

EDUCATION AND EXAMINATION COMMITTEE

OF THE

SOCIETY OF ACTUARIES

DESIGN AND PRICING—(DP)

RETIREMENT BENEFITS STUDY NOTE

RETIREMENT BENEFITS CASE STUDY—CANADA

REVISED IN 2007

This case study will be used as a basis for 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 the 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.

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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

2003 2004 2005 2006 2007

Participant Summary - January 1

<i>Active Participants</i>					
(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
<i>Deferred Vested Participants</i>					
(a) count	-	-	-	-	-
<i>Pensioners (incl beneficiaries)</i>					
(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) *

<i>Change in Plan Assets during Prior Year:</i>					
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%
<i>Average Portfolio Mix During Prior Year:</i>					
(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%
<i>Asset Class Returns during Prior Year:</i>					
(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

2003 2004 2005 2006 2007

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

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)**

	<u>Active</u>	<u>Pensioners/ Beneficiaries</u>	<u>Total</u>
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**

Age (Years)	# Participants	Average Salary	Service (Years)					Totals
			< 5	5-10	10-15	15-20	>20	
< 25	150	35,900	140	-	-	-	290	
25-35	200	47,100	160	100	55	-	515	
35-45	195	59,400	208	186	211	201	1,001	
45-55	184	62,600	163	195	310	755	1,607	
55-65	168	61,200	77	87	81	431	844	
> 65	4	47,000	5	10	6	4	29	
Totals	901	53,700	753	578	663	1,391	4,286	
	Avg Age		60,200	67,100	74,600	76,600	67,300	
	Avg Svc	45.5						
	Avg Salary	15.4						
		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 <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
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

2004 2005 2006 2007

Participant Summary

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) *

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

	2003	2004	2005	2006	2007
Participant Summary - January 1					
<i>Active Participants</i>					
(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
<i>Deferred Vested Participants</i>					
(a) count	-	-	-	-	-
<i>Pensioners (incl beneficiaries)</i>					
(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) *

<i>Change in Plan Assets during Prior Year:</i>					
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%
<i>Average Portfolio Mix During Prior Year</i>					
(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%
<i>Asset Class Returns during Prior Year:</i>					
(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

2003 2004 2005 2006 2007

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

	\$ 75	\$ 75	\$ 75	\$ 80	\$ 80
1 Actuarial Accrued Liability:					
Active Multiplier					
(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)**

	<u>Active</u>	<u>Pensioners/ Beneficiaries</u>	<u>Total</u>
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**

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

2003 2004 2005 2006 2007

Participant Summary

(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) *

<i>Change in Plan Assets during Prior Year:</i>					
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