

Office of the Superintendent
of Financial Institutions

Bureau du surintendant
des institutions financières

Canada Pension Plan
Thirteenth
Actuarial Report

February 1992

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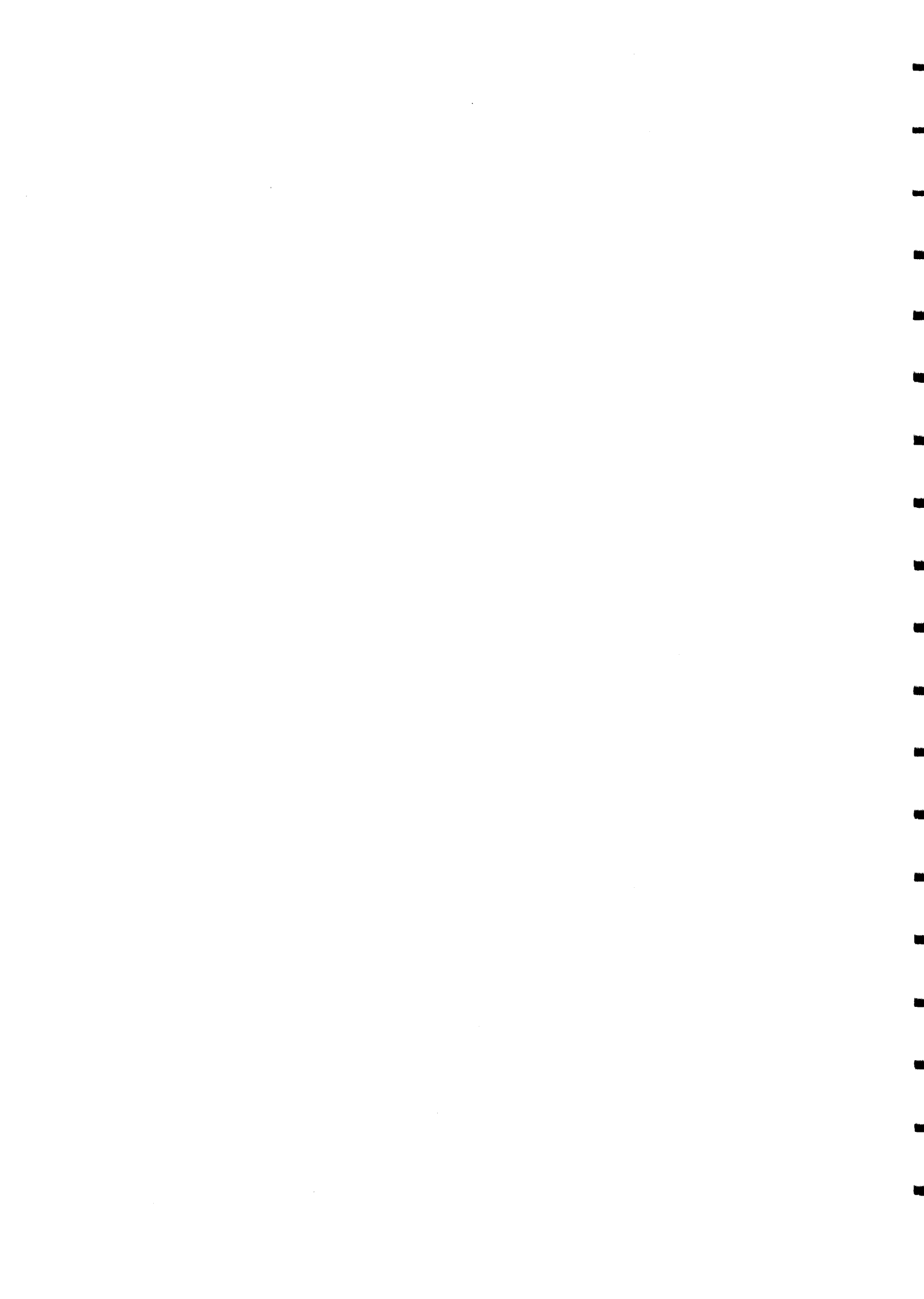
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**CANADA PENSION PLAN
THIRTEENTH ACTUARIAL REPORT
FEBRUARY 1992**

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**CANADA PENSION PLAN
THIRTEENTH ACTUARIAL REPORT
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I. Introduction

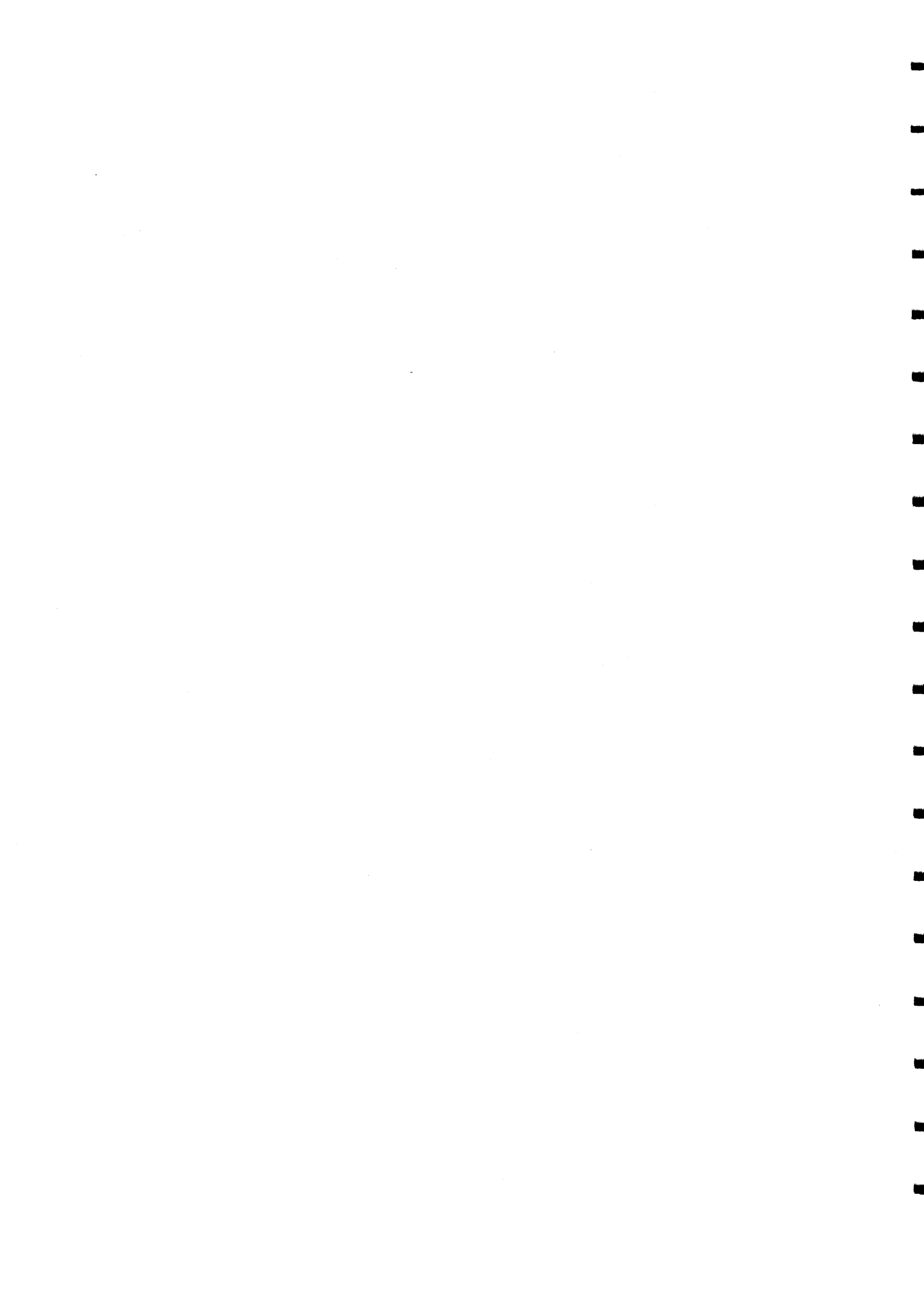
This is the thirteenth actuarial report since the inception of the plan in 1966. It has been prepared in compliance with subsection 115(2) of the Canada Pension Plan (CPP) which provides that,

"... in accordance with a request of the Minister of Finance, the Chief Actuary shall, whenever any Bill is introduced in or presented to the House of Commons to amend this Act in a manner that would in the opinion of the Chief Actuary materially affect any of the estimates contained in the most recent report under this section made by the Chief Actuary, prepare, using the same actuarial assumptions and basis as were used in that report, a report setting forth the extent to which such Bill would, if enacted by Parliament, materially affect any of the estimates contained in that report."

The most recent report made pursuant to section 115 was the twelfth actuarial report which was tabled in the House of Commons on 25 November 1991. The twelfth report had been prepared in connection with Bill C-39 which was proclaimed 27 January 1992 with an effective date of 1 January 1992.

This thirteenth report was prepared pursuant to the request of 11 February 1992 addressed to the Acting Chief Actuary by the Minister of Finance. In his letter, he indicates that the Minister of National Health and Welfare "expects to introduce a Bill soon in the House of Commons which would allow many disabled persons who were late in applying for disability benefits to be instated for benefits".

In accordance with subsection 114 of the Canada Pension Plan, the provisions of this amending Bill shall come into force "only on a day to be fixed by proclamation of the Governor in Council. The proclamation may not be issued and shall not in any case have any force or effect unless the lieutenant governor in council of each of at least two-thirds of the included provinces, having in the aggregate not less than two-thirds of the population of all the included provinces, has signified the consent of that province thereto". For purposes of financial estimates in this report, 1 January 1992 was deemed to be the effective date of the amending Bill.



The terms of the existing CPP, exclusive of the amendments contained in Bill C-39, are described in the eleventh report. The amendments contained in Bill C-39 are described in the twelfth report. In this report, references to

- (a) *pay-as-you-go rate(s)* or *contribution rate(s)* mean combined employer and employee rate(s) deemed to apply to the employee's CPP contributory earnings; the combined rate is deemed to apply to self-employed persons' CPP contributory earnings;
- (b) the *15-year formula* mean the formula, prescribed by the CPP Regulations, which provides for the minimum constant annual rate of change (positive or negative, and a multiple of one hundredth of a percentage point) in the *contribution rate* that produces an account/expenditure ratio at least equal to 2 after 15 years. The account/expenditure ratio is the balance in the CPP Account on December 31 divided by the next year's expenditure.

II. Description of the amending Bill

By virtue of paragraph 42(2)(b) of the CPP, a person is deemed to have become disabled at such time as is determined in a prescribed manner when he or she became disabled, but in no case shall a person be deemed to have become disabled earlier than 15 months before the month in which his or her application for the disability pension is received. This deemed date of disablement is the basis used for determining the eligibility for, the commencement date and the amount of the disability pension. On the other hand, paragraphs 44(1)(b) and 44(2)(a) state that a contributor is not eligible for a disability pension unless he/she has made contributions for at least 2 of the last 3, or 5 of the last 10 calendar years. Consequently, applications for disability pensions received, for example, more than five calendar years after the date of disablement, are automatically rejected for not meeting this eligibility test.

The Bill amends the CPP by removing the effect that the 15-month restriction has on the eligibility for the disability pension but not on the amount or the commencement date of the pension. Consequently, applications for disability pensions which are filed with more than 15 months of delay and which meet the eligibility test as at the presumed date of disablement but not as at the date the application is received will no longer be automatically rejected for not meeting the eligibility test. In such cases, however, the 15-month retroactivity provision will continue to apply for purposes of determining the commencement date and the amount of the disability pension.

The amendment applies to cases emerging after the effective date as well as to cases that would have emerged before that date had the amendment then been effective.

By deeming some persons to be eligible for disability benefits who would not otherwise meet the existing recency of contributions test, the Bill has the effect of increasing the number of disability pensions (including the portion payable to the children of disabled contributors) in respect of some contributors already eligible for an eventual retirement pension.

In addition to increasing the number of disability pensions, the amending Bill will increase the amount, but not the number, of the other CPP earnings-related benefits (retirement and surviving spouse's pensions, a subsequent disability pension, and the lump sum death benefit) eventually payable to these additional disabled contributors and/or their survivors. This increase in the earnings-related benefits results from the application of the CPP disability drop-out provision whereby years of nil earnings associated with a CPP disability period are dropped in the calculation of CPP earnings-related pensions.

III. Assumptions, methods and procedures

Actuarial assumptions, methods and procedures used for the financial estimates relating to the existing plan are described in Appendix B of the eleventh CPP Actuarial Report as at 31 December 1988. These assumptions, methods and procedures were also used for the twelfth report. As required by the CPP, the same actuarial assumptions and basis were used in this report for the financial estimates relating to the existing plan modified in accordance with the amending Bill.

However, additional procedures had to be developed and used for an adequate estimate of the financial effect of the amending Bill on the existing plan. They are described here.

To account for the additional cases that would become eligible for disability benefits pursuant to the amending Bill, it was assumed, on the basis of a sample study of CPP disability claim files, that the disability incidence rates (see schedule 13, page 64 of the eleventh report) would be increased by 1.85% for both sexes at all ages (18 to 64). This simple procedure produced the appropriate increase in the expenditures related to:

- (a) the flat-rate portions of disability pensions payable to disabled contributors and to each of their eligible children, and to
- (b) the earnings-related portion payable to disabled contributors. In respect of this earnings-related portion of the disability pensions, this procedure correctly implies that the average earnings of the contributors, deemed eligible for disability benefits by virtue of the amending Bill, are the same as those of all other active and disabled contributors combined.

However, their average earnings were subsequently increased by about 1%, through the normal valuation process, in accordance with the existing procedure described at item "d" on page 63 of the eleventh report. This adjustment represents an overestimate of the average earnings-related disability pension of the additional (i.e. 1.85%) cases since these new cases will not tend, as a result of the years of nil earnings from their disablement date to the application date, to have average earnings higher than those of all contributors. No adjustment was made for this overestimate because it has an effect of not more than 0.0001% of contributory earnings over the entire projection period and because it does not alter the appropriateness of the assumption underlying the above mentioned existing procedure.

We also developed and used the following procedures to account for the effect that the amending Bill has, in connection with the disability drop-out provision, on the initial rate of the other CPP average earnings-related pensions eventually payable to the additional disabled contributors and/or their survivors:

- (1) We removed the existing procedure used to estimate the effect of the disability drop-out provision and consisting in the application of increment factors to average earnings-related benefit factors (see paragraph "e" on page 59 of the eleventh report).
- (2) We applied an appropriate increase to the drop-out proportion "d" (see page 58 of the eleventh report), which takes into account the 15% and the child-rearing drop-out provisions, to account also for the disability drop-out provision. The increase in the drop-out proportion "d" was obtained as the ratio of
 - (a) the expected number of disability years over the contributory period, determined using the normally assumed values for the disability rates of incidence, termination and eligibility, to
 - (b) the number of years in the contributory period.
- (3) We applied the same procedure but using 101.85%, instead of 100%, of the normally assumed disability incidence rates. The 101.85% percentage is in accordance with the assumed 1.85% increase in disability incidence rates mentioned in the last paragraph of page 3.
- (4) The absolute dollar differences between the results obtained in (3) and (2) correspond to the particular effect that the amending Bill has in connection with the CPP disability drop-out provision.

IV. Tables of Financial Projections

This section presents tables of financial projections that take into account the provisions of the amending Bill.

The account projection shown in Table 5 was prepared, for purposes of measuring the effect of the amending Bill on the *contribution rates* after 2016, using the current 25-year (1992 to 2016) schedule of *contribution rates* prescribed by Bill C-39, and the *contribution rates* generated by the *15-year formula* after 2016.

The account projection shown in Table 6, prepared for purposes of measuring the effect of the amending Bill on future account/expenditure ratios, is similar to that in Table 5 except that after 2016, the *contribution rates* used are those of the previous report for the corresponding years (see Table 5, page 8 of the twelfth report, equally based on the *15-year formula* after 2016 but as applying to the expenditures of the existing, as opposed to the amended, plan).

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Table 1

Total expenditures (in millions of dollars)

Year	Retirement	Disability		Surviving Spouses		Orphans	Death	Expenses	Grand Total	
		Flat- Rate	Earnings- Related	Flat- Rate	Earnings- Related					Sub- Total
1992	8569	808	908	141	1856	1465	1770	192	186	12768
1993	9250	830	939	139	1907	1609	1929	198	195	13690
1994	9905	844	961	135	1940	1751	2084	204	204	14565
1995	10563	857	982	130	1969	1899	2245	205	214	15445
1996	11287	879	1011	132	2021	2063	2424	211	225	16436
1997	12092	910	1051	134	2095	2243	2622	219	240	17554
1998	12941	948	1103	138	2188	2435	2831	227	254	18750
1999	13830	996	1166	142	2305	2636	3052	236	270	20024
2000	14775	1051	1238	147	2436	2847	3284	245	286	21391
2001	15788	1111	1321	149	2581	3070	3529	254	303	22848
2002	16880	1180	1416	151	2748	3307	3788	264	320	24421
2003	18062	1256	1520	154	2931	3554	4059	275	340	26119
2004	19356	1338	1636	155	3130	3814	4344	285	359	27958
2005	20758	1428	1762	158	3348	4087	4643	297	380	29945
2006	22290	1522	1899	163	3584	4375	4959	307	401	32096
2007	24019	1624	2046	168	3838	4679	5292	317	424	34483
2008	25961	1725	2197	174	4096	4998	5641	327	447	37109
2009	28075	1832	2359	181	4372	5336	6011	337	471	39948
2010	30360	1948	2535	188	4671	5692	6400	350	497	43008
2011	32855	2064	2715	194	4974	6068	6811	361	524	46307
2012	35645	2160	2870	201	5231	6466	7245	373	551	49881
2013	38697	2264	3043	209	5516	6885	7701	385	581	53775
2014	41945	2379	3233	215	5827	7328	8183	398	610	57921
2015	45427	2500	3436	223	6159	7799	8694	412	641	62359
2016	49168	2626	3649	231	6505	8299	9234	427	674	67104
2017	53200	2751	3864	240	6855	8829	9807	443	708	72186
2018	57556	2874	4081	249	7204	9392	10413	460	743	77627
2019	62231	2996	4301	259	7555	9986	11051	478	781	83430
2020	67234	3116	4521	269	7906	10620	11728	497	818	89613
2025	97550	3708	5705	331	9744	14501	15840	610	1035	126778
2030	135356	4145	6772	405	11323	19903	21481	746	1324	173009
2035	177701	4904	8542	491	13937	27207	29040	899	1709	227097
2040	227320	5953	11054	588	17595	36670	38804	1075	2216	292124
2045	289248	7395	14653	706	22754	48409	50925	1290	2863	373775
2050	372188	9091	19223	855	29169	62582	65580	1560	3678	480759
2055	484344	10890	24534	1038	36463	79644	83217	1895	4714	621495
2060	629823	12959	31076	1257	45293	100702	104939	2295	6055	802115
2065	814930	15615	39861	1515	56991	127558	132573	2763	7797	1032467
2070	1053210	19055	51801	1821	72677	162457	168409	3319	10042	1329947
2075	1366541	23234	67289	2193	92717	207823	214914	3996	12903	1719753
2100	5024240	59109	234012	5623	298744	717129	733892	10233	45093	6211593

Table 2
Total Expenditures as percentages of contributory earnings (pay-as-you-go rates)

Year	Retirement	Disability		Surviving Spouses		Orphans	Death	Expenses	Total Pay-As-You-Go Rates		
		Flat-Earnings-Related	Children	Flat-Earnings-Related	Sub-Total						
1992	4.60	0.43	0.49	0.08	1.00	0.16	0.79	0.95	0.10	0.10	6.85
1993	4.75	0.43	0.48	0.07	0.98	0.16	0.83	0.99	0.11	0.10	7.02
1994	4.85	0.41	0.47	0.07	0.95	0.16	0.86	1.02	0.11	0.10	7.13
1995	4.93	0.40	0.46	0.06	0.92	0.16	0.89	1.05	0.12	0.10	7.20
1996	5.01	0.39	0.45	0.06	0.90	0.16	0.92	1.08	0.12	0.10	7.29
1997	5.05	0.38	0.44	0.06	0.87	0.16	0.94	1.09	0.12	0.10	7.32
1998	5.10	0.37	0.43	0.05	0.86	0.16	0.96	1.12	0.12	0.10	7.38
1999	5.13	0.37	0.43	0.05	0.86	0.15	0.98	1.13	0.12	0.10	7.43
2000	5.17	0.37	0.43	0.05	0.85	0.15	1.00	1.15	0.09	0.10	7.49
2001	5.22	0.37	0.44	0.05	0.85	0.15	1.01	1.17	0.13	0.10	7.55
2002	5.27	0.37	0.44	0.05	0.86	0.15	1.03	1.18	0.13	0.10	7.62
2003	5.32	0.37	0.45	0.05	0.86	0.15	1.05	1.20	0.13	0.10	7.69
2004	5.39	0.37	0.46	0.04	0.87	0.15	1.06	1.21	0.13	0.10	7.78
2005	5.47	0.38	0.46	0.04	0.88	0.15	1.08	1.22	0.14	0.10	7.89
2006	5.55	0.38	0.47	0.04	0.89	0.15	1.09	1.24	0.14	0.10	7.99
2007	5.67	0.38	0.48	0.04	0.91	0.14	1.10	1.25	0.14	0.10	8.14
2008	5.81	0.39	0.49	0.04	0.92	0.14	1.12	1.26	0.14	0.10	8.31
2009	5.96	0.39	0.50	0.04	0.93	0.14	1.13	1.28	0.14	0.10	8.48
2010	6.11	0.39	0.51	0.04	0.94	0.14	1.15	1.29	0.15	0.10	8.66
2011	6.27	0.39	0.52	0.04	0.95	0.14	1.16	1.30	0.15	0.10	8.84
2012	6.47	0.39	0.52	0.04	0.95	0.14	1.17	1.32	0.15	0.10	9.06
2013	6.67	0.39	0.52	0.04	0.95	0.14	1.19	1.33	0.15	0.10	9.26
2014	6.87	0.39	0.53	0.04	0.96	0.14	1.20	1.34	0.16	0.10	9.49
2015	7.08	0.39	0.54	0.03	0.96	0.14	1.22	1.36	0.16	0.10	9.72
2016	7.29	0.39	0.54	0.03	0.97	0.14	1.23	1.37	0.16	0.10	9.96
2017	7.51	0.39	0.55	0.03	0.97	0.14	1.25	1.38	0.17	0.10	10.19
2018	7.75	0.39	0.55	0.03	0.97	0.14	1.26	1.40	0.17	0.10	10.45
2019	7.97	0.38	0.55	0.03	0.97	0.14	1.28	1.42	0.17	0.10	10.69
2020	8.22	0.38	0.55	0.03	0.97	0.14	1.30	1.43	0.17	0.10	10.95
2025	9.42	0.36	0.55	0.03	0.94	0.13	1.40	1.53	0.19	0.10	12.24
2030	10.23	0.31	0.51	0.03	0.86	0.12	1.50	1.62	0.21	0.10	13.07
2035	10.40	0.29	0.50	0.03	0.82	0.11	1.59	1.70	0.22	0.10	13.29
2040	10.26	0.27	0.50	0.03	0.79	0.10	1.65	1.75	0.23	0.10	13.18
2045	10.10	0.26	0.51	0.02	0.79	0.09	1.69	1.78	0.23	0.10	13.05
2050	10.12	0.25	0.52	0.02	0.79	0.08	1.70	1.78	0.23	0.10	13.07
2055	10.28	0.23	0.52	0.02	0.77	0.08	1.69	1.77	0.23	0.10	13.18
2060	10.40	0.21	0.51	0.02	0.75	0.07	1.66	1.73	0.23	0.10	13.25
2065	10.45	0.20	0.51	0.02	0.73	0.06	1.64	1.70	0.22	0.10	13.24
2070	10.49	0.19	0.52	0.02	0.72	0.06	1.62	1.68	0.22	0.10	13.24
2075	10.59	0.18	0.52	0.02	0.72	0.05	1.61	1.67	0.22	0.10	13.33
2100	11.14	0.13	0.52	0.01	0.66	0.04	1.59	1.63	0.22	0.10	13.78

Table 3

Difference, in millions of dollars, between absolute dollar expenditures of this thirteenth report (Table 1) and those of the twelfth report (Table 3)

Year	Retirement	Disability		Sub-Total	Surviving Spouses		Orphans	Death	Expenses	Grand Total
		Flat-Earnings-Related	Children		Flat-Rate	Earnings-Related				
1992	6	10	12	23	1	0	1	0	0	30
1993	7	11	13	26	2	0	1	0	0	34
1994	6	13	16	31	2	0	1	0	0	38
1995	7	14	17	33	2	0	1	0	0	41
1996	7	16	19	37	2	0	2	0	0	46
1997	7	17	19	38	2	0	1	0	0	46
1998	8	18	21	41	2	0	1	0	0	50
1999	8	20	23	45	2	0	2	0	0	55
2000	9	21	23	47	3	0	1	0	0	57
2001	8	22	25	50	3	0	1	0	0	59
2002	9	23	27	53	3	0	2	0	0	64
2003	9	24	28	56	4	0	2	0	0	67
2004	9	25	30	58	3	0	2	0	0	69
2005	10	26	31	60	3	0	2	1	0	73
2006	10	27	33	63	3	0	2	1	0	76
2007	11	29	35	67	3	0	2	0	0	81
2008	11	30	37	70	3	0	1	1	0	83
2009	11	31	40	75	4	0	2	0	0	88
2010	12	33	42	79	4	0	2	0	0	93
2011	12	35	44	83	4	0	2	1	0	98
2012	13	37	46	87	4	0	2	0	0	102
2013	14	38	49	92	5	0	2	0	0	108
2014	14	40	52	96	4	0	2	1	0	113
2015	15	42	55	102	5	0	2	1	0	120
2016	16	44	58	107	5	0	2	1	0	126
2017	17	46	62	113	5	0	2	1	0	133
2018	18	48	65	118	5	0	3	0	0	139
2019	19	50	69	124	5	0	2	0	0	145
2020	20	52	71	128	5	0	2	1	0	151
2025	27	61	90	157	6	0	2	0	0	186
2030	37	68	106	181	7	0	2	1	0	221
2035	48	80	134	224	10	0	3	1	0	276
2040	61	96	172	279	11	0	4	2	0	346
2045	77	120	228	361	13	0	4	2	0	444
2050	99	147	300	463	16	0	5	3	0	570
2055	130	176	381	576	19	0	6	3	0	715
2060	170	209	482	714	23	0	7	4	0	894
2065	220	251	618	897	28	0	8	6	0	1131
2070	287	306	802	1142	34	0	10	8	0	1447
2075	372	373	1042	1456	41	0	10	9	0	1847
2100	1388	949	3618	4673	106	0	26	33	0	6121

Table 4

Difference between pay-as-you-go rates of this thirteenth report (Table 2) and those of the twelfth report (Table 4)

Year	Retirement	Disability		Surviving Spouses		Orphans	Death	Expenses	Grand Total
		Flat- Earnings- Related	Children	Flat- Rate	Earnings- Related				
1992	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02
1993	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02
1994	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
1995	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
1996	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
1997	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
1998	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
1999	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2000	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2001	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2002	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2003	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2004	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2005	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2006	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2007	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2008	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2009	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2010	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2011	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2012	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2013	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2014	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2015	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2016	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2017	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2018	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2019	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2020	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2025	0.00	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.02
2030	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.02
2035	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.02
2040	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.02
2045	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.02
2050	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.02
2055	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.02
2060	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01
2065	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01
2070	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01
2075	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01
2100	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01

Nota bene: rates above are shown with only two decimals; therefore, the underlying extra cost is not necessarily nil where the difference shown is 0.00%.

Table 5

Account Projection in Millions of Dollars
Effect of the amending Bill on the contribution rates after 2016

The contribution rate for 1991 was 4.60%.

Future contribution rates were determined as follows:

1. From 1992 to 2016: the existing 25-year schedule.
2. After 2016, contribution rates were generated by the 15-year formula.

Year	Pay-As- You-Go Rate %	Contri- bution Rate %	Contri- butions \$	Expen- ditures \$	Cash Flow \$	Invest- ment Earnings \$	Change in Account \$	Year- End Account \$	Account/ Expendi- ture Ratio
1991	6.46	4.60	8188	11503	-3315	4319	1004	41094	3.22
1992	6.85	4.80	8943	12768	-3825	4389	564	41658	3.04
1993	7.02	5.00	9746	13690	-3944	4423	480	42138	2.89
1994	7.13	5.20	10625	14565	-3940	4441	501	42639	2.76
1995	7.20	5.40	11577	15445	-3868	4444	576	43215	2.63
1996	7.29	5.60	12624	16436	-3812	4437	625	43839	2.50
1997	7.32	5.85	14022	17554	-3532	4424	891	44731	2.39
1998	7.38	6.10	15488	18750	-3262	4428	1166	45897	2.29
1999	7.43	6.35	17116	20024	-2908	4444	1535	47432	2.22
2000	7.49	6.60	18860	21391	-2531	4458	1927	49359	2.16
2001	7.55	6.85	20724	22848	-2124	4449	2325	51684	2.12
2002	7.62	7.10	22741	24421	-1680	4391	2711	54394	2.08
2003	7.69	7.35	24954	26119	-1165	4310	3145	57540	2.06
2004	7.78	7.60	27306	27958	-652	4377	3725	61265	2.05
2005	7.89	7.85	29803	29945	-142	4424	4282	65547	2.04
2006	7.99	8.10	32521	32096	425	4569	4995	70542	2.05
2007	8.14	8.30	35156	34483	673	4758	5432	75973	2.05
2008	8.31	8.50	37960	37109	851	4998	5850	81823	2.05
2009	8.48	8.70	40995	39948	1047	5261	6307	88130	2.05
2010	8.66	8.90	44224	43008	1216	5554	6770	94900	2.05
2011	8.84	9.10	47657	46307	1350	5882	7233	102133	2.05
2012	9.06	9.30	51222	49881	1341	6259	7600	109733	2.04
2013	9.26	9.50	55150	53775	1375	6681	8056	117788	2.03
2014	9.49	9.70	59184	57921	1263	7135	8398	126187	2.02
2015	9.72	9.90	63490	62359	1131	7614	8745	134932	2.01
2016	9.95	10.10	68082	67104	978	8120	9097	144029	2.00
2017	10.19	10.35	73316	72186	1130	8657	9788	153816	1.98
2018	10.45	10.60	78761	77627	1134	9239	10373	164189	1.97
2019	10.69	10.85	84686	83430	1256	9860	11116	175305	1.96
2020	10.95	11.10	90843	89613	1230	10523	11753	187058	1.94
2025	12.24	12.11	125397	126778	-1381	14159	12778	249930	1.85
2030	13.07	12.78	169148	173009	-3862	18008	14146	316968	1.73
2035	13.29	13.10	223931	227097	-3167	22743	19576	401964	1.68
2040	13.18	13.19	292282	292124	158	29739	29897	528564	1.72
2045	13.05	13.20	377964	373775	4189	40463	44652	721109	1.84
2050	13.07	13.16	484015	480759	3256	55634	58890	988451	1.95
2055	13.18	13.11	617972	621495	-3523	74636	71113	1319636	2.02
2060	13.25	13.06	790719	802115	-11396	97416	86020	1717357	2.04
2065	13.24	13.05	1017531	1032467	-14936	125768	110832	2216982	2.04
2070	13.24	13.09	1314534	1329947	-15413	163079	147666	2877202	2.06
2075	13.33	13.18	1700642	1719753	-19111	212478	193367	3749001	2.07
2100	13.78	13.54	6105551	6211593	-106042	752887	646845	13262814	2.03

Table 6

Account Projection in Millions of Dollars
Effect of the amending Bill on future account/expenditure ratios

The contribution rate for 1991 was 4.60%.

Future contribution rates were determined as follows:

1. From 1992 to 2016: the existing 25-year schedule.

2. After 2016, contribution rates are those estimated in the previous report (see Table 5 on page 8 of the twelfth report) for the corresponding years.

Year	Pay-As-You-Go Rate %	Contribution Rate %	Contributions \$	Expenditures \$	Cash Flow \$	Investment Earnings \$	Change in Account \$	Year-End Account \$	Account/Expenditure Ratio
1991	6.46	4.60	8188	11503	-3315	4319	1004	41094	3.22
1992	6.85	4.80	8943	12768	-3825	4389	564	41658	3.04
1993	7.02	5.00	9746	13690	-3944	4423	480	42138	2.89
1994	7.13	5.20	10625	14565	-3940	4441	501	42639	2.76
1995	7.20	5.40	11577	15445	-3868	4444	576	43215	2.63
1996	7.29	5.60	12624	16436	-3812	4437	625	43839	2.50
1997	7.32	5.85	14022	17554	-3532	4424	891	44731	2.39
1998	7.38	6.10	15488	18750	-3262	4428	1166	45897	2.29
1999	7.43	6.35	17116	20024	-2908	4444	1535	47432	2.22
2000	7.49	6.60	18860	21391	-2531	4458	1927	49359	2.16
2001	7.55	6.85	20724	22848	-2124	4449	2325	51684	2.12
2002	7.62	7.10	22741	24421	-1680	4391	2711	54394	2.08
2003	7.69	7.35	24954	26119	-1165	4310	3145	57540	2.06
2004	7.78	7.60	27306	27958	-652	4377	3725	61265	2.05
2005	7.89	7.85	29803	29945	-142	4424	4282	65547	2.04
2006	7.99	8.10	32521	32096	425	4569	4995	70542	2.05
2007	8.14	8.30	35156	34483	673	4758	5432	75973	2.05
2008	8.31	8.50	37960	37109	851	4998	5850	81823	2.05
2009	8.48	8.70	40995	39948	1047	5261	6307	88130	2.05
2010	8.66	8.90	44224	43008	1216	5554	6770	94900	2.05
2011	8.84	9.10	47657	46307	1350	5882	7233	102133	2.05
2012	9.06	9.30	51222	49881	1341	6259	7600	109733	2.04
2013	9.26	9.50	55150	53775	1375	6681	8056	117788	2.03
2014	9.49	9.70	59184	57921	1263	7135	8398	126187	2.02
2015	9.72	9.90	63490	62359	1131	7614	8745	134932	2.01
2016	9.95	10.10	68082	67104	978	8120	9097	144029	2.00
2017	10.19	10.34	73246	72186	1060	8656	9716	153744	1.98
2018	10.45	10.58	78612	77627	985	9232	10217	163961	1.97
2019	10.69	10.82	84452	83430	1022	9842	10864	174825	1.95
2020	10.95	11.06	90515	89613	902	10488	11390	186215	1.94
2025	12.24	12.06	124880	126778	-1898	13959	12061	246095	1.82
2030	13.07	12.73	168486	173009	-4523	17540	13017	308375	1.68
2035	13.29	13.05	223076	227097	-4021	21858	17836	385988	1.61
2040	13.18	13.18	292060	292124	-64	28312	28249	503624	1.64
2045	13.05	13.20	377964	373775	4189	38532	42721	687564	1.75
2050	13.07	13.16	484015	480759	3256	53036	56292	943330	1.86
2055	13.18	13.11	617972	621495	-3523	71142	67619	1258947	1.92
2060	13.25	13.06	790719	802115	-11396	92717	81321	1635725	1.94
2065	13.24	13.05	1017531	1032467	-14936	119447	104511	2107182	1.94
2070	13.24	13.09	1314534	1329947	-15413	154577	139164	2729513	1.95
2075	13.33	13.14	1695481	1719753	-24272	200489	176217	3537092	1.95
2100	13.78	13.49	6083005	6211593	-128588	663168	534580	11688323	1.79

TABLE 7

Comparison of key financial factors with the previous report (#12)

YEAR	Pay-as-you-go rates		Contribution rates		Account/Expenditure ratio	
	Table 4	Table 2	Table 5	Table 5	Table 5	Table 6
	rep. #12	rep.#13	rep. #12	rep. #13	rep. #12	rep. #13
1991	6.46	6.46	4.60	4.60	3.23	3.22
1992	6.84	6.85	4.80	4.80	3.05	3.04
1993	7.01	7.02	5.00	5.00	2.91	2.89
1994	7.11	7.13	5.20	5.20	2.78	2.76
1995	7.18	7.20	5.40	5.40	2.65	2.63
1996	7.27	7.29	5.60	5.60	2.52	2.50
1997	7.30	7.32	5.85	5.85	2.41	2.39
1998	7.36	7.38	6.10	6.10	2.32	2.29
1999	7.41	7.43	6.35	6.35	2.24	2.22
2000	7.47	7.49	6.60	6.60	2.19	2.16
2001	7.53	7.55	6.85	6.85	2.15	2.12
2002	7.60	7.62	7.10	7.10	2.12	2.08
2003	7.67	7.69	7.35	7.35	2.09	2.06
2004	7.76	7.78	7.60	7.60	2.08	2.05
2005	7.87	7.89	7.85	7.85	2.08	2.04
2006	7.98	7.99	8.10	8.10	2.09	2.05
2007	8.12	8.14	8.30	8.30	2.09	2.05
2008	8.29	8.31	8.50	8.50	2.09	2.05
2009	8.46	8.48	8.70	8.70	2.10	2.05
2010	8.64	8.66	8.90	8.90	2.10	2.05
2011	8.82	8.84	9.10	9.10	2.10	2.05
2012	9.04	9.06	9.30	9.30	2.09	2.04
2013	9.24	9.26	9.50	9.50	2.08	2.03
2014	9.47	9.49	9.70	9.70	2.08	2.02
2015	9.70	9.72	9.90	9.90	2.06	2.01
2016	9.94	9.96	10.10	10.10	2.05	2.00
2017	10.17	10.19	10.34	10.35	2.04	1.98
2018	10.43	10.45	10.58	10.60	2.02	1.97
2019	10.67	10.69	10.82	10.85	2.01	1.95
2020	10.93	10.95	11.06	11.10	1.99	1.94
2025	12.23	12.24	12.06	12.11	1.88	1.82
2030	13.06	13.07	12.73	12.78	1.75	1.68
2035	13.27	13.29	13.05	13.10	1.69	1.61
2040	13.17	13.18	13.18	13.19	1.73	1.64
2045	13.04	13.05	13.20	13.20	1.85	1.75
2050	13.06	13.07	13.16	13.16	1.97	1.86
2055	13.17	13.18	13.11	13.11	2.04	1.92
2060	13.23	13.25	13.06	13.06	2.06	1.94
2065	13.23	13.24	13.05	13.05	2.08	1.94
2070	13.23	13.24	13.09	13.09	2.10	1.95
2075	13.31	13.33	13.14	13.18	2.11	1.95
2100	13.76	13.78	13.49	13.54	2.01	1.79

V. Observations and Conclusions

As can be seen from Table 3, which shows the cost of the amendment expressed in terms of absolute dollar amounts, the amending Bill is expected to entail an additional annual expenditure of \$30 million in 1992 which would increase gradually to \$57 million in 2000, to \$570 million in 2050 and to \$6121 million in 2100. This gradual increase in the initial 1992 additional expenditure is largely the result of the combined effect of the wage increase adjustment that applies to the initial rate of CPP earnings-related pensions and to the cost of living adjustment that applies yearly to all types of benefits.

Table 4 shows the expected additional costs associated with the amending Bill, as percentages of contributory earnings, separately by calendar year and by type of benefit. These are also summarized in Table 7 which indicates that *pay-as-you-go rates* are at no time until 2100 expected to increase, in comparison with the previous report, by more than 0.02% of contributory earnings.

Table 7 also indicates that the account/expenditure ratio, which starts at 3.22 at the end of December 1991, is expected to stand at the end of 2016, as a result of the amending Bill, at 2.00 instead of 2.05. These ratios were determined using, in both cases, the existing 25-year schedule of *contribution rates*.

To conclude, the estimate made in this report of the effect of the amending Bill indicates mainly the following:

- (1) If the existing schedule of *contribution rates* were to apply until 2016, the account/expenditure ratio would not, pursuant the amending Bill, fall below 2 until 2016.
- (2) If the existing schedule of *contribution rates* were to apply until 2016, *contribution rates* after 2016 estimated in the previous report would have to be adjusted upwards, to account for the effect of the amending Bill in accordance with the *15-year formula*, by up to 0.05% of contributory earnings for some years as shown in the middle columns of Table 7.
- (3) If these *contribution rate* adjustments were not made after 2016, the account/expenditure ratio estimated in the previous report would gradually decline, pursuant to the amending Bill, as shown in the right hand columns of Table 7, by 0.11 (from 1.97 to 1.86) in 2050 and by 0.22 (from 2.01 to 1.79) in 2100.

VI. Actuarial Opinion

In my opinion, for the purposes of this actuarial report,

- the assumptions used are adequate and appropriate, and
- the methods and procedures employed are consistent with sound actuarial principles.

This report has been prepared and this opinion has been given in accordance with generally accepted actuarial principles and the Recommendations of the Canadian Institute of Actuaries.



Bernard Dussault, F.S.A., F.C.I.A.
Acting Chief Actuary

Ottawa, Canada
5 March 1992

