
SOCIETY OF ACTUARIES
Retirement Benefits Canada – Design & Pricing

Exam DP-RC

AFTERNOON SESSION

Date: Thursday, October 29, 2009

Time: 1:30 p.m. – 4:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 7 questions numbered 7 through 13 for a total of 60 points. The points for each question are indicated at the beginning of the question. Questions 9 and 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 morning or afternoon session for Exam DP-RC.
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.

Case Study - Course DP Retirement

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 five retirement programs:

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 defined contribution (DC) RPP 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.
5. a retiree health and welfare plan for the full-time salaried and union retirees. 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 for actives and terminated vested members
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 and immediate pension without a reduction upon permanent and total disability

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

2006 2007 2008 2009

Participant Summary - January 1

<i>Active Participants</i>				
(a) count	4,268	4,286	4,251	4,076
(b) average age	45.6	45.5	45.4	45.2
(c) average service	15.2	15.4	15.3	15.4
(d) average future working lifetime	11.0	11.0	11.0	11.0
(e) average plan earnings (prior year)	67,200	67,300	67,500	67,400
<i>Deferred Vested Participants</i>				
(a) count	-	-	-	-
<i>Pensioners (incl beneficiaries)</i>				
(a) count	665	695	720	773
(b) average age	70.9	69.8	68.2	68.0
(c) average annual benefit	19,700	20,100	21,800	22,000

Plan Assets (numbers in \$000's) *

<i>Change in Plan Assets during Prior Year:</i>				
Market Value of Assets at January 1 of prior year	772,639	860,847	959,430	928,941
Employer Contributions during prior year	39,789	-	-	-
Benefit Payments during prior year	(20,500)	(20,500)	(21,000)	(21,000)
Expenses during prior year	-	-	-	-
Investment return during prior year	68,919	119,084	(9,489)	(160,727)
Market Value of Assets at January 1 of current year	860,847	959,430	928,941	747,214
Rate of return during prior year	9%	14%	-1%	-17.5%
<i>Average Portfolio Mix During Prior Year:</i>				
(a) Domestic Large Cap Equities	29%	30%	32%	30%
(b) Domestic Small Cap Equities	28%	27%	25%	10%
(c) Domestic Fixed Income	27%	27%	23%	35%
(d) International Equities	11%	11%	15%	20%
(e) Real Estate	3%	3%	3%	0%
(f) Cash	2%	2%	2%	5%
(g) Total	100%	100%	100%	100%
<i>Asset Class Returns during Prior Year:</i>				
(a) Domestic Large Cap Equities	13%	23%	-3%	-30%
(b) Domestic Small Cap Equities	7%	18%	-2%	-45%
(c) Domestic Fixed Income	3%	4%	4%	8%
(d) International Equities	17%	10%	-5%	-35%
(e) Real Estate	12%	8%	5%	5%
(f) Cash	2%	2%	3%	3%

* numbers may not add due to rounding

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

2006 2007 2008 2009

Going Concern Valuation - January 1 (numbers in \$000's) *

1. Actuarial Accrued Liability:				
(a) Active participants	633,605	643,703	634,308	628,260
(b) Deferred vested participants	-	-	-	-
(c) Pensioners	134,935	143,886	161,669	178,563
(d) Total	768,540	787,589	795,977	806,823
2. Actuarial Value of Assets	860,847	959,430	928,941	747,214
3. Unfunded Actuarial Accrued Liability: (1d)-(2)	(92,306)	(171,841)	(132,964)	59,609
4. Normal Cost (beg. Of year)	41,685	41,799	41,458	40,796
5. Change in Unfunded AAL during prior year:				
(a) Unfunded AAL at prior valuation date	(41,464)	(92,306)	(171,841)	(132,964)
(b) Adjustment for Interest	(2,799)	(6,000)	(11,170)	(8,643)
(c) Normal Cost w/interest less contributions	1,343	44,394	44,516	44,153
(d) (Gain)/Loss on investment	(16,115)	(63,795)	71,170	220,426
(e) (Gain)/Loss on termination	(15,400)	(14,000)	(17,000)	(20,000)
(f) (Gain)/Loss on salary increases less than expected	(23,700)	(25,000)	(30,000)	(25,000)
(g) (Gain)/Loss on mortality	(6,800)	(6,800)	(6,900)	2,000
(h) (Gain)/Loss on retirement	(7,400)	(8,500)	(11,000)	(21,000)
(i) (Gain)/Loss on assumption changes	20,000	-	-	-
(j) (Gain)/Loss on expenses	-	-	-	-
(k) (Gain)/Loss on all other factors	28	166	(739)	637
(l) Unfunded AAL at current valuation date	(92,306)	(171,841)	(132,964)	59,609
6. Actuarial Basis				
(a) Interest	6.50%	6.50%	6.50%	6.50%
(b) Salary scale	3.50%	3.50%	3.50%	3.50%
(c) Consumer Price Index	3.00%	3.00%	3.00%	3.00%
(d) Mortality	GAM 1983	GAM 1983	GAM 1983	GAM 1983
(e) Turnover	Based on NOC experience for 1986-1988			
(f) Retirement age	Age 62			
(g) Proportion married and age difference	80% married, husbands 3 years older than wives			
(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
Solvency Valuation Results

2009

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

1. Actuarial Accrued Liability:	
(a) Active participants	692,043
(b) Deferred vested participants	-
(c) Pensioners	238,084
(d) Total	<u>930,127</u>
2. Market Value of Assets	747,214
3. Solvency Deficiency: (1d)-(2)	182,913
4. Actuarial Basis	
(a) Interest - Benefit paid by lump sum	4% for 10 years 5% thereafter
(a) Interest - Benefit settled by annuity purchase	5%
(c) Asset Valuation Method	Market value of assets
(d) Actuarial Cost Method	Unit Credit

* numbers may not add due to rounding

**National Oil Full-Time Salaried Pension Plan
Reconciliation of Plan Participants (2006 - 2009)**

	<u>Active</u>	<u>Pensioners/ Beneficiaries</u>	<u>Total</u>
1. 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
2. Participants as of January 1, 2007	4,286	695	4,981
- New Entrants/Rehires	250	-	250
- Terminated Nonvested	(120)	-	(120)
- Terminated Vested (Lump Sum Cashout)	(130)	-	(130)
- Retirement	(30)	30	-
- Death w/ Beneficiary	(5)	5	-
- Death w/o Beneficiary	-	(10)	(10)
- Net change	(35)	25	(10)
3. Participants as of January 1, 2008	4,251	720	4,971
- New Entrants/Rehires	100	-	100
- Terminated Nonvested	(100)	-	(100)
- Terminated Vested (Lump Sum Cashout)	(120)	-	(120)
- Retirement	(50)	50	-
- Death w/ Beneficiary	(5)	5	-
- Death w/o Beneficiary	-	(2)	(2)
- Net change	(175)	53	(122)
4. Participants as of January 1, 2009	4,076	773	4,849

National Oil Full-Time Salaried Pension Plan
Age/Svc/Earnings as of January 1, 2009

		Service (Years)					Totals	
		< 5	5-10	10-15	15-20	>20		
Age (Years)	< 25	# Participants	180	120	-	-	-	300
		Average Salary	35,900	46,100	-	-	-	40,000
	25-35	# Participants	210	140	90	55	-	495
		Average Salary	47,100	58,000	62,000	65,100	-	54,900
	35-45	# Participants	175	198	176	201	201	951
		Average Salary	59,400	66,300	70,200	76,300	77,800	70,300
	45-55	# Participants	164	153	175	290	739	1,521
		Average Salary	62,600	65,200	72,000	75,600	77,800	73,800
	55-65	# Participants	168	77	77	75	399	796
		Average Salary	61,200	64,100	68,100	73,900	74,200	69,900
	> 65	# Participants	4	3	1	2	3	13
		Average Salary	47,000	52,100	47,000	57,600	53,900	51,400
	Totals	# Participants	901	691	519	623	1,342	4,076
		Average Salary	52,700	60,600	69,000	74,600	76,700	67,400
		Avg Age	45.2					
		Avg Svc	15.4					
		Avg Salary	67,400					

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 <u>less</u> 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 for active members and terminated vested members
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

2006 2007 2008 2009

Participant Summary

1. Active Participants				
(a) count	49	52	60	50
(b) average age	53.1	53.1	52.0	50.0
(c) average service	18.2	18.2	19.1	17.0
(d) average future working lifetime	6.3	6.3	6.3	8.8
(e) average earnings (prior year)	315,000	325,000	350,000	350,000
2. Deferred Vested Participants				
(a) count	-	-	-	-
3. Pensioners (incl beneficiaries)				
(a) count	15	17	20	30
(b) average age	70.4	70.1	69.3	66.1
(c) average annual benefit	13,100	14,000	15,000	16,000

Valuation Results (numbers in \$000's) *

1. Reconciliation of funded status at valuation date:				
(a) Accrued Benefit Obligation	(33,762)	(42,444)	(51,793)	(50,525)
(b) Fair Value of Assets	-	-	-	-
(c) Funded Status: (a) + (b)	(33,762)	(42,444)	(51,793)	(50,525)
2. Service Cost	1,074	1,340	1,597	1,280
3. Benefit Payments	197	238	300	480
4. Actuarial Basis				
(a) Discount rate	5.50%	5.00%	5.25%	7.50%
(b) Salary scale	3.50%	3.50%	3.50%	3.50%
(c) CPI	3.00%	3.00%	3.00%	3.00%
(d) All other assumptions	Same as the Salaried Plan			

* 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 2005 \$80 per month times years of service for terminations/ retirements during 2006 and 2007 \$85 per month times years of service for terminations/ retirements during 2008 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 for actives and terminated vested members
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 Going Concern Actuarial Valuation Results

	2006	2007	2008	2009
Participant Summary - January 1				
<i>Active Participants</i>				
(a) count	6,253	6,321	6,395	6,225
(b) average age	46.5	46.3	46.0	46.1
(c) average service	17.4	17.2	17.0	17.3
(d) average future working lifetime	10.6	10.8	10.8	10.8
(e) average plan earnings (prior year)	39,800	39,600	39,400	39,700
<i>Deferred Vested Participants</i>				
(a) count	-	-	-	-
<i>Pensioners (incl beneficiaries)</i>				
(a) count	1,060	1,081	1,120	1,135
(b) average age	72.8	71.8	70.0	68.0
(c) average annual benefit	10,800	11,200	12,200	13,400

Plan Assets (numbers in \$000's) *

<i>Change in Plan Assets during Prior Year:</i>				
Market Value of Assets at January 1 of prior year	444,857	504,928	605,648	621,714
Employer Contributions during prior year	34,400	42,000	39,234	46,369
Benefit Payments during prior year	(12,000)	(15,000)	(17,000)	(17,000)
Expenses during prior year	-	-	-	-
Investment return during prior year	37,670	73,720	(6,168)	(111,370)
Market Value of Assets at January 1 of current year	504,928	605,648	621,714	539,714
Rate of return during prior year	8%	14%	-1%	-18%
<i>Average Portfolio Mix During Prior Year:</i>				
(a) Domestic Large Cap Equities	30%	30%	32%	30%
(b) Domestic Small Cap Equities	21%	27%	25%	10%
(c) Domestic Fixed Income	36%	27%	23%	35%
(d) International Equities	9%	11%	15%	20%
(e) Real Estate	2%	3%	3%	0%
(f) Cash	2%	2%	2%	5%
(g) Total	100%	100%	100%	100%
<i>Asset Class Returns during Prior Year:</i>				
(a) Domestic Large Cap Equities	13%	23%	-3%	-30%
(b) Domestic Small Cap Equities	7%	18%	-2%	-45%
(c) Domestic Fixed Income	3%	4%	4%	8%
(d) International Equities	17%	10%	-5%	-35%
(e) Real Estate	12%	8%	5%	5%
(f) Cash	2%	2%	3%	3%

* numbers may not add due to rounding

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

	2006	2007	2008	2009
Going Concern Valuation - January 1 (numbers in \$000's) *				
1. Actuarial Accrued Liability:				
<i>Active Multiplier</i>	\$ 80	\$ 80	\$ 85	\$ 85
(a) Active participants	507,668	548,941	616,046	576,316
(b) Deferred vested participants	-	-	-	-
(c) Pensioners	117,914	124,704	140,739	159,695
(d) Total	<u>625,582</u>	<u>673,645</u>	<u>756,785</u>	<u>736,011</u>
2. Actuarial Value of Assets	504,928	605,648	621,714	539,714
3. Unfunded Actuarial Accrued Liability: (1d)-(2)	120,655	67,997	135,071	196,297
4. Normal Cost (beg. Of year)	29,176	31,915	36,238	33,313
5. Change in Unfunded AAL during prior year:				
(a) Unfunded AAL at prior valuation date	88,534	120,655	67,997	135,071
(b) Adjustment for Interest	5,976	7,843	4,420	8,780
(c) Normal Cost w/interest less contributions	(8,709)	(12,292)	(6,519)	(9,283)
(d) (Gain)/Loss on investment	(6,886)	(40,023)	46,257	152,736
(e) (Gain)/Loss on termination	(10,400)	(6,000)	(8,000)	(36,000)
(f) (Gain)/Loss on salary increases less than expected	-	-	-	-
(g) (Gain)/Loss on mortality	(1,900)	(1,900)	(3,900)	(28,000)
(h) (Gain)/Loss on retirement	(550)	(400)	(600)	(26,000)
(i) (Gain)/Loss on assumption changes	23,400	-	-	-
(j) (Gain)/Loss on expenses	-	-	-	-
(k) (Gain)/Loss on all other factors	(539)	114	(822)	(1,007)
(l) Change in active benefit multiplier	31,729	-	36,238	-
(m) Unfunded AAL at current valuation date	<u>120,655</u>	<u>67,997</u>	<u>135,071</u>	<u>196,297</u>
6. Actuarial Basis				
(a) Interest	6.50%	6.50%	6.50%	6.50%
(b) Salary scale	N/A	N/A	N/A	N/A
(c) Consumer Price Index	3.00%	3.00%	3.00%	3.00%
(d) Mortality	GAM 1983	GAM 1983	GAM 1983	GAM 1983
(e) Turnover		Based on NOC experience for 1986-1988		
(f) Retirement age		Age 62, with the appropriate early retirement reduction, if any		
(g) Proportion married and age difference		80% married, husbands 3 years older than wives		
(h) Expenses		Assume all expenses paid by company		
(i) Post-retirement indexing		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
Solvency Valuation Results

2009

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

1. Actuarial Accrued Liability:	
(a) Active participants	676,192
(b) Deferred vested participants	-
(c) Pensioners	205,322
(d) Total	<u>881,514</u>
2. Market Value of Assets	539,714
3. Solvency Deficiency: (1d)-(2)	341,800
4. Actuarial Basis	
(a) Interest - Benefit paid by lump sum	4% for 10 years 5% thereafter
(a) Interest - Benefit settled by annuity purchase	5%
(c) Asset Valuation Method	Market value of assets
(d) Actuarial Cost Method	unit credit

* numbers may not add due to rounding

**National Oil Full-Time Hourly Union Pension Plan
Reconciliation of Plan Participants (2006 - 2009)**

	<u>Active</u>	<u>Pensioners/ Beneficiaries</u>	<u>Total</u>
1. 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
2. Participants as of January 1, 2007	6,321	1,081	7,402
- New Entrants/Rehires	220	-	220
- Terminated Nonvested	(50)	-	(50)
- Terminated Vested (Lump Sum Cashout)	(50)	-	(50)
- Retirement	(40)	40	-
- Death w/ Beneficiary	(6)	6	-
- Death w/o Beneficiary	-	(7)	(7)
- Net change	74	39	113
3. Participants as of January 1, 2008	6,395	1,120	7,515
- New Entrants/Rehires	50	-	50
- Terminated Nonvested	(50)	-	(50)
- Terminated Vested (Lump Sum Cashout)	(120)	-	(120)
- Retirement	(50)	50	-
- Death w/ Beneficiary	-	-	-
- Death w/o Beneficiary	-	(35)	(35)
- Net change	(170)	15	(155)
4. Participants as of January 1, 2009	6,225	1,135	7,360

**National Oil Full-Time Hourly Union Pension Plan
Age/Svc/Earnings as of January 1, 2009**

		Service (Years)						
		< 5	5-10	10-15	15-20	>20	Totals	
Age (Years)	< 25	# Participants	200	139	-	-	-	339
		Average Salary	25,500	31,300	-	-	-	27,900
	25-35	# Participants	256	105	91	62	-	514
		Average Salary	26,800	31,800	37,800	38,300	-	31,200
	35-45	# Participants	215	330	320	659	441	1,965
		Average Salary	27,000	32,200	39,400	44,300	46,600	40,100
	45-55	# Participants	120	160	315	688	895	2,178
		Average Salary	25,000	32,200	38,600	43,000	46,800	42,100
	55-65	# Participants	95	62	91	180	779	1,207
		Average Salary	24,500	28,700	36,400	39,900	46,400	42,000
	> 65	# Participants	7	6	5	3	1	22
		Average Salary	20,600	21,600	25,700	24,600	25,100	22,800
	Totals	# Participants	893	802	822	1,592	2,116	6,225
		Average Salary	26,000	31,600	38,500	43,000	46,600	39,700
		Avg Age	46.1					
		Avg Svc	17.3					
		Avg Salary	39,700					

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

2006 2007 2008 2009

Participant Summary

(a) number participating during prior year	6,250	6,500	7,000	6,800
(b) average age	30.9	28.9	29.2	30.8
(c) average base pay	26,000.00	29,000.00	30,000.00	31,000.00

Plan Assets (numbers in \$000's) *

<i>Change in Plan Assets during Prior Year:</i>				
Market Value of Assets at January 1 of prior year	57,871	67,779	75,248	79,166
Employee Contributions during prior year	4,875	5,655	6,300	6,324
Company Contributions during prior year	2,438	2,828	3,150	3,162
Benefit Payments during prior year	(5,625)	(5,850)	(6,300)	(6,120)
Expenses during prior year	-	-	-	-
Investment return during prior year	8,220	4,837	768	(16,170)
Market Value of Assets at January 1 of current year	67,779	75,248	79,166	66,362
Rate of return during prior year	14%	7%	1%	-20%

* numbers may not add due to rounding

National Oil Full-Time Salaried and Union Retiree Health Benefit Program

Eligibility	Immediate
Earliest Retirement Age	55 and 10 years of service
Retirement benefit	Retirees and their spouses may elect to participate in a self insured health plan, with 100% the of cost of the plan paid by the employer.
Death benefit	Coverage continues for the life of the spouse after death of an eligible employee
Benefits Covered	\$0 deductible; \$0 copay No lifetime maximum Office visits Hospital visits Surgery Prescription drugs

Retiree Health and Welfare Program
Historical Valuation Results

2006 2007 2008 2009

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

1. Reconciliation of funded status at valuation date:				
(a) Accrued Benefit Obligation				
(i) actives	(734,147)	(835,331)	(842,433)	(670,434)
(ii) retirees	(511,869)	(538,528)	(594,208)	(514,368)
(iii) total	(1,246,016)	(1,373,859)	(1,436,641)	(1,184,802)
(b) Market Value of Assets	0	0	0	0
(c) Surplus: (a) + (b)	(1,246,016)	(1,373,859)	(1,436,641)	(1,184,802)
2. Service Cost (beg. of year)	45,884	52,208	52,652	41,902
3. Benefit Payments	22,000	27,000	30,000	30,000
4. Actuarial Basis				
(a) Discount rate	5.50%	5.00%	5.25%	7.50%
(b) Return on assets	N/A	N/A	N/A	N/A
(c) Medical trend				
Initial rate	5.50%	6.00%	7.00%	10.00%
Annual decrease	0.50%	0.50%	0.50%	1.00%
Ultimate rate	4.50%	4.50%	4.50%	5.00%
Year ultimate trend rate reached	2008	2010	2013	2014
(d) CPI	3.00%	3.00%	3.00%	3.00%
(e) Per capita claims cost	8,800	9,500	10,500	12,000
(f) Retirement assumption	Age 62 with 10 years of service			
(g) All other demographic assumptions	Same as those used for pension plans			

* 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****
AFTERNOON SESSION

7. (8 points) You are the actuary for a company that sponsors a non-contributory defined benefit plan for its employees. You are given:

Defined Benefit Plan Provisions:

Normal Retirement Age:	Age 65
Normal Form of Payment:	Life annuity, payable monthly in advance
Normal Retirement Benefit:	1.5% of final salary times years of service
Other Ancillary Benefits:	None

Actuarial Assumptions and Methods:

Retirement Age:	Age 65
Discount Rate:	6% per year
Annual Salary Increases:	3% per year
Pre-Retirement Decrements:	None
Actuarial Cost Method:	Entry age normal

Annuity Factors:

$\ddot{a}_{55}^{(12)}$	=	13.6
$\ddot{a}_{60}^{(12)}$	=	12.2
$\ddot{a}_{62}^{(12)}$	=	12.0
$\ddot{a}_{65}^{(12)}$	=	11.8

Funding Policy:

Normal cost plus amortization of unfunded accrued liability over 10 years.

Participant Data as at January 1, 2009:

Employee	Age	Salary	Service
A	30	\$20,000	5
B	60	\$80,000	25

7. (Continued)

Financial Information:

Plan assets as at January 1, 2009: \$150,000

- (a) Determine the 2009 employer contribution.
- (b) Redetermine the 2009 employer contribution assuming the attained age normal method is adopted effective January 1, 2009.

Show all work.

- 8.** (7 points) You are the actuary for a global company that would like to establish retirement programs for all of its employees. Describe the fundamental issues in structuring international retirement arrangements.

<p>Question 9 pertains to the Case Study.</p>
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- 9.** (12 points) You are the actuary to the National Oil Company (NOC) Full-Time Salaried Pension Plan. NOC wants to eliminate the defined benefit past service liability and is currently looking at two options with respect to active members' past service benefits:
- (a) Conversion of past service benefits under the defined benefit plan to some type of defined contribution arrangement; or
 - (b) Termination/wind-up of the defined benefit provision for the active members.

Compare and contrast the above options.

10. (8 points)

- (a) Describe the following types of hedge fund investment strategies:
 - (i) Equity Market Neutral
 - (ii) Convertible Arbitrage
 - (iii) Distressed Securities
 - (iv) Global Macro
- (b) Describe the features which distinguish the different types of hedge fund indices.

Question 11 pertains to the Case Study.
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11. (10 points) You are performing a valuation of the National Oil Company's (NOC) Full-Time Salaried Pension Plan as at January 1, 2010 and are reviewing the going concern assumptions.

- (a) Describe how you would establish the following assumptions:
 - (i) Discount rate
 - (ii) Salary scale
- (b) Describe issues you would consider when establishing a mortality assumption.
- (c) There have been significant increases in the number of disabled pensioners in the plan. Describe the considerations in introducing a disability retirement assumption.

12. (6 points) Several automakers are facing financial difficulty and are considering the creation of a multiemployer pension plan effective January 1, 2009 for future service for their unionized employees.

Explain how multiemployer pension plan designs and features can help mitigate future financial difficulty.

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13. (9 points) You are the actuary for a company that sponsors a non-contributory defined benefit pension plan. You are given:

Plan Provisions:

Normal Retirement Benefit:	\$50 per month per year of service
Normal Retirement Age:	Age 65
Early Retirement Age:	Age 55
Early Retirement Reduction:	4% per year before age 62
Normal Form of Payment:	Life only, payable monthly in advance
Optional Forms of Payment:	(i) Joint and survivor 60% (ii) Lump sum payment of commuted value All optional forms of pension are actuarial equivalent to the normal form
Actuarial Equivalence Basis:	Committed value basis as of the retirement date
Annual Indexation:	50% of CPI

Annuity Factors:

Interest Rate (per year)	$\ddot{a}_{58}^{(12)}$	$\ddot{a}_{55}^{(12)}$	$\ddot{a}_{58:55}^{(12)}$
2.50% for first 10 years, 3.60% thereafter	17.4	19.6	15.8
3.80% for first 10 years, 5.80% thereafter	14.6	16.1	13.5
3.10% for first 10 years, 4.70% thereafter	15.9	17.7	14.6
3.20% for the first 10 years, 4.80% thereafter	15.8	17.5	14.5

Annualized Bank of Canada Bond Yields:

7-year Government of Canada benchmark bond yield (V122542)	Long-term Government of Canada benchmark bond yield (V122544)	Long-term real-return Government of Canada bond yield (V122553)
2.86%	4.23%	2.35%

13. (Continued)

Maximum Transfer Value Factors:

Age	Factor
55	10.4
56	10.6
57	10.8
58	11.0
59	11.3
60	11.5
61	11.7
62	12.0
63	12.2
64	12.4
65	12.4

Participant Data as at July 1, 2009:

Age: 58
Spouse Age: 55
Service: 25 years

The member retires at July 1, 2009. Calculate and describe the benefits payable under the normal form and each optional form of payment.

Show all work.

****END OF EXAMINATION****
Afternoon Session