable rate. It is therefore clear that the recommended rate is significantly lower than the maximum rate that is acceptable under the *ITA* and therefore, contributions may increase to recommended rates.

We have commented previously (under section 4) on the 9% limit that applies to individual member contributions.

V. Subsequent Events

To the best of our knowledge, there are no material subsequent events that would affect the results and recommendations of this valuation. Any investment experience occurring between the valuation date and the report date, which differs from the assumption made, is not reported on in this valuation report and will be reported on in future valuations.

VI. Actuarial Opinion

In our opinion,

(a) The membership data on which the valuation is based are sufficient and reliable for purposes of the valuation;

(b) The assumptions are appropriate for purposes of the valuation; and

(c) The methods employed in the valuation 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. Pursuant to the JTA and regulatory requirements, the next valuation should be completed no later than as of December 31, 2017.

VII. Acknowledgement

We gratefully acknowledge the generous assistance of the staff of the Pension Corporation in the preparation of the data and other items required for this report.

Respectfully submitted,

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September 14, 2015

[1] Canadian Institute of Actuaries is the Primary Regulator.

Appendix A: Summary of Plan and Amendments

As at December 31, 2014

Changes to the Plan

The previous valuation was based on the provisions of the Plan as at December 31, 2011.

Between January 1, 2012 and December 31, 2014, the Plan text was amended four times incorporating the following changes:

- Effective April 1, 2013, the plan rules were amended to remove the requirement for members to apply to purchase leaves of absence prior to termination of employment with the employer where the leave occurred, and provide members who terminate employment with an additional 30 days to apply to purchase eligible service. This amendment also clarifies that all retired members will receive cost of living benefits on the January 1 following the year in which they attain age 56;
- Effective July 1, 2013, the plan rules were amended to increase the member basic contribution rate to 9.50% of pensionable salary below the year's maximum pensionable earnings (YMPE) and 11.00% of pensionable salary above the YMPE;
- Effective July 1, 2013, the plan rules were amended to increase the employer basic contribution rate to 13.50% of pensionable salary below the YMPE and 15.00% of pensionable salary above the YMPE;
- Effective March 31, 2014, the plan rules were amended to implement all nomination of beneficiary changes required under the *Wills, Estates and Succession Act* including providing members with more options around who can be nominated as a beneficiary of their pension and how nominations can be made; and
- Effective April 1, 2015, the plan rules were amended to allow the purchase of a leave of absence (or period of reduced pay) if a member contributed to a different employer under the same plan or another registered pension plan during the period, subject to Income Tax Regulation limits.

The main provisions of the Plan are summarized below. Except as otherwise noted, the section references are to the Teachers' Pension Plan Rules as at December 31, 2014. The valuation is based on these provisions.

Employer and Employee Eligibility

The Plan applies to a board of school trustees constituted under the *School Act*, a francophone education authority established under the *School Act*, an official trustee appointed under the *School Act* and to any

other body designated by the board or former board as an employer, on terms and conditions of eligibility specified by the board or former board. [Section 2]

Participation is compulsory for teachers, administrative officers, associated professionals, and certified professionals employed by boards of school trustees or francophone education authorities. [Section 3]

Member Contributions

Section 5 defines the following contributions, which are deducted from a member's salary during a calendar year:

(a) 9.50% of that part of the member's cumulative salary that does not exceed the YMPE (paid into the Basic Account);

(b) 11.00% of the member's cumulative salary which is in excess of the YMPE (paid into the Basic Account); and

(c) 3% of the member's entire salary (paid into the Inflation Adjustment Account).

Member contributions cease after 35 years of pensionable service have been accrued.

(At the 2011 valuation, the contribution rates in (a) and (b) were 8.20% and 9.70% respectively).

Employer Contributions

Section 6 requires every employer to contribute the following amounts during a calendar year:

(a) 13.50% of that part of the member's cumulative salary that does not exceed the YMPE (paid into the Basic Account);

(b) 15.00% of the member's cumulative salary which is in excess of the YMPE (paid into the Basic Account); and

(c) 1.13% of the member's salary (paid into the Inflation Adjustment Account).

Employer contributions continue to be remitted on behalf of employees who have accrued 35 years of pensionable service.

(At the 2011 valuation, the contribution rates in (a) and (b) were 12.20% and 13.70% respectively).

Funding and Transitional Rules

These are covered in Articles 10, 15 and Appendix B of the Joint Trust Agreement.

Plan funding must comply with the *PBSA* requirements for a going-concern valuation. Further, future contribution rate increases in the Basic Account indicated by a valuation, must be shared equally between employers and members.

The use of emerging surpluses is limited during a transition period, to achieving the following objectives in the following order:

(a) Rebalancing Contributions to the Inflation Adjustment Account

Excess assets must first be used to reduce the Employer contribution rate to the Basic Account by 2.0%, with a concurrent and corresponding 2.0% increase in the Employer contribution rate to the Inflation Adjustment Account. Unless the Partners otherwise agree, this increase in the Employer contribution rate to the Inflation Adjustment Account from 1.13% to 3.13% is permanent, and is unaffected by any subsequent adjustment in Plan Member and Employer contribution rates to the Basic Account. For the purpose of rebalancing, the 0.13% differential in Employer and Plan Member Inflation Adjustment Account contribution rates will continue.

(b) Rebalancing Contributions to the Basic Account

If the Employer contribution rate to the Inflation Adjustment Account has been increased to 3.13% under subsection (a), excess assets must then be used to rebalance between Employers and Plan Members the contribution rates to the Basic Account. This is to be accomplished by next using excess assets to reduce the Employer contribution rate to the Basic Account by 2.0%.

(c) Transfer to the Inflation Adjustment Account

After the rebalancing of Employer and Plan Member contribution rates under subsection (b) has been completed, the Partners may direct a transfer or transfers of all or part of the excess assets in the Basic Account to the Inflation Adjustment Account. Alternatively, the Partners may direct that all or part of the excess assets be used to reduce the Employer and Plan Member contribution rates to Basic Account in equal amounts, with concurrent and corresponding increases in the Plan Member and Employer contribution rates to the Inflation Adjustment Account.

(d) Then, improve the normal form of pension from a single life without guarantee to a single life with a 10-year guarantee;

(e) Next, change the benefit formula from 1.3/2% to 1.35/2%; and

(f) Last, change the benefit formula from 1.35/2% to 1.4/2%.

None of these changes have occurred.

Retirement Benefits: Eligibility Conditions for Pension

The normal retirement age is 65 for all members. Section 50 provides that an active member who terminates employment is entitled, upon application, to an unreduced pension calculated under section 54, if the member has:

(a) Attained age 55 and the sum of the member's age plus years of contributory service is 90 or more; or

(b) Attained age 60 with at least 2 years of contributory service; or

(c) Attained age 65.

Section 51(a) provides for a reduced pension calculated under section 55(1) if the terminating member has attained age 55 and completed at least 2 years of contributory service.

Section 51(b) provides for a reduced pension calculated under section 55(2) if the terminating member has attained age 60 but has not completed 2 years of contributory service.

Calculation of Unreduced Pension

Section 54 provides that the unreduced lifetime monthly pension payable to a member, in the form of a single life annuity with no guarantee, is calculated as the sum of the following:

(a) 2% of the member's highest average salary multiplied by the number of years of pensionable service accrued before January 1, 1966

(b) 1.3% of the lesser of

  (i) The member's highest average salary, and

  (ii) 1/12 of the YMPE for the calendar year immediately before the effective date of the pension

  multiplied by the number of years of pensionable service accrued on and after January 1, 1966 not exceeding 35 years, and

(c) 2% of the excess of the member's highest average salary over the amount determined under paragraph (b) (ii), multiplied by the number of years of pensionable service accrued on and after January 1, 1966 not exceeding 35 years.

In addition, the member is entitled to a pension payable until the earlier of the death of the member or the member reaching age 65; that is:

(a) 0.7% of the lesser of

  (i) the member's highest average salary, and

(ii) 1/12 of the YMPE for the calendar year immediately before the effective date of the pension multiplied by

(b) The number of years of pensionable service on and after January 1, 1966 not exceeding 35 years.

Highest average salary means one-twelfth of the average annual salary earned by a member during the 5 years of pensionable service (not necessarily consecutive) in which the salaries were highest (or, if the member has accrued less than 5 years of pensionable service, the total number of years and partial years of pensionable service).

A member who has made voluntary additional contributions in the past - these are no longer accepted - will be granted an additional pension or may take a refund of the balance in that account.

Calculation of Reduced Pension

Where a reduced pension is payable under section 51 to members aged between 55 and 60 who have 2 or more years of contributory service, section 55 provides that the lifetime and temporary pensions, described above, are each reduced by a percentage equal to 3% for each year by which the member's age is less than the earlier of age 60 and the age at which the member's age plus years of contributory service total 90 (subsection 55(1)), prorated for fractions of a year, to a maximum of 15%.

If the member terminates employment (a) under age 55, (b) with less than 10 years of pensionable service, or (c) has not completed at least 1 year of pensionable service or 2 years of contributory service in the 24 calendar months immediately preceding termination of employment, then the 3% (per year) early retirement reduction factor is increased to 5% (per year).

Where a reduced pension is payable under section 51 to members aged 60 or over who do not have 2 years of contributory service, section 55 provides that the lifetime and temporary pensions, described above, are each reduced by a percentage equal to 5% for each year by which the member's age is less than 65 years of age (subsection 55(2)), prorated for fractions of a year.

Alternative Types of Pensions

Section 56 provides that a pension may be granted on the single life plan with no guaranteed period (normal form), single life plan with a guaranteed period (5, 10 or 15 years), joint life and last survivor plan, temporary life plan or a combination of these plans with the approval of the plan administrative agent. The amount of any pension granted on a form other than the normal form is calculated on an actuarially equivalent basis.

Section 56(3) provides that where a member has a spouse at retirement, the member is deemed to have elected that 60% of the pension be paid on the joint life and last survivor plan, unless the spouse waives this requirement in writing or there is a written agreement or court order made under Part 5 or 6 of the *Family*

Law Act that is filed with the plan administrative agent. A spouse is as defined in the *PBSA*, and includes a common-law or same-sex spouse.

Disability Pensions

Sections 12(7) and 99(2) provide that if a member is receiving a monthly income benefit from an approved group disability plan, the member and employer do not make contributions and the member is not entitled to a pension under the Plan, but the period for which the member receives such group disability income benefit is considered pensionable service, with the final pension based on the highest average salary at disablement increased to retirement in accordance with changes in the consumer price index.

Section 60 provides that a member is entitled upon application to a disability pension if the member, before reaching age 60, has terminated employment, is totally and permanently disabled, has completed 2 years of contributory service, is not eligible for a monthly income benefit from a group disability plan, and has not received a lump sum payment in lieu of monthly LTD payments from a group disability plan. Section 63 provides that where a disability pension is payable, the disability pension is an immediate unreduced lifetime pension based on service earned to date.

Pre-retirement Death Benefits

The pre-retirement death benefits for active and inactive plan members are covered in section 69, and are as follows:

(a) On death before age 60 with less than 2 years of contributory service, the death benefit is a payment of the member's contributions with interest;

(b) On death before age 55 with 2 or more years of contributory service, the benefit is the full commuted value of the regular pension earned to the date of death (but not less than the value of member contributions with interest). If there is a surviving spouse, then the spouse may choose either the foregoing value or an immediate pension actuarially equivalent to the commuted value;

(c) On death after age 55 with 2 or more years of contributory service (or after age 60 with less than 2 years of contributory service), without a surviving spouse, the benefit is also equal to the full commuted value of the regular pension earned to the date of death (but not less than the value of member contributions with interest). If there is a surviving spouse, then the benefit is an immediate pension to the spouse which is actuarially equivalent to the full commuted value.

Refunds, Vesting and Portability

Sections 42(1)(a) and 44 provide for the payment of the member contributions plus interest should the member terminate membership under age 60 with less than 2 years of contributory service. In accordance

with section 96, interest credits are based on the average yields of 5-year personal fixed term chartered bank deposit rates, published in the Bank of Canada Review as CANSIM Series V122515.

Under sections 42(1)(b) and 45, a terminating member is entitled to a deferred pension equal to the full normal pension accrued to the date of termination; this may be paid on a reduced basis at an early retirement date depending on the service to termination - see above "Eligibility conditions for pension" section. Sections 42(1)(c) and 46 provide for the payment of a lump sum commuted value in lieu of the deferred pension, if the member is below age 55, subject to the commuted value being payable on a locked-in basis. Under certain limited conditions (small pensions, or small commuted values) the *PBSA* permits the election of a lump-sum payout, regardless of age, and on a non-locked-in basis.

Section 100 provides that the deferred vested pension of a terminating member is based on the highest average salary at termination, increased to retirement or to December 31, 1980 if earlier, in accordance with changes in the pension index. Subsequent to 1980, the highest average salary is increased to retirement by the percentage increase granted to pensions for the period between the month of termination and the month the pension becomes effective.

Section 75(3)(h) provides that the cost of the deferred indexing described above is funded from the Inflation Adjustment Account.

Cost of Living Benefits (Indexing)

Section 73 sets out how cost of living benefits are to be administered. It provides that a retired member may, on the January 1st following the year in which they attain age 56, receive a cost of living increase, subject to sufficient funds being available in the Inflation Adjustment Account from which the benefit is funded. The benefit is based on the total amount of pension being received, including previous cost of living increases, less any portion of the pension that is a result of voluntary contributions (which are no longer permitted). The bridge pension to age 65, payable as part of the regular pension formula, and a temporary life annuity arising as a result of converting some or all of the regular pension to one of the optional forms, are subject to indexing increases. The maximum increase is equal to the percentage increase in the Consumer Price Index ("CPI") over the 12 months ending on September 30 of the previous year.

Section 73 sets out additional requirements with regards to the cost of living benefit, including:

(a) The same uniform percentage increase will be granted in respect of all pensions eligible for adjustment;

(b) The increase is prorated if the pension has not been in payment for at least 12 months;

(c) The total capitalized value of all cost of living benefits granted on January 1 must not exceed the amount in the Inflation Adjustment Account on the preceding September 30;

(d) The capitalized value of all cost of living benefits granted annually is transferred from the Inflation Adjustment Account to the Basic Account; and

(e) In the event of deflation, the deflation will be recovered before any further cost of living adjustments are granted in the future.

The Fund

Section 75 provides that the Pension Fund is divided into the following three accounts:

(a) The **Basic Account**, consisting of all the assets in the fund other than assets in the Inflation Adjustment Account and the Supplemental Benefits Account;

(b) The **Inflation Adjustment Account**, consisting of:

(i) The 3% contribution by each of the members under section 5(1)(c);

(ii) The 1.13% employer contributions under section 6(1)(c);

(iii) The net investment income earned on the Inflation Adjustment Account; and

(iv) The income, as determined by the plan administrative agent, that is earned on fund assets held in the Basic Account in respect of pensions being paid and that is in excess of the investment return anticipated in the most recent actuarial valuation;

less:

(v) Amounts transferred to the Basic Account in respect of capitalized cost of living benefits granted under section 73;

(vi) Refunds to plan members in respect of the 3% contribution made to this account under section 5(1)(c), or amounts otherwise transferred out of this account in respect of member and employer contributions allocated to this account;

(vii) Amounts determined by the plan administrative agent in respect of the portions of commuted value payments or other transfers out of the Plan that are attributable to cost of living adjustments;

(viii) Amounts transferred to the Basic Account that are equal to the capitalized value of increases in deferred pensions resulting from increases in highest average salaries under section 100; and

(ix) Amounts transferred to the Supplemental Benefits Account to cover inflation protection on benefits in excess of those registrable under the *Income Tax Act*; and

(Section 10.3 of the Joint Trust Agreement also permits the Board to transfer portions of any actuarial surplus in the Basic Account to the IAA.)

(c) The **Supplemental Benefits Account**, consisting of assets required for the administration and payment of benefits that are non-registrable under the *Income Tax Act*.

Income Tax Act Limits

The *Income Tax Act* imposes certain limits on the contributions that may be made to, and the benefits that may be paid from, a registered pension plan. However, in total, the contribution requirements from, and the benefit promises to, Plan members have not been altered under the Teachers' Pension Plan. To this end, a Supplemental Benefits Account has been created to cover the financing and payment of benefits in excess of those registrable under the *Income Tax Act*. The excess benefits are paid on a current cash basis, by allocating from the regular employer contributions, the amounts necessary to maintain the Supplemental Benefits Account at a zero balance. Effectively, from a Plan member's perspective, it is expected that these procedures will be invisible - the total contribution and benefit obligations remain unchanged. We have ignored the implications of all such internal restructuring in completing the primary, Basic Account valuation. In the Plan summary herein, and elsewhere in this valuation report, our references to contributions/benefits to/from the Basic/Inflation Adjustment Accounts are inclusive of the allocations to/from the Supplemental Benefits Account; in general, the allocations to/from the Supplemental Benefits Account have not been referenced.

We have also completed supplementary valuations recognizing the income tax limits on pensions. We understand that these limits are applied only in respect of service after 1991. The maximum annual pension permitted (before application of any early retirement reductions, where applicable) is the lesser of:

(i) $2,770 in 2014 ($2,819 in 2015, increasing thereafter in accordance with an external general wage index) multiplied by the years of service; and

(ii) 2% multiplied by the years of service further multiplied by the average of the best 3 years of remuneration paid to the member.

The Plan also imposes a 35-year cap on accruals at the above maximum rate.

Other Items

1. The Post-Retirement Group Benefit Rules set out the non-pension (i.e. group) benefits that are provided to retired members. Non-pension benefits were previously contained in sections 91 through 95 of the plan rules which were repealed effective January 1, 2004.

Effective May 1, 2002, the member is responsible for paying for 100% of the premiums for coverage under the British Columbia Medical Services Plan for the member and any eligible dependants.

Effective July 31, 2007, the subsidized dental plan available to members was discontinued, and an unsubsidized voluntary dental plan came into effect effective August 1, 2007.

Effective December 31, 2011, the subsidized extended health care plan available to members was discontinued, and an unsubsidized voluntary extended health care plan came into effect January 1, 2012.

2. Section 3.2 of the Joint Trust Agreement provides that all expenses incurred in the administration of the Plan are to be paid from the fund.

3. Section 57 enables an employer to request the plan administrative agent to adopt a Special Retirement Incentive Plan (SRIP), whereby the age and service conditions, or the early retirement percentage reductions, or both, may be adjusted. Where the plan administrative agent agrees, the administrative agent must also determine the members eligible for the SRIP, the period it remains open, the conditions applicable to the incentives, the additional costs to the employer, and the timing of these payments to fund the SRIP.

4. A transfer of reserve agreement for the four public sector plans in B.C. exists, whereby the plan member may elect to have a reserve transferred and then covered by the rules of the importing plan. Plan members may pay for any shortfall subject to Canada Revenue Agency approval, within the deadlines set out in the agreement. Members can also choose to leave their entitlements with their respective plans and apply for the appropriate benefits available from each plan at termination and/or retirement.

5. A maximum of 5 years taken to raise a child may be recognized as contributory service in establishing eligibility for a pension provided the member has a period of pensionable service immediately before and after the child-rearing period(s).

Appendix B: Actuarial Methods and Assumptions

The significant actuarial assumptions are summarized below.

Investment Return	6.50% per annum (unchanged from the previous valuation)
General ("across-the-board") Salary Increases	3.75% per annum (unchanged from the previous valuation)
Seniority Salary Increases	Annual percentages varying by age and sex
CPI Increases	3.00% (unchanged from the previous valuation)
Pension Indexing	▪ Future indexing of pensions and deferred pensions ignored, as will be covered by Inflation Adjustment Account ▪ Future indexing (by inflation) of wage base for disability accruals assumed to be a charge to the Basic Account and to be 3.00% per annum (unchanged from the previous valuation) ▪ Indexing to date is capitalized and forms part of pension
Asset Values	▪ Assets carried at smoothed market values ▪ Smoothed value restricted to a range of 90% to 110%
Costing Method	Contributions are based on an entry-age funding approach

More detail with respect to the above, detail with respect to other assumptions, and comparisons with assumptions and approaches in the previous valuation follow.

1. Actuarial Methods

The plan has been valued on a going-concern basis, which assumes that the plan will continue to operate indefinitely. The basis is used to estimate the funded position of the Plan, and to estimate the contributions required to be made to the Plan's fund.

The methodology used to calculate the valuation liabilities shown in the statement of actuarial position was as follows:

The liability for current pensioners and active members was calculated by projecting the benefit payments to be made to those persons and to their eligible spouses using the actuarial assumptions described below and then discounting those projected payments to the valuation date at the investment return assumption.

The liability for members currently receiving benefits from a long-term disability plan was calculated partly as if they would continue to earn service credits and ultimately receive a pension from the Plan and partly as if they would again become contributing members of the Plan.

The liability for the inactive group (including those entitled to deferred vested pensions) was calculated on the assumption that a proportion (based on present working status, contribution balance, length of credited service and date of last contribution) would again become contributing members of the Plan and a further proportion (based on similar, but different, criteria) would collect deferred vested pensions.

The liability for the remaining inactive members was generally calculated as their accumulated refund values (in some cases, depending on the member's status, we held twice the refund value).

In order to test the adequacy of the current contribution rates, we calculated the required member/employer contribution rate for current service in accordance with the entry-age actuarial cost method, based on the data for those members who joined the plan in the last three years prior to the valuation date and the actuarial assumptions described below. This method produces the level rate of the member/employer contributions sufficient to provide the benefits for the average future new entrants to the plan. The cost so determined is also referred to as the normal actuarial cost and is calculated on an aggregate basis for all entrants as a level percentage of salaries.

The valuation assets consist of:

(i) The Basic Account; and

(ii) The present value of future member and employer contributions at the entry-age normal cost rates, for the closed active group, for the basic non-indexed benefits.

(iii) The present value of any existing amortization requirements established at previous valuations.

The unfunded actuarial liability is equal to the excess of the valuation liabilities over the valuation assets. If the assets exceed the liabilities, then the difference between them gives rise to an actuarial surplus. Additional payments, in excess of these normal actuarial costs, required to amortize this unfunded liability/surplus were then determined, as a percentage of payroll, as follows:

(1) If the result is an unfunded liability amortize it over the 15 year period commencing January 1, 2015[1]; and

(2) If the result is a surplus (the result of a gain since the last valuation), apply the gain to amortize or reduce the previously identified unfunded liabilities, starting with the oldest established. If, after

[1] We use an unadjusted 15 year rolling amortization period for the supplementary indexed valuation.

removing all previously established amortization amounts there is still a surplus, amortize this surplus over 25 years and test whether the transitional arrangements in the Joint Trust Agreement can be met.

The required contributions are the sum of the normal actuarial cost and the amounts required to amortize the unfunded actuarial liability/surplus.

The actuarial procedures followed are substantially the same as those in the previous valuation.

2. Treatment of Member and Pensioner Data

Data as of December 31, 2014 were prepared by the Pension Corporation for 43,801 active members, 34,484 pensioners, 1,033 members receiving benefits from a long-term disability plan, 4,711 terminated members eligible for a vested pension, 7,381 other inactive members (including 6 on leave of absence) plus a further 1,243 non-retired individuals with very limited data. The data also included 6,775 active member terminations and 1,699 pensioner terminations during the period January 1, 2012 to December 31, 2014. The Pension Corporation advised us that the data supplied are generally proper, complete and in accordance with specifications, unless otherwise noted.

Where possible, we compared totals with corresponding details in the Plan's audited Annual Reports. We also subjected the data to a number of tests of reasonableness and consistency, including the following:

- A member's (and partner's as applicable) age is within a reasonable range;
- A member's gender or date of birth did not change;
- A member joined the plan or commenced pension at a reasonable age;
- Accrued service increased by a reasonable amount (e.g. no more than 30 months since the last valuation and no more than 10 months in the valuation year);
- The salary level and the salary increase from the previous valuation was within a reasonable range;
- Pensions in pay increased by a reasonable amount (e.g. in line with the indexation since the last valuation); and
- We examined the additions to and deletions from each of the data files (i.e., the files for active employees, pensioners and terminated members) since the previous valuation to determine whether all Plan members were accounted for in this valuation, to check for duplicate records and to confirm pension amounts.

There were a number of discrepancies recorded during our examination of the data and we sought clarification of these from the Pension Corporation. Where necessary, we modified the data, our assumptions, or both, to compensate for these discrepancies.

The active member data includes a number of individuals who work less than full time. For the purposes of calculating liabilities and normal actuarial costs, we treated all members as if they were full-time employees after the valuation date; however, in calculating the amortization costs as a percentage of total future payrolls, we reduced the total payroll base by 12% to reflect the part-time employment (a 10% adjustment was applied at the previous valuation).

The active member data included 3,156 persons who had no salary or service reported for the year ending December 31, 2014, or with a last-contribution-date prior to December 2014. We excluded them from the active member base, and have included them with the inactive data. We also excluded one active member from the valuation process because of missing, invalid or inconsistent detail. A liability of twice their accumulated account was held for this member.

Salary details were inappropriate (missing, very low, or very high) for 3 active members. We assumed that these 3 members had the same average earnings as for other actives in the same age-sex category.

The liability for 989 of the members on long-term disability was calculated in two steps. We first calculated a liability as if these individuals would ultimately collect deferred vested pensions starting at age 60 (unchanged from the previous valuation) with deferred pensions on the basis of service projected to retirement date (maximum 35 years) and the actual salaries indexed to the valuation date (where the actual salary detail shown for those members was inappropriate, we used the average salaries for active members in the same age-sex category). We also calculated a liability as if these members would again become contributing members of the plan. In order to allow for the possibility of recoveries from disability we set the liability equal to 85% of the former figure plus 15% of the latter figure. A similar approach was used in the previous valuation, except the disabled/recovery percentages used were 80% and 20% respectively.

We also excluded 44 members on long-term disability from the valuation because of missing, invalid or inconsistent detail. Liabilities of twice their accumulated accounts were held for these members.

We divided the 4,711 terminated members entitled to a vested pension into two classes:

(i) Those with missing, invalid or inconsistent detail, and

(ii) All other inactive members.

The liability for the first group was held as twice their accumulated accounts. For the second group, we calculated liabilities on the assumption that 50% of those in this second group who have been inactive for less than 10 years would be reactivated on January 1, 2015 (with salaries set equal to the average salaries

for active members in the same age-sex category), and that the remaining members in this group would remain inactive and receive deferred vested pensions. This approach is unchanged from the previous valuation.

We excluded 338 vested members from the regular valuation process because of missing, invalid or inconsistent detail. Liabilities of twice their accumulated accounts were held for these members.

We divided the 10,538 other inactive members (i.e., including the 3,156 persons reassigned from the active group plus the one active member excluded from active status due to insufficient data) into three classes:

(i) Those on leave of absence,

(ii) Those with missing, invalid or inconsistent detail, or whose accumulated accounts were less than $1,500, or who had less than 2 complete years of service, or who have not contributed for at least 10 years, or who were known to have taken a refund after the valuation date, and

(iii) All other inactive members.

We calculated liabilities on the assumption that 100% of the first group would be reactivated on January 1, 2015, with assumed average salaries equal to the average salaries for active members in the same age-sex category, that 100% of the second group would take immediate refunds, and that 100% of the third group would become vested, with a vested liability equal to twice their accumulated accounts. A similar approach was used in the previous valuation.

With respect to the 1,243 remaining non-retired members with limited data, we held a liability equal to twice their accumulated accounts.

The data from the Pension Corporation and our treatment of this data is summarised below. Further details on the active member data, the new entrant groups on which our entry-age costs are based, the inactive member data and the pensioner data are summarized in Appendices C, D and E.

	Valuation Treatment								
	Pension Corp. Data	**Pensioners**	**Pensioners with zero liability**	**Active Members**	**LTD**	**Vested**	**Reactivate**	**Refund CWI[1]**	**Refund 2 x CWI**
Pensioners	34,484	34,414	70						
Active Members	43,801			40,644				1,014	2,143
Long Term Disability	1,033				989				44
Terminated Vested	4,711					3,267	1,106		338
Inactive Members	7,381						6	7,375	
Limited Data	1,243								1,243
Total Membership	**92,653**	**34,414**	**70**	**40,644**	**989**	**3,267**	**1,112**	**8,389**	**3,768**

3. Actuarial Assumptions

Investment return and general salary increase rates

Our actuarial costing method involves projecting future benefit disbursements and contribution and investment income. In such projections, the most significant assumptions are those that are made for the future rates of return to be earned by the fund and future general salary increases (which are across-the-board increases applying to employees regardless of service, rank or position).

(a) Relationship to excess investment return threshold

The investment return assumption is also significant for another reason. Since 1980, the provisions of the Plan relating to the indexing of pensions provide that the income to be credited to the Inflation Adjustment Account in respect of pensions being paid is determined by reference to the amount in excess of the investment return anticipated in the most recent actuarial valuation. An increase in the investment return assumption, and hence in the excess return threshold, would have at least two effects:

a) It would reduce the amount of excess investment return allocated to the IAA, and hence reduce the potential for future indexing; and

b) It would reduce the costs of the basic non-indexed plan, provided benefit levels are not changed.

[1] Contributions with interest.

A reduction in the investment return assumption would have the opposite effects. In this context, the excess investment return threshold takes on benefit design connotations as well, and thus consistency in the assumptions, from one valuation to the next, takes on added significance.

The previous valuation used a long-term investment return assumption of 6.5% per annum. As noted earlier, this also became the threshold rate used to determine excess investment return transfers to the IAA during the post-retirement period; effectively, this was the same as saying that the Basic Account would earn no more than 6.5% per annum during the post-retirement period.

(b) Actual returns and asset mix

We have calculated market value returns on the total fund (i.e. Basic plus IAA), including non-invested assets (i.e. receivables, net of payables), net of investment-related expenses, and assuming that all cash flows occur at mid-year, as 10.4% for 2012, 14.6% for 2013 and 11.7% for 2014. At December 31, 2014, approximately 63.2% of the total portfolio was invested in equities (including private placements, infrastructure and renewable resources), a further 14.9% in real estate, and the balance of 21.9% in fixed income (including mortgages).

(c) Expected returns

After examining the net average investment return earned by the fund's investments, the yield on investments made in recent years, the likely future trend of investment returns in general, the investment practices, and the provisions of this Plan - e.g. the allocation of excess investment income to the Inflation Adjustment Account - we have concluded that a reasonable best estimate of the long term investment return on the plan's assets is 6.75%. We also concluded that a reasonable best estimate of the real return on the assets, i.e., the investment return in excess of inflation, is 4%.

In setting the valuation assumptions it is necessary to reduce these expected returns by a margin, so that the resulting liabilities have a suitable provision for adverse deviations. Following discussions with the Board regarding the appropriate adjustments to the best estimate assumptions and taking into account the requirements of the Board's funding policy, for the purposes of this valuation we continued with our previous long-term investment return assumption of 6.5% per annum. We also continued with our previous valuation assumption for the real return of 3.5%. In other words there is a margin of 0.25% on the investment return assumption, and a margin of 0.5% on the real return assumption.

The following table shows the development of the investment return assumption:

	Discount rate
Weighted average return	6.65%
Diversification and rebalancing effect	0.30%
Provision for investment related expenses	(0.25%)
Rounding	0.05%
Estimated net investment return before margin	**6.75%**
Margin for adverse deviation	(0.25%)
Discount return assumption (rounded to nearest 0.25%)	**6.50%**

To determine the going concern discount rate, our model determined expected long term capital market returns, standard deviations and correlations for each major asset class by using historic returns, current yields and forecasts. We then stochastically generated projected asset class returns for 1,000 paths over 20 years to create expected returns for each major asset class and applied these to the Plan's target asset mix.

For the purposes of establishing the discount rate used in this report, we have assumed that there will be no added-value returns from employing an active management strategy in excess of the associated additional investment management fees. The investment expense allowance of 0.25% provides for expected future management fees.

(d) Real return and salary relationships - derive salary assumption

The 6.5% investment return assumption used in this valuation was viewed as consisting of a real return component of about 3.5% per annum plus a long-term underlying inflation assumption of about 3.0% per annum. This can also be viewed as a best estimate of future inflation of 2.75% (derived from the best estimate nominal return assumption of 6.75% less the best estimate real return assumption of 4%), plus a margin for adverse deviations of 0.25%.

The general salary increase assumption used in the 2011 valuation was 3.75% per annum. This was viewed as consisting of the underlying inflation assumption of 3.0% per annum, plus a real salary increase component of 0.75% per annum. For this valuation, we continued with the real salary increase assumption of 0.75% and the general salary increase assumption of 3.75%. The real salary increase assumption of 0.75% consists of a best estimate of real salary increases of 0.50%, plus a margin for adverse deviations of 0.25%.

The impact of these assumptions on the valuation result is discussed further below.

(e) Impact of investment return and salary assumptions on the valuation

During the **post-retirement period**, the excess investment return threshold is critical as this is the discount rate for the Basic Account post-retirement liabilities. It also sets the excess investment return threshold which puts a ceiling on the amounts the Basic Account can effectively earn on the portion of the assets that support post-retirement liabilities. For example, if the threshold is 6.5%, then, provided the long-term returns exceed 6.5% on average, all of the excess will be transferred to the IAA, i.e. the Basic Account will only retain 6.5% on these assets.

During the **pre-retirement period**, it is the relationship, i.e. the net difference, between the investment return and general salary increase assumptions that is the key, rather than their absolute levels - projected benefits increase each year by the salary assumption and are then discounted by the investment assumption, i.e. the net result is that the liabilities are effectively being discounted by the net difference between the two assumptions. For example, the long-term assumptions we have used in this valuation (i.e. 6.5% investment return, 3.75% salary, 3.0% underlying inflation) would produce results similar to those using assumptions of 6.75% investment return and 4.0% salary, with 3.25% underlying inflation; or 6.25% investment return and 3.50% salary, with 2.75% underlying inflation, etc. Thus, the underlying inflation assumption itself is not material to the result.

(f) Summary of interrelationships

The 2014 and 2011 annual investment return and general salary increase assumptions, and their underlying economic interrelationships, are summarized below.

	2014 and 2011 valuations
1. Investment return = excess investment return threshold	6.50%
2. Real return rate	3.50%
3. Implied underlying inflation = 1 - 2	3.00%
4. Real salary increase	0.75%
5. General salary increase = 3 + 4	3.75%

(g) Actual vs. expected salaries; adjust data salaries

The 2014 valuation data indicates that average annual earnings increased by about 1.9% from mid-fiscal-2011 to mid-fiscal-2014 (i.e., about 0.6% per annum), as compared with an expected increase of about 11.7% (i.e., 3.75% per annum) on the basis of the assumptions used in the 2011 valuation.

The input data salaries provided to us for this valuation were the annualized earnings during fiscal 2014. In order to bring these data salaries forward to the valuation date, we took them without further adjustment as

being equal to the salary rates on the valuation date (this may slightly understate the actual salary rates at the valuation date). Thereafter, the assumed rates of salary increase are applied continuously during each future year.

(h) YMPE increase

We also assumed that the YMPE under the Canada Pension Plan would increase at the general salary increase rate of 3.75% per year from its 2015 level of $53,600, both for the regular valuation and for the purposes of computing the entry-age costs. In the previous valuation we assumed that the YMPE would increase at the same rate of 3.75% per year, but from its 2012 level of $50,100, both for the regular valuation and the entry-age costs.

Pension Indexing - Basic Valuation

Indexing supplements on and after January 1, 1982 are provided on an annual basis and are limited to those amounts that can be appropriately financed by the balances available in the Inflation Adjustment Account. Thus we do not need to allow for future indexing in our calculations as the costs of this indexing are currently fixed at 3% of salaries to be paid by the members, plus 1.13% paid by the employers. With respect to indexed supplements granted through January 1, 2014, the present values have been included in the actuarial liabilities for pensions in the course of payment and thus form part of the determination of the recommended contribution.

As in the previous valuation, we ignored the future pre-retirement escalation that applies to vested pensions, since the cost of this "indexing" is also charged to the Inflation Adjustment Account.

With regard to the vested pensions of members who have terminated employment, the amounts of deferred pensions quoted to us include indexing during the deferred period to date. We understand that such transfers from the Inflation Adjustment Account do not occur until retirement (theoretically, such transfers should be made on an annual basis as the indexing occurs, so as to reduce the inter-generational transfer of the costs of such indexing). We have therefore adjusted the deferred pension amounts to remove this indexing so that the Basic Account liability is aligned with the allocation of assets between the Basic and IAA accounts. We made the same adjustment in the previous valuation.

The indexing of salaries before retirement in the case of members on long-term disability is, on the other hand, a charge to the Basic Account rather than to the Inflation Adjustment Account. Accordingly, in valuing the deferred pensions for those currently on long-term disability, we have made an allowance for this by applying an escalation assumption (at the full underlying inflation assumption) of 3.0% per annum during the deferral period to retirement.

Asset Values

The fund's annual reports record assets on a market value basis. We relied on these annual reports for the asset values used for the years ending December 31, 2012 to December 31, 2014.

As in the previous valuation we applied a five year smoothing technique to these assets. We believe a smoothing approach is appropriate as it cushions the actuarial valuation results against dramatic swings in market value that can occur. The funding policy provides an additional constraint on the smoothed value of assets by restricting it to a range of 90% to 110% of market value.

To obtain the unconstrained smoothed value, we first determine the actual return on the basis of market values during the year (taking into account the timing of non-investment related cashflows, i.e. the net contributions minus benefits and non-investment expenses). We then determine an assumed return for the year at a rate equal to the assumed underlying real return rate plus the year-over-year change in the Consumer Price Index. The difference between these two returns is then spread over a five year period, recognizing one-fifth of it in each of the current and four succeeding years. This approach effectively spreads the difference between (a) the total investment return (including both realized and unrealized capital changes) and (b) a hypothetical return based on a long-term real return rate, over a five year period.

The smoothed value is then restricted to a range of 90% to 110% of market value, if necessary. This constraint applied as of December 31, 2014.

The application of this approach to the total fund yields the following results:

Total Fund Smoothing

Target Return	**2012**	**2013**	**2014**
1. Dec-over-Dec increase in CPI	0.8%	1.2%	1.5%
2. Base return = (1) + 3.5%	4.3%	4.7%	5.0%
Year-end asset values - $000's			
3. Market value	18,348,066	20,694,124	22,688,539
4. Smoothed value	17,407,781	18,709,681	20,419,685
5. Ratio of (4) ÷ (3)	0.949	0.904	0.900
Annual returns			
6. Market value	10.4%	14.6%	11.7%
7. Smoothed value	3.2%	9.3%	11.4%

Using the relationship between the market and smoothed values shown in line 5 above, and applying this relationship to the Basic Account and Inflation Adjustment Account balances, we get:

Year-end asset values - $000's

Basic Account	2012	2013	2014
8. Market value	15,192,768	17,096,159	18,690,709
9. Smoothed value	14,414,183	15,456,739	16,821,638
10. Ratio of (9) ÷ (8)	0.949	0.904	0.900
Inflation Adjustment Account			
11. Market value	3,155,298	3,597,965	3,997,830
12. Smoothed value	2,993,598	3,252,942	3,598,047
13. Ratio of (12) ÷ (11)	0.949	0.904	0.900

Timing of Decrements

We updated our valuation system which has resulted in minor changes in assumptions as to the timing of decrements.

Mortality

We examined the 2011-2014 mortality experience and compared this with the experience observed in our previous analyses of the mortality rates and with the rates used in the previous valuation. In general, the actual experience showed fewer deaths than were indicated on the basis of the rates used in the previous valuation. We therefore adjusted the mortality rates to allow for the improvements in mortality of the members. In addition, the Canadian Institute of Actuaries published the results of a study of Canadian specific pension plan mortality in February 2014. The CIA report included a 2014 Public Sector Mortality Table (CPM2014Publ) and an improvement scale CPM Improvement Scale B (CPM-B). We reviewed the recent mortality experience of the Plan against both the base mortality table and the improvement scale. We found both to be a good fit, but also observed that the recent number of deaths for males and females below age 80 has been lower than implied by the CPM2014Publ table, and the experience for females age 80 and over is also lower, but not as low as for those members under age 80. As a result, we made an adjustment to the rates underlying that table as follows:

(a) The incidence of mortality both prior to and after retirement (other than employees retired on account of disability) was assumed to be in accordance with 70% for males and 60% for females of the rates in the 2014 Public Sector Mortality Table (CPM2014Publ) for ages below 80, and 100% for males and 90% for females of the rates of CPM2014Publ for ages 80 and above, all projected using CPM Improvement Scale B (CPM-B).

The previous valuation used 55% for males and 70% for females of the respective rates in the 1994 Group Annuity Mortality Table.

(b) For deferred vested pensions, mortality was ignored during the deferral period before retirement. This same assumption was made in the previous valuation.

(c) For Employees retired on account of disability we used 75% for males and 80% for females of the mortality rates (applicable in 2012) for similar retirees used for the valuation of the Pension Plan for the Public Service of Canada as at March 31, 2011. The previous valuation used 75% for males and 80% for females of the mortality rates (applicable in 1997) for similar retirees used for the valuation of the Pension Plan for the Public Service of Canada (previously referred to as the Canadian Public Service Superannuation Plan) as at March 31, 1996.

Withdrawal

We examined the rates of withdrawal for reasons other than death, retirement or disability over the period January 1, 2012 to December 31, 2014 and compared this with the experience observed and the rates used for previous valuations. The observed rates for females in their first year of service were slightly lower than those assumed in the previous valuation, while the observed rates for both males and females withdrawing after three years of service were higher than assumed in previous valuations. As a result, we have made modest changes to the withdrawal rates used for the previous valuation, by adopting the following multiples of those rates.

Multiples applied to 2011 rates

	In the first 3 years of service			After 3 years of service
	1st year	2nd year	3rd year	
Males	100%	100%	100%	105%
Females	95%	100%	100%	110%

Sample withdrawal rates are shown in the following tables.

A. Withdrawal Rates Applicable in the First 3 Years of Service (these also include terminations from disability)

Age at entry	2014 valuation			2011 valuation		
	1st year	2nd year	3rd year	1st year	2nd year	3rd year
Males						
20	.106	.080	.059	.106	.080	.059
30	.106	.080	.059	.106	.080	.059
40	.106	.080	.059	.106	.080	.059
50	.106	.080	.059	.106	.080	.059
Females						
20	.046	.047	.042	.048	.047	.042
30	.117	.096	.064	.123	.096	.064
40	.104	.059	.047	.109	.059	.047
50	.104	.059	.047	.109	.059	.047

B. Withdrawal Rates Applicable After 3 Years of Service

Attained age	2014 valuation		2011 valuation	
	Males	Females	Males	Males
23	.028	.048	.027	.044
33	.018	.032	.017	.029
43	.014	.014	.013	.013
53	.014	.013	.013	.012

The withdrawal rates we have used do not extend past age 54; they were previously set at a level less than 100% of experience rates to be on a basis consistent with our handling of the inactive member data, where we assume some will be reactivated.

Disability

The Plan provides for either the payment of a disability pension from the Plan or, for members receiving long-term disability benefits, the continued accrual of pension benefits. We examined the combined experience of members going on disability pensions and on long-term disability and concluded that the experience in the inter-valuation period merited a change in the assumed rates from those used in the previous valuation. Since most members receive continuing disability service credits rather than an immediate pension, we have continued to value the disability cost for active members as a deferred pension (indexed before retirement) with continued accrual of service, rather than as an immediate pension. Based

on an examination of those now retired who had, prior to retirement, been in receipt of disability service credits, we assumed that the deferred pensions would commence at age 60 (or, immediately, for those older than age 60). The same assumption was made in the 2011 valuation.

Sample disability rates are shown in the following table. No direct allowance is made for the possibility of an individual recovering from disability prior to retirement - the rates used have been reduced from the observed disability incidence to implicitly allow for such recoveries.

Sample disability rates

Age	2014 valuation		2011 valuation	
	Males	Females	Males	Females
25	.0002	.0001	.0002	.0001
35	.0002	.0007	.0003	.0007
45	.0014	.0022	.0016	.0023
55	.0046	.0059	.0044	.0064

The rates used for the 2014 valuation are 120% for males and 100% for females of the respective rates used for the valuation of the Pension Plan for the Public Service of Canada as at March 31, 2011. The 2011 valuation used 100% for males and 100% for females of the respective rates used for the valuation of the Pension Plan for the Public Service of Canada (previously referred to as the Canadian Public Service Superannuation Plan) as at March 31, 2005.

Retirement

We examined the 2012-2014 retirement experience and compared this with the experience observed in our previous analyses of the retirement rates and with the rates used in the previous valuation. In general, the actual experience show fewer retirements than were indicated on the basis of the rates used in the previous valuation. We gave partial recognition to the observed experience by making modest adjustments to the rates previously used for retirement by slightly decreasing the rates for reduced early retirement for both males and females, and also slightly decreasing the rates assumed for unreduced retirement for males aged 55 to 62 inclusive, and for females aged 55 to 59 inclusive and age 64.

The rates used in this and the previous valuation, are as follows:

Retirement rates

		2014 valuation		2011 valuation	
Age	**Service**	**Males**	**Females**	**Males**	**Females**
For unreduced retirement pensions					
55-59	rule-of-90	.44	.39	.48	.44
60	10	.40	.36	.44	.36
61	10	.25	.23	.27	.23
62	10	.25	.23	.27	.23
63	10	.25	.23	.25	.23
64	10	.30	.30	.30	.32
65	0	1.00	1.00	1.00	1.00
For reduced early retirement					
55-59	at least 10 years, but not rule-of-80	.05	.06	.06	.07
55-59	rule-of-80	.12	.12	.13	.15

Even though pensions (unreduced and reduced) are available with less than 10 years of service, we have continued to apply the retirement rates before age 65 only to those with 10 or more years of service, on the assumption that those with fewer than 10 years would not retire until age 65.

Seniority Salary Scales

Seniority salary increases are in addition to the general salary increases and are intended to reflect increasing seniority, recognition of merit and promotion. We examined the seniority salary scales based both on the earnings history of the active members during the 3 year period ended December 31, 2014 and on the graduated average salaries of the active members as of December 31, 2014, and compared these with the experience observed and rates used in the previous valuation. Based on these investigations we decided to continue with the previous salary scales.

The annual seniority increases are assumed to reduce with age. Sample seniority increase assumptions at key ages are shown below. The assumptions represent the assumed seniority increase in the next year. Note that these rates are the same as those used for the previous valuation, but that valuation report showed the rates expressed as a proportion of earnings at age 65.

Sample seniority earnings rates

Age	2014 and 2011 Valuations	
	Males	Females
25	.036	.044
35	.038	.021
45	.006	.011
55	.003	.003
65	.000	.000

Proportion of Eligible Terminating Members Electing a Vested Pension

Effective January 1, 1996, locking-in of vested pensions occurs after 2 years of service, in respect of all service credits. We have therefore valued all vested terminations as vested pensions. The same assumption was made in the previous valuation.

The balance of the terminating members (i.e., those not vested) are assumed to elect a refund of contributions with interest.

Proportions of Contributors Married at Death

For this valuation, we assumed that the surviving spouses of all vested members who die after age 55 would opt to take the commuted value of the pension earned to the date of death. Therefore, the proportions of members assumed to be married at death are irrelevant for this valuation. The same assumption was made in the previous valuation.

Growth of Active Teacher Population

We assumed in all the actuarial projections that there would be no future growth or decline in the Teacher population. The same assumption was made in the previous valuation.

Expenses

Administration expenses are paid out of the Teachers' fund. These amounts totalled 0.45%, 0.42% and 0.48% of salaries during 2012, 2013 and 2014 respectively. Accordingly, we increased the expense provision from 0.35% of salary used in the previous valuation to 0.45% of salary, as part of the normal actuarial costs in the determination of the required contribution rates under the entry-age funding method. We also included a provision for the present value of expenses in the statement of actuarial position. The same approach was used in the previous valuation.

As before, the investment management fees are excluded from our analysis above and from the expense provision we have made as they are reflected in the long-term investment return assumption.

Refunds

We continued with the interest assumption used for accumulation and refunds of member contributions to be 1.5% less than the valuation investment return assumption, i.e. at 5.0% per annum. This allows for the *PBSA*-related practice whereby the refund interest rate is set equal to an average of 5-year bank-term-deposit rates (which are assumed to be 1.5% less than fund earnings).

Recognition of Child-Rearing Periods for Pension Eligibility

We continued to assume that this would only affect female members, and that, on average, it would increase the member's contributory service (which is used for determining pension eligibility) by 2 years; there would, of course, be no increase to the member's pensionable service (which is used for determining pension amounts). The impact of this would be to reduce the eligibility requirement for unreduced pensions between ages 55 and 59, from a rule-of-90 to a rule-of-88, and we assumed that there would be no impact on the eligibility assumptions made for other benefits. The same assumption was made in the previous valuation.

Plan Termination

The Standards of Practice issued by the Canadian Institute of Actuaries require that a valuation report "disclose the financial position of the plan if it were to be wound up on the calculation date, unless the plan does not define the benefits payable upon wind-up, in which case the actuary should include a statement to that effect".

While the Joint Trust Agreement deals with plan termination in Sections 13.4 and 13.5, it is our, and the Board's, opinion that the benefits on wind-up are not defined. Accordingly, we no longer comment on the financial position of the plan if were to be wound up.

Fully Indexed Valuation - Assumption Changes

We made the following changes to the assumptions when doing the fully indexed valuations:

- We combined the assets in the Basic and Inflation Adjustment Accounts, using a smoothed asset value of $20,419,685,000;
- We applied an indexing assumption equal to the full assumed underlying inflation rate, i.e. 3.0% per annum. This indexing rate was applied both to pensions after retirement and during the pre-retirement period in the case of deferred vested pensions and disability salary accruals. We loaded

the pensions in pay by 2.0% to cover the actual January 1, 2015 indexing increase. The indexing is applied annually, in arrears;

- We combined the contribution rates to Basic and IAA, i.e. we assumed a total member contribution rate of 11.0% + 3.0% = 14.0%, integrated with the CPP (i.e. reduced by 1.5% of salaries below the YMPE). The total employer rate is assumed to be 15.0% + 1.13% = 16.13%, integrated with CPP. (For the previous comparative 2011 costings, we used combined net contributions of 12.7% for members and 14.83% for employers.); and
- We assumed future cost-of-living increases are granted to all retirees with no age restriction, in order to demonstrate the financial position of the plan assuming full indexing (with no restrictions) is granted.

Maximum Pension Rule - Assumption Changes

As noted earlier, we have not applied these rules when doing the primary Basic and Fully Indexed valuations. We have applied them, as described below, when doing the supplementary valuations with benefits limited to the *ITA* maximums.

The maximum annual pension currently permitted under the income tax rules is the lesser of:

(i) $2,818.89 in 2015 multiplied by the years of service; and

(ii) 2% multiplied by the years of service further multiplied by the average of the best 3 years of remuneration paid to the member.

While the Plan applies the *ITA* limits only in respect of service after 1991, we have, for ease of calculation, assumed that this limit applies on all service; this assumption does not affect the future normal costs, but the accrued liabilities will be slightly understated. The Plan also imposes a 35 year cap on accruals at the above maximum rate, which we have applied.

For an individual in this Plan to be currently affected by the $2,818.89 maximum, the final average salary must be very high. While current salaries are not such as to cause many problems, the salaries projected in the future through application of the assumed salary increase rates outlined above are such that some individuals would be limited. However, under the income tax rules, the flat $2,818.89 limit is automatically indexed each year after 2015 in accordance with increases in the average wage. Accordingly, we have applied a 3.75% per annum increase to the $2,818.89 limit after 2015. (At the previous valuation the corresponding dollar limit was $2,646.67 for 2012, and was scheduled to be automatically indexed each year after 2012 in accordance with increases in the average wage; the same 3.75% increase rate was applied after 2012 to the $2,646.67 limit at the previous valuation.)

It should also be noted that, in the tax-limited results, we valued the deferred vested pensions not yet in pay, in full, as provided to us, i.e. we were unable to carve out any "excess" portions. In the previous valuation we also valued the existing pensions in pay in full. Given the changes to the pension administration system, we were able to carve out the pensions in pay in excess of the limits for this valuation.

Appendix C: Active Member Data as at December 31, 2014

Age group[1]	Active members December 31, 2014			New entrants Jan. 1, 2012 to Dec. 31, 2014 and still active Dec. 31, 2014	
	Number	Average annual earnings[2] $	Average service (years)	Number	Average annual earnings[2] $
Males					
20-24	29	48,572	0.5	92	48,878
25-29	464	50,493	1.5	419	49,446
30-34	1,220	59,214	4.2	281	51,279
35-39	1,607	71,343	7.7	129	56,366
40-44	1,863	79,085	11.6	77	56,046
45-49	1,945	83,349	16.0	39	54,695
50-54	1,791	83,864	19.4	27	62,528
55-59	1,441	84,218	23.4	6	63,410
60 & over	785	82,266	22.9	15	70,487
Total	**11,145**	**76,924**	**14.1**	**1,085**	**52,046**
Females					
20-24	211	47,442	0.4	584	48,307
25-29	2,417	50,560	1.6	1,639	49,197
30-34	4,059	59,845	4.3	539	52,046
35-39	4,320	68,870	6.9	308	54,395
40-44	4,798	74,609	10.0	259	56,916
45-49	4,259	77,702	13.8	129	55,941
50-54	4,027	78,946	16.9	68	62,312
55-59	3,407	80,458	20.1	43	60,288
60 & over	2,001	78,640	20.4	19	60,991
Total	**29,499**	**71,560**	**11.4**	**3,588**	**51,170**
Total males & females	**40,644**	**73,031**	**12.1**	**4,673**	**51,373**

[1] Age nearest birthday at December 31, 2014 for actives and at entry for new entrants.

[2] Actual earnings in 2014 for those employed all year and annualized for others. Zero, very low or very high earnings figures were replaced by the average earnings in the same age-sex group.

A comparison of the December 31, 2014 active membership with the December 31, 2011 active membership is as follows:

	Dec. 31, 2011	Dec. 31, 2014	Change 2011 to 2014
Males			
Number	11,713	11,145	- 4.8%
Proportion of total	28.1%	27.4%	- 0.7%
Average age (at 12.31)	45.2	45.4	+ 0.2 years
Average service	14.1	14.1	+ 0.0 years
Average salary	$76,072	$76,924	+ 1.1%
Females			
Number	30,015	29,499	- 1.7%
Proportion of total	71.9%	72.6%	+ 0.7%
Average age (at 12.31)	43.8	43.8	+ 0.0 years
Average service	11.4	11.4	+ 0.0 years
Average salary	$69,995	$71,560	+ 2.2%

The above comparison indicates a decrease in both male and female membership during the 3 year inter-valuation period. The proportion of males to females continues to decrease. The average age has increased slightly for males. The average salary increase is higher for females than males.

A comparison of the new entrant subset used at December 31, 2014 with that used at December 31, 2011 in determining the entry-age normal costs is as follows:

	Dec. 31, 2011	Dec. 31, 2014	Change 2011 to 2014
Males			
- Number	976	1,085	+ 11.2%
- Proportion of total	22.6%	23.2%	+ 0.6%
- Average age at entry	32.7	32.1	- 0.6 years
- Average salary	$51,737	$52,046	+ 0.6%
Females			
- Number	3,352	3,588	+ 7.0%
- Proportion of total	77.4%	76.8%	- 0.6%
- Average age at entry	30.6	30.6	+ 0.0 years
- Average salary	$49,407	$51,170	+ 3.6%

The average age of new entrants has slightly decreased for males. The increase in average salary for new entrants is lower for males and higher for females than the average salary increases for actives.

Appendix D: Inactive Member Data as at December 31, 2014

1. LOA Members Assumed Reactivated on Valuation Date

	Number	Average annual earnings[1]	Average service
Total males & females	**6**	**$71,237**	**13.9 years**

Average age is 42.2.

2. Members on Long-Term Disability with Projected Deferred Pensions

Age group[2]	Males		Females	
	Number	Average annual deferred pensions[3] $	Number	Average annual deferred pensions[3] $
Under 35	-[4]	-[4]	11	29,600
35-39	7	34,257	39	29,417
40-44	12	37,463	77	31,959
45-49	22	33,508	99	32,753
50-54	44	30,257	163	31,245
55-59	70	31,706	208	27,385
60 & over	50	27,154	187	25,835
Total	**205**	**30,902**	**784**	**29,077**

Average age is 53.4.

[1] Assumed same earnings as for active members in same age-sex group.

[2] Age nearest birthday at December 31, 2014.

[3] Basic lifetime portions payable from age 60; additional temporary amounts payable from age 60 to 65.

[4] One member included in the age 35-39 group due to privacy.

3. Other Inactive Members Entitled to Vested Pensions – 50% valued as deferred and 50% valued as Reactivated

Age group[1]	Males				
		Data for valuation as reactivated		Data for valuation as deferred	
	Number	Average annual earnings[2]	Average service (years)	Initial[3] $	Offset at age 65 $
<30	10	52,240	2.8	2,813	961
30-34	52	51,577	2.9	3,010	963
35-39	103	51,061	3.2	3,189	1,025
40-44	115	55,557	4.8	5,620	1,523
45-49	112	65,959	8.0	10,957	2,583
50-54	90	69,745	10.7	15,139	3,409
55-59	50	71,266	12.8	17,899	4,042
60 +	37	64,036	6.5	8,734	2,132
Total	**569**	**60,544**	**6.7**	**8,730**	**2,140**

Age group[1]	Females				
		Data for valuation as reactivated		Data for valuation as deferred	
	Number	Average annual earnings[2]	Average service (years)	Initial[3] $	Offset at age 65 $
<30	24	51,137	1.8	1,831	631
30-34	196	50,524	2.5	2,475	823
35-39	362	51,358	3.1	3,160	995
40-44	377	54,878	4.7	5,178	1,466
45-49	286	62,170	7.1	8,990	2,258
50-54	219	63,372	8.1	10,881	2,623
55-59	122	62,378	8.6	11,161	2,705
60 +	57	57,310	5.4	6,266	1,664
Total	**1,643**	**56,571**	**5.2**	**6,268**	**1,664**

Average age is 44.1.

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[1] Age nearest birthday at December 31, 2014.

[2] Assumed same earnings as for active members in same age-sex group

[3] Average annual pensions assumed to commence at the first age at which the member is entitled to an unreduced pension, i.e. at various ages between 60 and 65.

4. Other Inactive Members Entitled to Vested Pensions and Not Assumed Reactivated

Age group[1]	Males			Females		
	Average annual vested pensions			Average annual vested pensions		
	Number	Initial[2] $	Offset at age 65 $	Number	Initial[2] $	Offset at age 65 $
Under 39	15	1,648	564	111	1,545	528
40-44	104	2,273	737	363	2,365	768
45-49	168	4,144	1,174	464	3,868	1,136
50-54	137	6,159	1,587	356	5,154	1,416
55-59	70	7,890	1,859	174	5,785	1,482
60 & over	65	7,579	1,796	134	5,335	1,359
Total	**559**	**5,091**	**1,336**	**1,602**	**3,983**	**1,129**

Average age is 49.5.

5. Remaining Inactive Members

	Number	Member contributions with interest
Assumed to take refund of contributions with interest	8,389	$19,741,191
Valued at 2 x contributions with interest	3,768	61,456,304
Total	**12,157**	**$81,197,495**

Average age is 52.0.

[1] Age nearest birthday at December 31, 2014.

[2] These pensions are assumed to commence at the first age at which the member is entitled to an unreduced pension, i.e. at various ages between 60 and 65.

Appendix E: Pensioner Data as at December 31, 2014

1. Former Contributors

		Annual Pensions ($000's)[1]				
Age group[2]	**Number of pensioners[3]**	**Single life**	**Joint life & Survivor**	**Joint life & Survivor with guarantee**	**Single life with guarantee**	**Temporary life**
Male pensioners						
Less than 59	431	137	5,711	3,647	3,980	4,668
60 - 64	2,009	3,254	27,742	18,256	17,249	21,327
65 - 69	3,498	15,842	50,457	22,805	26,004	3,402
70 - 74	2,937	33,270	47,988	6,834	9,752	7
75 - 79	1,821	33,523	27,147	335	933	-
80 - 84	1,062	20,887	11,843	-	43	-
85 - 89	613	12,020	6,076	-	-	-
90 & over	232	5,301	1,650	-	-	-
Total	**12,603**	**124,234**	**178,614**	**51,877**	**57,961**	**29,404**
Female pensioners						
Less than 55	17	11	-	-	135	29
55 - 59	1,062	1,526	6,416	5,394	12,647	9,468
60 - 64	4,397	15,538	24,473	21,344	56,738	38,643
65 - 69	6,134	50,551	33,052	19,828	56,036	5,230
70 - 74	3,680	53,862	18,202	3,334	14,556	-
75 - 79	1,787	34,579	7,040	184	1,516	-
80 - 84	1,165	22,506	2,299	-	10	-
85 - 89	715	13,314	740	-	-	-
90 & over	490	9,506	123	-	-	-
Total	**19,447**	**201,393**	**92,345**	**50,084**	**141,638**	**53,370**
Grand Total	**32,050**	**325,627**	**270,959**	**101,961**	**199,599**	**82,774**
Supplemental Pensions (included above)		**18**	**146**	**61**	**25**	

Average age is 70.2.

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[1] Including supplements to January 1, 2014.
[2] Age nearest birthday at December 31, 2014.
[3] These numbers include only those who were formerly contributors to the plan.

2. Beneficiaries

		Annual Pensions ($000's)[1]	
Age group[2]	**Number of beneficiaries**[3]	**Single life**	**Single Life with Guarantee**
Male beneficiaries			
Less than 50	10	70	-
50 - 54	11	140	-
55 - 59	22	355	26
60 - 64	56	869	134
65 - 69	92	1,407	191
70 - 74	106	1,823	133
75 - 79	71	1,277	111
80 - 84	64	950	-
85 - 89	46	594	-
90 & over	24	397	-
Total	**502**	**7,882**	**595**
Female pensioners			
Less than 50	10	106	-
50 - 54	12	265	-
55 - 59	39	606	85
60 - 64	84	1,610	217
65 - 69	210	4,201	811
70 - 74	263	6,162	169
75 - 79	261	6,433	43
80 - 84	284	6,236	-
85 - 89	293	6,863	-
90 & over	256	6,896	-
Total	**1,712**	**39,377**	**1,325**
Remaining guarantees	**150**	**3,690**	**-**
Grand Total	**2,364**	**50,949**	**1,920**
Supplemental Pensions (included above)		**34**	

Average age of the beneficiaries is 77.1.

[1] Including supplements to January 1, 2014.
[2] Age nearest birthday at December 31, 2014.
[3] These numbers include spouses (or estates) currently receiving benefits where the former contributor is deceased.

Appendix F: Development of Required Contribution Rates

All of the figures shown herein are on a combined member/employer basis.

	2014	2011
Normal ("entry-age") actuarial cost portion	**%**	**%**
Males	16.29	15.69
Females	16.69	16.05
Combined	16.59	15.96

The change in the normal actuarial cost from 2011 to 2014 can be traced as follows:

	Combined
	%
Normal cost at 2011 valuation	**15.96**
▪ data changes	(0.01)
▪ new contribution rate	0.02
▪ assumption changes:	
▪ pre-retirement mortality	0.00
▪ LTD incident rates	0.00
▪ withdrawal rates	(0.10)
▪ retirement rates	(0.11)
▪ post-retirement mortality	0.70
▪ post-retirement mortality for LTD	0.03
▪ change in administration expense assumption	0.10
Total change	**0.63**
Normal cost at 2014 valuation	**16.59**

Calculation of Required Contribution Rate

	2014	2011
A. Normal (entry-age) actuarial cost	16.59%	15.96%
B. (Unfunded) actuarial liability on entry-age basis ($000's)	(1,208,929)	(2,359,704)
C. Present value of existing amortization requirements ($000's)		
(i) 3.05% to 2017	229,867	456,042
(ii) 2.93% to 2020	424,976	632,676
(iii) 1.50% to 2023	314,193	415,987
(iv) 2.56% to 2026	688,684	n/a
D. Sum of B + C	448,791	(854,999)
E. Balance of unfunded liability to be amortized over 15 years ($000's) (= D, or zero if D is greater than zero)	0	(854,999)
	%	**%**
F. 15 year amortization of balance of unfunded actuarial liability	n/a	2.56
G. Reduction to existing amortization (if D is greater than zero)	4.56	n/a
H. Total *PBSA* amortization requirement		
(i) to 2017	-	3.05
(ii) to 2020	1.42	2.93
(iii) to 2023	1.50	1.50
(iv) to 2026	2.56	2.56
Total	**5.48**	**10.04**
I. Total *PBSA* required contribution rate	**22.07**	**26.00**

The percentages are applied to members' total earnings and are inclusive of approximate Canada Pension Plan employer contributions (i.e. 1.5% of each member's salary up to the YMPE for each of the members and the employers, for a 3.0% total reduction).

Appendix G: Comparative Results

Comparative Results on Fully Indexed Basis, and with Income Tax Limits

The results herein are analogous to those contained in Schedules 1 through 5 in the body of the report. For ease of comparison, we have repeated the 2014 Basic Account results; selected 2011 comparisons are also shown. The results are included for:

- Basic (i.e. non-indexed) benefits only, no tax limits;
- Basic plus Indexed, no tax limits;
- Basic only, with tax limits; and
- Basic plus Indexed, with tax limits

Schedule G1 - Statement of Actuarial Position as at December 31, 2014

Present Plan - ($000's)

	Without Tax Limits		With Tax Limits	
	Basic Only	**Basic + Indexed**	**Basic Only**	**Basic + Indexed**
Assets				
Market value of Fund	18,690,709	22,688,539	18,690,709	22,688,539
Asset smoothing adjustment	(1,869,071)	(2,268,854)	(1,869,071)	(2,268,854)
Smoothed value of Fund	**16,821,638**	**20,419,685**	**16,821,638**	**20,419,685**
Actuarial present values of:				
▪ future contributions at entry-age rates	4,401,401	6,174,607	4,398,354	6,174,607
▪ present value of existing amortization				
(i) 3.05% to 2017	229,867	229,867	229,867	229,867
(ii) 2.93% to 2020	424,976	424,976	424,976	424,976
(iii) 1.50% to 2023	314,193	314,193	314,193	314,193
(iv) 2.56% to 2026	688,684	688,684	688,684	688,684
Total Assets	**22,880,759**	**28,252,012**	**22,877,712**	**28,252,012**
Liabilities				
Actuarial present values for:				
▪ pensions being paid	10,640,001	14,245,460	10,636,609	14,240,826
▪ inactive members	580,722	835,959	580,722	835,959
▪ active members	11,074,126	15,418,808	11,068,888	15,411,559
▪ future expenses	137,108	137,108	137,108	137,108
Voluntary contribution balance	11	11	11	11
Total Liabilities	**22,431,968**	**30,637,346**	**22,423,338**	**30,625,463**
Surplus (Unfunded Actuarial Liability)	**448,791**	**(2,385,334)**	**454,374**	**(2,373,451)**
Present value of existing amortization		1,657,720		1,657,720
Surplus (Unfunded Liability) to be amortized over 15 years		**(4,043,054)**		**(4,031,171)**
Selected 2011 Comparisons				
Total Assets including amortization	20,691,072	25,483,649	20,691,072	25,483,649
Total Liabilities	20,691,072	28,501,889	20,689,831	28,500,152
Surplus (Unfunded Actuarial Liability)	0[1]	(3,018,240)[2]	1,241[3]	(3,016,503)[4]

[1] Prior to the 2011 amortization of 2.56% of salary, the unfunded liability was $854,999 thousand.

[2] Prior to the 2011 amortization of 2.56% of salary, the unfunded liability was $5,377,944 thousand.

[3] Prior to the 2011 amortization of 2.56% of salary, the unfunded liability was $853,758 thousand.

[4] Prior to the 2011 amortization of 2.56% of salary, the unfunded liability was $5,376,207 thousand.

Schedule G3 - Current and Required Contribution Rates - December 31, 2014

	Without Tax Limits		With Tax Limits	
	Basic Only %	Basic + Indexed %	Basic Only %	Basic + Indexed %
Current contribution rates				
Member[1]	11.00	14.00	11.00	14.00
Employer[1,2]	15.00	16.13	15.00	16.13
Combined member/employer	**26.00**	**30.13**	**26.00**	**30.13**
Required contribution rates				
Entry age normal cost rate[1]	**16.59**	**22.43**	**16.58**	**22.43**
Amortization of unfunded actuarial liability (surplus)				
▪ 25 year amortization	2.52	8.44	2.51	8.41
▪ 15 year amortization	3.73	12.48	3.71	12.44
▪ *PBSA* amortization	5.48	n/a	5.44	n/a
Total contribution rate[1]				
▪ 25 year amortization	19.11	30.87	19.09	30.84
▪ 15 year amortization	20.32	34.91	20.29	34.87
▪ *PBSA* rate	22.07	n/a	22.02	n/a
Total required contribution rate[1]	**22.07**	**n/a**	**22.02**	**n/a**
Selected 2011 Comparisons				
Member[1]	9.70	12.70	9.70	12.70
Employer[1, 3]	13.70	14.83	13.70	14.83
Combined member/employer	**23.40**	**27.53**	**23.40**	**27.53**
Required contribution rates				
Entry age normal cost rate[1]	**15.96**	**21.54**	**15.96**	**21.54**
Amortization of unfunded actuarial liability (surplus)				
▪ 25 year amortization	4.78	10.88	4.77	10.88
▪ 15 year amortization	7.06	16.10	7.06	16.09
▪ *PBSA* amortization	10.04	n/a	10.04	n/a
Total contribution rate[1]				
▪ 25 year amortization	20.74	32.42	20.73	32.42
▪ 15 year amortization	23.02	37.64	23.02	37.63
▪ *PBSA* rate	26.00	n/a	26.00	n/a
Total required contribution rate[1]	**26.00**	**n/a**	**26.00**	**n/a**

[1] Less 1.5% of salary up YMPE (for each of the members and the employers).

[2] Non-indexed costs ignore IAA contributions; indexed costs include IAA contributions, of 3.0% for members and 1.13% for employers.

Schedule G5 - Accrued Liabilities and Funded Ratio - December 31, 2014

($000's)	Without Tax Limits		With Tax Limits	
	Basic Only	Basic + Indexed	Basic Only	Basic + Indexed
Assets – smoothed value	**16,821,638**	**20,419,685**	**16,821,638**	**20,419,685**
Accrued Liabilities				
▪ for pensions being paid	10,640,001	14,245,460	10,636,609	14,240,826
▪ for inactive members	580,722	835,959	580,722	835,959
▪ for active members	6,305,192	8,762,901	6,303,201	8,760,091
▪ for voluntary contributions	11	11	11	11
Total Accrued Liabilities	**17,525,926**	**23,844,331**	**17,520,543**	**23,836,887**
Surplus (Unfunded Actuarial Liability)	**(704,288)**	**(3,424,646)**	**(698,905)**	**(3,417,202)**
Funded Ratio – Fund ÷ Total accrued liabilities	**96.0%**	**85.6%**	**96.0%**	**85.7%**
Select 2011 Comparisons				
Assets	14,067,984	17,162,913	14,067,984	17,162,913
Total Liabilities	15,937,887	21,903,924	15,936,798	21,902,400
Surplus (Unfunded Actuarial Liability)	(1,869,903)	(4,741,011)	(1,868,814)	(4,739,487)
Funded Ratio	88.3%	78.4%	88.3%	78.4%