SOCIETY OF ACTUARIES

Retirement Benefits Canada – Design & Pricing, Segment A

Exam DP-RC,A

Date: Thursday, November 1, 2007
Time: 8:30 a.m. – 1:15 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 90 points.

   The points for each question are indicated at the beginning of the question. Questions 1 - 6 and 9 – 11 pertain to the Case Study, which is enclosed inside the front cover of this exam booklet.

2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.

3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.

2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.

3. The answer should be confined to the question as set.

4. When you are asked to calculate, show all your work including any applicable formulas.

5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets since they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate Exam DP-RC,A.

6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d’examen pour la version française.

475 N. Martingale Road
Schaumburg, IL 60173-2226

Printed in the U.S.A.

NOVEMBER 2007

EXAM DP-RC, A

Design and Pricing Retirement Benefits Canada—Segment A

CASE STUDY

Case Study - Course DP Retirement-CANADA

National Oil Company - Background

National Oil Company (NOC) is a large well-established company that services oil wells all over Canada. Most of NOC's employees are employed in the province of Ontario. NOC has been in existence for over 30 years and has more than 10,000 full-time salaried and union hourly employees and over 6,000 part-time employees. The full-time workforce is reasonably stable, but turnover in the last 5 years has been greater than desired, due to competitors recruiting NOC's employees.

Normally, an undergraduate degree is a minimum requirement to obtain entry to the salaried workforce and many employees have graduate degrees About half of NOC's salaried employees are recruited directly from university with the other half coming from competitors.

The company's financial position varies with the price of oil. As oil prices rise, oil companies become increasingly active and in turn require the services of NOC. Conversely, activity slows as oil prices drop. Despite this, the company is usually in a taxable position.

NOC has managed to be successful by staying on the cutting edge of technology. NOC prides itself in being state of the art in processes and software relevant to its industry. This has helped it to stave off competition from both inside and outside of Canada. Although NOC is the largest player in the industry within Canada, there are larger players from outside of the country, with which NOC has to compete. From time to time, there are rumors of a takeover of NOC.

Canadian legislation and social programs will apply to NOC in this case study.

Summary of National Oil's Retirement Benefits

NOC maintains three defined benefit plans:

1. a final-average pay defined benefit (DB) RPP for its full-time salaried employees;
2. a flat dollar DB RPP for its full-time hourly union staff;
3. a dc plan for its part-time workforce; and
4. a non-eligible pension plan (referred to as the SERP) for its executives that is supplemental to the salaried RPP. This plan has no assets.

Extracts of Retirement Benefits Provisions and Financial Information

National Oil Full-Time Salaried Pension Plan

Eligibility	Immediate
Vesting	100% after 2 years of plan membership
Normal Retirement Age	65
Early Retirement Age	55 with 2 years of plan membership
Best Average Earnings	Average annual earnings during 60 consecutive months in which earnings were highest
Earnings	Basic pay, excluding overtime and bonuses
Normal Retirement Benefit	2% of best average earnings times years of service, subject to tax system maximum
Accrued Benefit	Benefit calculated as under the normal retirement benefit formula using best average earnings and service as of date of calculation
Early Retirement Benefit	Accrued benefit reduced by 0.25% per month that early retirement precedes age 62
Form of Benefit	If married, 60% joint & survivor benefit, without reduction. If not married, single life annuity
Optional Forms of Benefit	None
Indexing	None
Termination Benefit	Lump sum equal to actuarial present value of accrued benefit
Pre-Retirement Death Benefit	Lump sum equal to actuarial present value of accrued benefit payable to named beneficiary
Disability Benefit	Accrual of service while on long term disability

National Oil Full-Time Salaried Pension Plan
Historical Actuarial Valuation Results

Participant Summary - January 1

	2003	2004	2005	2006	2007
Active Participants					
(a) count	4,243	4,293	4,305	4,268	4,286
(b) average age	44.9	44.7	45.6	45.6	45.5
(c) average service	15.6	15.5	15.5	15.2	15.4
(d) average future working lifetime	11.3	11.7	11.0	11.0	11.0
(e) average plan earnings (prior year)	64,000	65,000	67,000	67,200	67,300
Deferred Vested Participants					
(a) count	-	-	-	-	-
Pensioners (incl beneficiaries)					
(a) count	590	612	640	665	695
(b) average age	70.8	70.7	70.8	70.9	69.8
(c) average annual benefit	19,100	19,300	19,500	19,700	20,100

Plan Assets (numbers in $000's) *

	2003	2004	2005	2006	2007
Change in Plan Assets during Prior Year:					
Market Value of Assets at January 1 of prior year	545,745	529 366	674,861	772 639	860 847
Employer Contributions during prior year	31,532	40 145	37,000	39,789	-
Benefit Payments during prior year	(14 660)	(15,110)	(19,480)	(20,500)	(20,500)
Expenses during prior year	-	-	-	-	-
Investment return during prior year	(33,251)	120,461	80,257	68,919	119,084
Market Value of Assets at January 1 of current year	529 366	674,861	772,639	860,847	959,430
Rate of return during prior year	-6%	22%	12%	9%	14%
Average Portfolio Mix During Prior Year:					
(a) Domestic Large Cap Equities	27%	30%	30%	29%	30%
(b) Domestic Small Cap Equities	24%	30%	27%	28%	27%
(c) Domestic Fixed Income	34%	25%	26%	27%	27%
(d) International Equities	8%	11%	13%	11%	11%
(e) Real Estate	3%	2%	2%	3%	3%
(f) Cash	4%	2%	2%	2%	2%
(g) Total	100%	100%	100%	100%	100%
Asset Class Returns during Prior Year:					
(a) Domestic Large Cap Equities	-14%	25%	15%	13%	23%
(b) Domestic Small Cap Equities	-18%	30%	14%	7%	18%
(c) Domestic Fixed Income	9%	5%	7%	3%	4%
(d) International Equities	-16%	40%	12%	17%	10%
(e) Real Estate	4%	3%	3%	12%	8%
(f) Cash	2%	1%	1%	2%	2%

* *numbers may not add due to rounding*

National Oil Full-Time Salaried Pension Plan
Historical Actuarial Valuation Results

Funding Valuation - January 1 (numbers in $000's) *

	2003	2004	2005	2006	2007
1. Actuarial Accrued Liability:					
(a) Active participants	502,139	570 617	616 733	633,605	643 703
(b) Deferred vested participants	-	-	-	-	-
(c) Pensioners	98,040	106,304	114,442	134,935	143,886
(d) Total	600,179	676 921	731 175	768,540	787 589
2 Actuarial Value of Assets	529,366	674 861	772 639	860,847	959 430
3 Unfunded Actuarial Accrued Liability. (1d)-(2)	70,813	2 060	(41,464)	(92,306)	(171 841)
4 Normal Cost (beg Of year)	32,188	36 814	39,789	41 685	41,799
5. Change in Unfunded AAL during prior year.					
(a) Unfunded AAL at prior valuation date	7 275	70,813	2 060	(41 464)	(92,306)
(b) Adjustment for Interest	582	5,665	144	(2 799)	(6,000)
(c) Normal Cost w/interest less contributions	382	(6 987)	1 096	1,343	44,394
(d) (Gain)/Loss on investment	77 585	(77,110)	(32 404)	(16,115)	(63 795)
(e) (Gain)/Loss on termination	(2 200)	(2 100)	(8 100)	(15,400)	(14,000)
(f) (Gain)/Loss on salary increases less than expected	(12 800)	(19,700)	(13 800)	(23,700)	(25 000)
(g) (Gain)/Loss on mortality	200	(1,400)	(4 000)	(6,800)	(6,800)
(h) (Gain)/Loss on retirement	(1 200)	(2,800)	(4 700)	(7,400)	(8 500)
(i) (Gain)/Loss on assumption changes	-	36 500	19 100	20,000	-
(j) (Gain)/Loss on expenses	-	-	-	-	-
(k) (Gain)/Loss on all other factors	988	(821)	(860)	28	166
(l) Unfunded AAL at current valuation date	70 813	2,060	(41 464)	(92,306)	(171,841)
6. Actuarial Basis					
(a) Interest	8 00%	7 00%	6 75%	6 50%	6 50%
(b) Salary scale	5 00%	4 00%	3 75%	3 50%	3 50%
(c) Consumer Price Index	3 50%	3 50%	3 00%	3 00%	3 00%
(d) Mortality			GAM83		
(e) Turnover			Based on NOC experience for 1986-1988		
(f) Retirement age			Age 62		
(g) Proportion married and age difference			80% married, male spouse 3 years older than female spouse		
(h) Expenses			Assume all expenses paid by company		
(i) Asset Valuation Method			Market value of assets		
(j) Actuarial Cost Method			Projected unit credit		

** numbers may not add due to rounding*

National Oil Full-Time Salaried Pension Plan
Reconciliation of Plan Participants (2003 - 2006)

	Active	*Pensioners/ Beneficiaries*	*Total*
1. Participants as of January 1, 2003	**4,243**	**590**	**4,833**
- New Entrants/Rehires	375	-	375
- Terminated Nonvested	(120)	-	(120)
- Terminated Vested (Lump Sum Cashout)	(175)	-	(175)
- Retirement	(28)	28	-
- Death w/ Beneficiary	(2)	2	-
- Death w/o Beneficiary	-	(8)	(8)
- Net change	50	22	72
2. Participants as of January 1, 2004	**4,293**	**612**	**4,905**
- New Entrants/Rehires	400	-	400
- Terminated Nonvested	(150)	-	(150)
- Terminated Vested (Lump Sum Cashout)	(200)	-	(200)
- Retirement	(35)	35	-
- Death w/ Beneficiary	(3)	3	-
- Death w/o Beneficiary	-	(10)	(10)
- Net change	12	28	40
3. Participants as of January 1, 2005	**4,305**	**640**	**4,945**
- New Entrants/Rehires	250	-	250
- Terminated Nonvested	(115)	-	(115)
- Terminated Vested (Lump Sum Cashout)	(140)	-	(140)
- Retirement	(30)	30	-
- Death w/ Beneficiary	(2)	2	-
- Death w/o Beneficiary	-	(7)	(7)
- Net change	(37)	25	(12)
4. Participants as of January 1, 2006	**4,268**	**665**	**4,933**
- New Entrants/Rehires	300	-	300
- Terminated Nonvested	(130)	-	(130)
- Terminated Vested (Lump Sum Cashout)	(115)	-	(115)
- Retirement	(35)	35	-
- Death w/ Beneficiary	(2)	2	-
- Death w/o Beneficiary	-	(7)	(7)
- Net change	18	30	48
5. Participants as of January 1, 2007	**4,286**	**695**	**4,981**

National Oil Full-Time Salaried Pension Plan
Age/Svc/Earnings as of January 1, 2007

			Service (Years)					
			< 5	5-10	10-15	15-20	>20	Totals
Age (Years)	< 25	# Participants	150	140	-	-	-	290
		Average Salary	35,900	46,100	-	-	-	40,800
	25-35	# Participants	200	160	100	55	-	515
		Average Salary	47,100	58,000	62,000	65,100	-	55,300
	35-45	# Participants	195	208	186	211	201	1,001
		Average Salary	59,400	66,300	70,200	76,300	77,800	70,100
	45-55	# Participants	184	163	195	310	755	1,607
		Average Salary	62,600	65,200	67,500	75,600	77,800	73,100
	55-65	# Participants	168	77	87	81	431	844
		Average Salary	61,200	64,100	68,100	73,900	74,200	70,000
	> 65	# Participants	4	5	10	6	4	29
		Average Salary	47,000	52,100	46,200	57,600	53,900	50,700
	Totals	# Participants	901	753	578	663	1,391	4,286
		Average Salary	53,700	60,200	67,100	74,600	76,600	67,300

Avg Age	45.5
Avg Svc	15.4
Avg Salary	67,300

National Oil Full-Time Salaried Supplemental Executive Retirement Plan (SERP)

Eligibility	Immediate
Normal Retirement Age	65
Early Retirement Age	55 with 2 years of plan membership
Accrued Benefit	Accrued Benefit calculated under the provisions of the Salaried Pension Plan without regard to tax system maximums less actual Accrued Benefit under the Salaried Pension Plan
Normal Retirement Benefit	Accrued Benefit
Early Retirement Benefit	Accrued Benefit reduced by 0.25% per month that early retirement precedes age 62
Commencement Date and Form of Benefit	Must be same as under Salaried Pension Plan
Indexing	None
Termination Benefit	None
Pre-Retirement Death Benefit	None
Disability Benefit	None

Supplemental Retirement Plan
Historical Valuation Results - January 1

Participant Summary

	2004	2005	2006	2007
1. Active Participants				
(a) count	45	47	49	52
(b) average age	52.4	52.9	53.1	53.1
(c) average service	17.5	18.1	18.2	18.2
(d) average future working lifetime	7.0	6.5	6.3	6.3
(e) average earnings (prior year)	305,000	310,000	315,000	325,000
2. Deferred Vested Participants				
(a) count	-	-	-	-
3. Pensioners (incl beneficiaries)				
(a) count	13	14	15	17
(b) average age	69.0	69.6	70.4	70.1
(c) average annual benefit	12,500	12,900	13,100	14,000

Valuation Results (numbers in $000's) *

	2004	2005	2006	2007
1. Reconciliation of funded status at valuation date:				
(a) Accrued Benefit Obligation	(25,036)	(28,813)	(33,762)	(42,444)
(b) Fair Value of Assets	-	-	-	-
(c) Funded Status: (a) + (b)	(25,036)	(28,813)	(33,762)	(42,444)
2. Service Cost	911	992	1,074	1,340
3. Benefit Payments	163	181	197	238
4. Actuarial Basis				
(a) Discount rate	6.25%	6.00%	5.50%	5.00%
(b) Salary scale	4.00%	3.75%	3.50%	3.50%
(c) CPI	3.50%	3.00%	3.00%	3.00%
(d) All other assumptions				

** numbers may not add due to rounding*

National Oil Full-Time Hourly Union Pension Plan

Eligibility	Immediate
Vesting	100% after 2 years of plan membership
Normal Retirement Age	65
Early Retirement Age	55 with 10 years of service
Normal Retirement Benefit	$75 per month times years of service for terminations/ retirements during 2003, 2004, and 2005 $80 per month times years of service for terminations/ retirements during 2006 and beyond
Accrued Benefit	Benefit calculated as under the normal retirement benefit formula based on service and multiplier as of date of calculation.
Early Retirement Benefit	Unreduced benefit at 62 with 30 years of service, otherwise reduced by 0.25% per month that early retirement precedes Normal Retirement Age.
Form of Benefit	With a spouse, 60% joint & survivor benefit without reduction Without a spouse, single life annuity.
Optional Forms of Benefit	None
Post-Retirement Indexing	Lesser of 1% or CPI each year after pension commencement
Termination Benefit	Lump sum equal to actuarial present value of accrued benefit assuming no indexing
Pre-Retirement Death Benefit	Lump sum equal to actuarial present value of accrued benefit assuming no indexing, payable to named beneficiary
Disability Benefit	None

National Oil Full-Time Hourly Union Pension Plan
Historical Actuarial Valuation Results

Participant Summary - January 1

	2003	2004	2005	2006	2007
Active Participants					
(a) count	6,437	6,376	6,295	6,253	6,321
(b) average age	45.1	45.5	46.4	46.5	46.3
(c) average service	16.2	16.7	17.3	17.4	17.2
(d) average future working lifetime	11.8	11.5	10.7	10.6	10.8
(e) average plan earnings (prior year)	37 100	38 032	39,500	39 800	39 600
Deferred Vested Participants					
(a) count	-	-	-	-	-
Pensioners (incl beneficiaries)					
(a) count	985	1,016	1,034	1,060	1,081
(b) average age	71.0	71.5	72.3	72.8	71.8
(c) average annual benefit	9,800	9,900	10,000	10,800	11,200

Plan Assets (numbers in $000's) *

	2003	2004	2005	2006	2007
Change in Plan Assets during Prior Year:					
Market Value of Assets at January 1 of prior year	306,848	306 622	380,679	444,857	504 928
Employer Contributions during prior year	19,000	24 000	33,000	34,400	42,000
Benefit Payments during prior year	(9,883)	(11,258)	(11,340)	(12 000)	(15 000)
Expenses during prior year	-	-	-	-	-
Investment return during prior year	(9,342)	61,315	42,518	37,670	73,720
Market Value of Assets at January 1 of current year	306,622	380,679	444 857	504 928	605,648
Rate of return during prior year	-3%	20%	11%	8%	14%
Average Portfolio Mix During Prior Year:					
(a) Domestic Large Cap Equities	21%	25%	29%	30%	30%
(b) Domestic Small Cap Equities	23%	25%	20%	21%	27%
(c) Domestic Fixed Income	47%	35%	38%	36%	27%
(d) International Equities	2%	10%	8%	9%	11%
(e) Real Estate	2%	2%	2%	2%	3%
(f) Cash	5%	3%	3%	2%	2%
(g) Total	100%	100%	100%	100%	100%
Asset Class Returns during Prior Year:					
(a) Domestic Large Cap Equities	-14%	25%	15%	13%	23%
(b) Domestic Small Cap Equities	-18%	30%	14%	7%	18%
(c) Domestic Fixed Income	9%	5%	7%	3%	4%
(d) International Equities	-16%	40%	12%	17%	10%
(e) Real Estate	4%	3%	3%	12%	8%
(f) Cash	2%	1%	1%	2%	2%

** numbers may not add due to rounding*

National Oil Full-Time Hourly Union Pension Plan

Historical Actuarial Valuation Results

Funding Valuation - January 1 (numbers in $000's) *

	2003	2004	2005	2006	2007
1 Actuarial Accrued Liability:					
Active Multiplier	$ 75	$ 75	$ 75	$ 80	$ 80
(a) Active participants	281,619	376,579	435 162	507,668	548,941
(b) Deferred vested participants	-	-	-	-	-
(c) Pensioners	91,704	96,561	98,230	117,914	124,704
(d) Total	373 323	473,140	533,392	625,582	673 645
2 Actuarial Value of Assets	306,622	380,679	444,857	504 928	605,648
3. Unfunded Actuarial Accrued Liability: (1d)-(2)	66 701	92,460	88 534	120,655	67,997
4. Normal Cost (beg Of year)	17,384	22 550	25,154	29,176	31,915
5. Change in Unfunded AAL during prior year:					
(a) Unfunded AAL at prior valuation date	32 959	66,701	92,460	88 534	120,655
(b) Adjustment for Interest	2,637	5,336	6 472	5,976	7,843
(c) Normal Cost w/interest less contributions	(2 389)	(6,185)	(10 027)	(8,709)	(12,292)
(d) (Gain)/Loss on investment	34 255	(36,276)	(15 112)	(6,886)	(40,023)
(e) (Gain)/Loss on termination	(1,500)	(8 000)	(6,700)	(10 400)	(6,000)
(f) (Gain)/Loss on salary increases less than expected	-	-	-	-	-
(g) (Gain)/Loss on mortality	200	(1,000)	(1,200)	(1,900)	(1,900)
(h) (Gain)/Loss on retirement	(250)	(500)	(750)	(550)	(400)
(i) (Gain)/Loss on assumption changes	-	73,000	24 200	23 400	-
(j) (Gain)/Loss on expenses	-	-	-	-	-
(k) (Gain)/Loss on all other factors	789	(615)	(809)	(539)	114
(l) Change in active benefit multiplier	-	-	-	31,729	-
(m) Unfunded AAL at current valuation date	66,701	92 460	88 534	120,655	67,997
6. Actuarial Basis					
(a) Interest	8.00%	7.00%	6.75%	6.50%	6.50%
(b) Salary scale	N/A	N/A	N/A	N/A	N/A
(c) Consumer Price Index	3.50%	3 50%	3.00%	3 00%	3.00%
(d) Mortality	GAM83				
(e) Turnover	Based on NOC experience for 1986-1988				
(f) Retirement age	Age 62, with appropriate early retirement reduction, if any				
(g) Proportion married and age difference	80% married, male spouses 3 years older than female spouses				
(h) Expenses	Assume all expenses paid by company				
(i) Post-retirement indexing	1 00%	1.00%	1.00%	1.00%	1.00%
(j) Asset Valuation Method	Market value of assets				
(k) Actuarial Cost Method	Unit credit				

** numbers may not add due to rounding*

National Oil Full-Time Hourly Union Pension Plan
Reconciliation of Plan Participants (2003 - 2006)

	Active	*Pensioners/ Beneficiaries*	*Total*
1. Participants as of January 1, 2003	**6,437**	**985**	**7,422**
- New Entrants/Rehires	200	-	200
- Terminated Nonvested	(100)	-	(100)
- Terminated Vested (Lump Sum Cashout)	(120)	-	(120)
- Retirement	(40)	40	-
- Death w/ Beneficiary	(1)	1	-
- Death w/o Beneficiary	-	(10)	(10)
- Net change	(61)	31	(30)
2. Participants as of January 1, 2004	**6,376**	**1,016**	**7,392**
- New Entrants/Rehires	120	-	120
- Terminated Nonvested	(75)	-	(75)
- Terminated Vested (Lump Sum Cashout)	(100)	-	(100)
- Retirement	(25)	25	-
- Death w/ Beneficiary	(1)	1	-
- Death w/o Beneficiary	-	(8)	(8)
- Net change	(81)	18	(63)
3. Participants as of January 1, 2005	**6,295**	**1,034**	**7,329**
- New Entrants/Rehires	150	-	150
- Terminated Nonvested	(80)	-	(80)
- Terminated Vested (Lump Sum Cashout)	(75)	-	(75)
- Retirement	(35)	35	-
- Death w/ Beneficiary	(2)	2	-
- Death w/o Beneficiary	-	(11)	(11)
- Net change	(42)	26	(16)
4. Participants as of January 1, 2006	**6,253**	**1,060**	**7,313**
- New Entrants/Rehires	170	-	170
- Terminated Nonvested	(30)	-	(30)
- Terminated Vested (Lump Sum Cashout)	(40)	-	(40)
- Retirement	(30)	30	-
- Death w/ Beneficiary	(2)	2	-
- Death w/o Beneficiary	-	(11)	(11)
- Net change	68	21	89
5. Participants as of January 1, 2007	**6,321**	**1,081**	**7,402**

National Oil Full-Time Hourly Union Pension Plan
Age/Svc/Earnings as of January 1, 2007

			Service (Years)					
			< 5	5-10	10-15	15-20	>20	Totals
Age (Years)	< 25	# Participants	200	90	-	-	-	290
		Average Salary	25,500	31,300	-	-	-	27,300
	25-35	# Participants	270	120	91	62	-	543
		Average Salary	26,800	31,800	37,800	38,300	-	31,100
	35-45	# Participants	275	350	320	659	441	2,045
		Average Salary	27,000	32,200	39,400	44,300	46,600	39,600
	45-55	# Participants	120	160	300	688	895	2,163
		Average Salary	25,000	32,200	38,600	43,000	46,800	42,200
	55-65	# Participants	95	62	94	186	801	1,238
		Average Salary	24,500	28,700	36,400	39,900	46,400	42,100
	> 65	# Participants	8	9	11	8	6	42
		Average Salary	20,600	21,600	25,700	24,600	25,100	23,600
	Totals	# Participants	968	791	816	1,603	2,143	6,321
		Average Salary	26,100	31,600	38,400	42,900	46,500	39,600

Avg Age	46.3
Avg Svc	17.2
Avg Salary	39,600

National Oil Part-Time DC Pension Plan

Eligibility	Immediate
Vesting	Immediate
Employer Contributions	50% match of employee contributions
Employee Contributions	3% of base pay
Plan Fund	The employer invests the contributions in a balanced fund. There are no employee investment choices.
Account Balance	Contributions are accumulated in member's individual account earning investment income at the rate of return earned by the Plan Fund.
Loans	Not permitted.
Benefit on Termination or Retirement	Account balance is transferred to a LIRA/LIF for the member after one year from date of termination or retirement, unless employee has since returned to employment with NOC.
Benefit on Death	Account balance is payable to named beneficiary

National Oil Part-Time DC Pension Plan
Historical Results - January 1

Participant Summary

	2003	2004	2005	2006	2007
(a) number participating during prior year	5,900	6,200	6,300	6,250	6,500
(b) average age	29.5	30.0	30.5	30.9	28.9
(c) average base pay	22,000.00	23,000.00	24,000.00	26,000.00	29,000.00

Plan Assets (numbers in $000's) *

	2003	2004	2005	2006	2007
Change in Plan Assets during Prior Year:					
Market Value of Assets at January 1 of prior year	40,000	41,739	46,792	57,871	67,779
Employee Contributions during prior year	3,894	4,278	4,536	4,875	5,655
Company Contributions during prior year	1,947	2,139	2,268	2,438	2,828
Benefit Payments during prior year	(5,310)	(5,580)	(5,670)	(5,625)	(5,850)
Expenses during prior year	-	-	-	-	-
Investment return during prior year	1,208	4,216	9,945	8,220	4,837
Market Value of Assets at January 1 of current year	41,739	46,792	57,871	67,779	75,248
Rate of return during prior year	3%	10%	21%	14%	7%

* *numbers may not add due to rounding*

CASE STUDY INSTRUCTIONS

The case study will be used as a basis for some examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. Other advantages should not be listed, as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.

****BEGINNING OF EXAMINATION****
Retirement Benefits Canada – Design & Pricing, Segment A

Questions 1 - 6 and 9 – 11 pertain to the Case Study

1. *(8 points)* The CFO of NOC has engaged you to conduct an asset/liability study for the Hourly Pension Plan for the purpose of setting the asset allocation policy.

(a) Describe the possible objectives of an asset/liability study.

(b) Describe the characteristics of NOC and the Hourly Pension Plan that should be considered in conducting an asset/liability study.

(c) Describe the development of the economic assumptions required for the asset/liability study.

Questions 1 - 6 and 9 – 11 pertain to the Case Study

2. *(8 points)* The January 1, 2007 going concern funding valuation results for NOC's Salaried Pension Plan show a 2007 maximum employer contribution of $0.

Prior to filing the valuation report, NOC's management has indicated they would like to make a contribution in 2007 to the pension fund. They have asked you to revise your assumptions.

(a) Evaluate the potential of a change in the discount rate, salary scale, mortality and retirement age assumptions to increase contributions, including the factors you will take into consideration when setting these assumptions.

(b) Describe how the CIA professional requirements apply to NOC's request.

Questions 1 - 6 and 9 – 11 pertain to the Case Study

3. *(7 points)* You are the new actuary for NOC. You are in the process of preparing your first information request for the Salaried Pension Plan valuation.

(a) Identify the information and its sources required for the funding valuation.

(b) Describe the quality control checks you will perform on the information obtained.

Questions 1 - 6 and 9 – 11 pertain to the Case Study

4. *(15 points)* NOC is considering converting the Salaried Pension Plan to a defined contribution (DC) plan.

(a) Identify the reasons why NOC may prefer a DC plan.

(b) Compare and contrast alternative DC plans NOC could consider.

(c) NOC has decided to convert to a registered DC pension plan. Describe the considerations in designing the DC formula for current defined benefit members.

(d) Describe the additional considerations required if past service benefits are to be converted.

Questions 1 - 6 and 9 – 11 pertain to the Case Study

5. *(7 points)* You are working on the design of a new unfunded SERP at NOC. The new SERP will cover only the CEO, the COO and a CFO currently being recruited.

You are given the following information:

	Age	Service	Base Salary	Target Bonus
CEO	45	20	$500,000	50%
COO	60	20	$400,000	35%
New CFO	50	0	$300,000	35%

Describe the plan design considerations for the SERP.

Questions 1 - 6 and 9 – 11 pertain to the Case Study

6. *(6 points)* NOC is asking your help to establish a pension plan for its third-country national employees in the European Union.

(a) Describe the required components of a global benefits policy.

(b) Describe the issues that need to be considered when designing and implementing a pension benefits program in the European Union.

7. *(8 points)* You are reviewing a pension plan's investment performance over the past two years. You are given the following information:

	Actual Return		Benchmark Return		Actual Allocation		Target Allocation	
Asset Class	2005	2006	2005	2006	2005	2006	2005	2006
Domestic Equities	11%	21%	13%	15%	51%	57%	50%	50%
International Equities	17%	10%	16%	7%	9%	11%	15%	15%
Domestic Bonds	3%	4%	7%	5%	38%	30%	35%	35%
Cash	2%	2%	3%	1%	2%	2%	0%	0%

(a) Calculate the pension fund performance in each of the last two years and in total relative to the benchmark returns. Show all work.

(b) Explain the difference in returns for 2005 and 2006 between the pension fund and the benchmark using macro attribution analysis. Show all work.

(c) Describe potential issues that should be considered when comparing the actual fund return with the benchmark return to assess the manager added value.

8. *(6 points)*

(a) Describe the general features and common design objectives of flexible pension plans.

(b) Describe the benefits that can be enhanced within flexible pension plans.

(c) Describe the regulatory constraints affecting a flexible pension plan design.

Questions 1 - 6 and 9 – 11 pertain to the Case Study

9. *(12 points)* You are the actuary for NOC's Salaried Pension Plan. In addition to the going concern funding valuation, summarized in the case study, the solvency valuation results as at January 1, 2007 are as follows:

Solvency Balance Sheet as at January 1, 2007	
Market Value of Assets	$959,430,000
Windup Expenses	($1,000,000)
Solvency Assets	$958,430,000
Liabilities	
Active members	$806,000,000
Pensioners	$167,000,000
Solvency Liabilities	$973,000,000
Solvency Surplus (Solvency Deficiency)	($14,570,000)

You are given the following additional information:

2007 and 2008 Normal Cost on the solvency basis	$52,000,000
2007 and 2008 Normal Cost on the going concern basis	$41,799,000
Existing Solvency Amortization Payments	$0
2007 and 2008 Pensioner Payments	$14,000,000 per year
2007 and 2008 Lump Sum payments	$6,500,000 per year
Solvency Discount Rate – Pensioners	4.50% per year
Solvency Discount Rate – Actives	4.75% per year
2007 Asset Return	4.00%
2008 Asset Return	15.00%

9. **(Continued)**

(a) Determine the special payments under Ontario legislation, over the next 3 years, by estimating the solvency valuation results at January 1, 2008 and January 1, 2009 assuming no going concern unfunded liability will emerge, no other actuarial gains or losses will occur and NOC will remit the minimum required employer contributions.

(b) On January 1, 2007, NOC acquired a group of active employees and granted past service under the Salaried Pension Plan. This acquisition increased the January 1, 2007 obligations as follows:

Increase in Obligations	
Going Concern Liabilities	$200,000,000
Solvency Liabilities	$250,000,000
Going Concern Normal Cost	$15,000,000

Calculate the minimum required employer contributions for 2007 under Ontario legislation.

Show all work.

Questions 1 - 6 and 9 – 11 pertain to the Case Study

10. *(6 points)* NOC is considering using a three year asset smoothing method for their January 1, 2007 Salaried Pension Plan going concern funding valuation.

(a) Determine the going concern funding valuation assets as at January 1, 2007 under the three-year smoothed market value without phase-in method. Assume an interest rate of 6.5% for the full three-year period.

(b) Describe the advantages and disadvantages of using a smoothed asset valuation method versus a market value asset method.

Questions 1 - 6 and 9 – 11 pertain to the Case Study

11. *(7 points)* You are given the following information regarding a member of the NOC Salaried Pension Plan.

Gender:	Female
Date of Birth:	April 1, 1967
Date of Membership:	April 1, 1997
Date of Termination:	April 1, 2007
Marital Status:	Married
Province:	Ontario
Best Average Earnings at April 1, 2007:	$200,000
Breaks in Service:	None

You are also given the following information:

	7 year Government of Canada Benchmark Bond Yield (CANSIM B14070)	Long Term Government of Canada Benchmark Bond Yield (CANSIM B14072)	Long Term Real Return Government of Canada Bond Yield (CANSIM B14081)
January 2007	4.12	4.22	1.79
February 2007	3.98	4.09	1.75
March 2007	4.03	4.21	1.77
April 2007	4.12	4.20	1.76
May 2007	4.16	4.24	1.78
June 2007	4.20	4.28	1.80

A plan amendment was made to the NOC Salaried Pension Plan effective January 1, 2007 to provide post retirement indexing at 75% of the increase in the Consumer Price Index and to apply the early retirement provisions at age 55 or later for members terminating prior to age 55. This amendment was retroactive for all service and applied to pensions for all members.

Assume that the frequency of indexing is equal to the payment frequency, that no indexing is payable for the period between termination and pension commencement, and that the income tax limits are applied at pension commencement.

Neither the plan text nor the sponsor/administrator gives guidance on assumptions.

11. (Continued)

(a) Determine the interest assumptions to be used for the calculation of the commuted value of this member's registered pension benefit as at April 1, 2007.

(b) Describe all the assumptions other than the interest rates that will be required in the calculation of the commuted value.

Show all work.

****END OF EXAMINATION****