



Case Study

FALL 2016

Funding & Regulation Exam–Canada
EXAM RETFRC

RETFRC Afternoon

Case Study - Course FR 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 reporting to work 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.

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 retirement programs, all registered in Ontario:

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; and
3. a defined contribution (DC) RPP for its part-time workforce.

Extracts of Retirement Benefits Provisions and Financial Information

National Oil Full-Time Salaried Pension Plan

Eligibility	Immediate
Vesting	Immediate, effective July 1, 2012
Normal Retirement Age	65
Early Retirement Age	55
Best Average Earnings	Average annual earnings during 60 consecutive months in which earnings were highest
Earnings	Base pay, excluding overtime and bonuses
Normal Retirement Benefit	2% of best average earnings times years of service, subject to legislative 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 participants and actuarial equivalent for terminated participants
Form of Benefit	If with spouse, 60% joint & survivor benefit, without reduction. If without spouse, single life annuity
Optional Forms of Benefit	None
Indexing	None
Termination Benefit	(1) Lump sum value equal to actuarial present value of accrued pension payable at age 65; or (2) Deferred pension
Pre-Retirement Death Benefit	Lump sum value equal to actuarial present value of accrued pension payable at age 65 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
Reconciliation of Plan Participants (2013 - 2016)**

	<u>Active</u>	<u>Pensioners/ Beneficiaries</u>	<u>Total</u>
1. Participants as of January 1, 2013	4,032	851	4,883
- New Entrants/Rehires	150	-	150
- Terminated (Lump Sum Cashout)	(100)	-	(100)
- Retirement	(50)	50	-
- Death w/ Beneficiary	(5)	5	-
- Death w/o Beneficiary	-	(14)	(14)
- Net change	(5)	41	36
2. Participants as of January 1, 2014	4,027	892	4,919
- New Entrants/Rehires	140	-	140
- Terminated (Lump Sum Cashout)	(90)	-	(90)
- Retirement	(60)	60	-
- Death w/ Beneficiary	(3)	3	-
- Death w/o Beneficiary	(2)	(22)	(24)
- Net change	(15)	41	26
3 Participants as of January 1, 2015	4,012	933	4,945
- New Entrants/Rehires	-	-	-
- Terminated (Lump Sum Cashout)	(170)	-	(170)
- Retirement	(120)	120	-
- Death w/ Beneficiary	(2)	2	-
- Death w/o Beneficiary	(3)	(20)	(23)
- Net change	(295)	102	(193)
4 Participants as of January 1, 2016	3,717	1,035	4,752

National Oil Full-Time Salaried Pension Plan
Age/Svc/Earnings as of January 1, 2016

		Service (Years)					Totals	
		< 5	5-10	10-15	15-20	>20		
Age (Years)	< 25	# Participants	110	80	-	-	-	190
		Average Salary	37,800	49,000	-	-	-	42,500
	25-35	# Participants	260	120	70	10	-	460
		Average Salary	48,900	60,600	69,000	71,500	-	55,500
	35-45	# Participants	170	170	180	190	90	800
		Average Salary	62,100	70,500	77,800	84,000	85,100	75,200
	45-55	# Participants	130	160	150	300	640	1,380
		Average Salary	67,300	68,900	78,300	82,000	83,000	79,200
	55-65	# Participants	130	110	100	110	430	880
		Average Salary	65,100	70,100	75,000	81,100	83,000	77,600
	> 65	# Participants	2	4	1	-	-	7
		Average Salary	59,000	64,000	69,000	-	-	63,300
	Totals	# Participants	802	644	501	610	1,160	3,717
		Average Salary	55,800	65,500	76,100	82,300	83,200	73,100

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

	2013	2014	2015	2016
Participant Summary - January 1				
<i>Active Participants</i>				
(a) count	4,032	4,027	4,012	3,717
(b) average age	46.0	45.9	46.2	46.4
(c) average service	14.7	14.7	14.8	15.2
(d) average future working lifetime	11.0	12.0	12.0	12.0
(e) average plan earnings (prior year)	69,500	71,600	72,500	73,100
<i>Deferred Vested Participants</i>				
(a) count	-	-	-	-
<i>Pensioners (incl beneficiaries)</i>				
(a) count	851	892	933	1,035
(b) average age	67.7	68.0	68.6	68.7
(c) average annual benefit	22,800	23,100	25,500	26,500

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	832,957	968,997	1,188,326	1,310,572
Employer Contributions during prior year	100,000	120,000	60,000	93,000
Benefit Payments during prior year	(22,200)	(22,400)	(29,700)	(75,500)
Expenses during prior year	-	-	-	-
Investment return during prior year	58,240	121,729	91,946	8,971
Market Value of Assets at January 1 of current year	968,997	1,188,326	1,310,572	1,337,043
Rate of return during prior year	6.7%	12.0%	7.6%	0.7%
<i>Average Portfolio Mix During Prior Year:</i>				
(a) Domestic Large Cap Equities	32%	32%	32%	32%
(b) Domestic Small Cap Equities	8%	8%	8%	8%
(c) Domestic Fixed Income	40%	40%	40%	40%
(d) International Equities	16%	16%	16%	16%
(e) Real Estate	0%	0%	0%	0%
(f) Cash	4%	4%	4%	4%
(g) Total	100%	100%	100%	100%
<i>Asset Class Returns during Prior Year:</i>				
(a) Domestic Large Cap Equities	7%	13%	11%	-8%
(b) Domestic Small Cap Equities	7%	38%	-2%	-13%
(c) Domestic Fixed Income	4%	-1%	9%	3%
(d) International Equities	14%	32%	4%	19%
(e) Real Estate	8%	8%	10%	-5%
(f) Cash	1%	1%	1%	1%

* numbers may not add due to rounding

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

	2013	2014	2015	2016	2016 Interest Rate Sensitivity
Going Concern Valuation - January 1 (numbers in \$000's) *					
1. Actuarial Accrued Liability:					
(a) Active participants	915,409	861,242	946,339	901,675	1,171,318
(b) Deferred vested participants	-	-	-	-	-
(c) Pensioners	252,236	261,334	320,281	376,701	412,785
(d) Total	1,167,645	1,122,576	1,266,620	1,278,377	1,584,102
2. Actuarial Value of Assets	968,997	1,188,326	1,310,572	1,337,043	1,337,043
3. Unfunded Actuarial Accrued Liability: (1d)-(2)	198,648	(65,750)	(43,951)	(58,666)	247,059
4. Normal Cost (beg. Of year)	62,273	58,588	63,942	59,321	79,143
5. Change in Unfunded AAL during prior year:					
(a) Unfunded AAL at prior valuation date	152,104	198,648	(65,750)	(43,951)	
(b) Adjustment for Interest	9,126	10,926	(3,781)	(2,527)	
(c) Normal Cost w/interest less contributions	(49,576)	(57,602)	232	(28,055)	
(d) (Gain)/Loss on investment	(5,929)	(65,750)	(22,746)	66,890	
(e) (Gain)/Loss on termination	5,000	3,000	(5,300)	2,700	
(f) (Gain)/Loss on salary increases less than expected	(14,000)	(7,000)	(19,200)	(25,000)	
(g) (Gain)/Loss on mortality	(3,000)	(2,000)	2,400	(1,500)	
(h) (Gain)/Loss on retirement	4,000	(4,000)	(8,900)	(9,700)	
(i) (Gain)/Loss on assumption changes	104,000	(141,100)	80,039	(16,700)	
(j) (Gain)/Loss on expenses	-	-	-	-	
(k) (Gain)/Loss on all other factors	(3,078)	(872)	(945)	(822)	
(l) Unfunded AAL at current valuation date	198,648	(65,750)	(43,951)	(58,666)	
6. Actuarial Basis					
(a) Interest	5.50%	5.75%	5.75%	5.50%	4.50%
(b) Salary scale	4.00%	3.50%	3.50%	3.00%	3.00%
(c) Consumer Price Index	2.50%	2.50%	2.50%	2.00%	2.00%
(d) Mortality	1994 Uninsured Pensioner Mortality - Generational	1994 Uninsured Pensioner Mortality - Generational	CPM 2014 Private - Generational with scale CPM B		
(e) Turnover	Based on NOC experience for 1996-2006				
(f) Retirement age	Age 62				
(g) Proportion married and age difference	80% married; male spouses are 3 years older				
(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

	2014	2015	2016	2016 Interest Rate Sensitivity
Solvency Valuation - January 1 (numbers in \$000's) *				
1. Actuarial Accrued Liability:				
(a) Active participants	814,809	1,030,369	1,023,974	1,270,356
(b) Deferred vested participants	-	-	-	-
(c) Pensioners	308,133	410,458	446,193	497,145
(d) Total	1,122,942	1,440,827	1,470,167	1,767,501
2. Market Value of Assets	1,188,326	1,310,572	1,337,043	1,310,572
3. Solvency Deficiency: (1d)-(2)	(65,384)	130,255	133,124	456,929
4. Actuarial Basis				
(a) Interest - Benefit paid by lump sum	3.1% per year for 10 years 4.6% per year thereafter	2.4% per year for 10 years 3.7% per year thereafter	1.9% per year for 10 years 3.6% per year thereafter	0.9% per year for 10 years 2.6% per year thereafter
(a) Interest - Benefit settled by annuity purchase	3.9%	2.6%	3.1%	2.1%
(b) Mortality	UP 1994 - Generational	UP 1994 - Generational	CPM2014 Combined - Generational with Scale CPM-B	
(c) Retirement age	The age that produces the largest value			
(d) Proportion married and age difference	80% married; male spouses are 3 years older			
(e) Asset Valuation Method	Market value of assets			
(f) Actuarial Cost Method	Unit Credit			

* numbers may not add due to rounding

National Oil Full-Time Hourly Union Pension Plan

Eligibility	Immediate
Vesting	Immediate, effective July 1, 2012
Normal Retirement Age	65
Early Retirement Age	55
Normal Retirement Benefit	\$80 per month times all years of service for terminations/retirements after 2004
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 active participants and actuarial equivalent for terminated participants
Form of Benefit	With a spouse, 60% joint & survivor benefit without reduction Without a spouse, single life annuity.
Optional Forms of Benefit	None
Bridge Benefit	\$20 per month times all years of service for retirements after 2014. The bridge benefit is payable starting from the latest of age 55 and 85 points and ceasing at age 65
Post-Retirement Indexing	Lesser of 1% or CPI each year after pension commencement
Termination Benefit	(1) Lump sum value equal to actuarial present value of accrued pension payable at age 65; or (2) Deferred pension
Pre-Retirement Death Benefit	Lump sum value equal to actuarial present value of accrued pension payable at age 65 to named beneficiary
Disability Benefit	None

**National Oil Full-Time Hourly Union Pension Plan
Reconciliation of Plan Participants (2013 - 2016)**

	<u>Active</u>	<u>Pensioners/ Beneficiaries</u>	<u>Total</u>
1. Participants as of January 1, 2013	6,300	1,190	7,490
- New Entrants/Rehires	300	-	300
- Terminated Vested (Lump Sum Cashout)	(200)	-	(200)
- Retirement	(80)	80	-
- Death w/ Beneficiary	(5)	5	-
- Death w/o Beneficiary	-	(50)	(50)
- Net change	15	35	50
2. Participants as of January 1, 2014	6,315	1,225	7,540
- New Entrants/Rehires	250	-	250
- Terminated Vested (Lump Sum Cashout)	(175)	-	(175)
- Retirement	(90)	90	-
- Death w/ Beneficiary	(10)	10	-
- Death w/o Beneficiary	-	(45)	(45)
- Net change	(25)	55	30
3. Participants as of January 1, 2015	6,290	1,280	7,570
- New Entrants/Rehires	-	-	-
- Terminated Vested (Lump Sum Cashout)	(250)	-	(250)
- Retirement	(140)	140	-
- Death w/ Beneficiary	(5)	5	-
- Death w/o Beneficiary	-	(45)	(45)
- Net change	(395)	100	(295)
4. Participants as of January 1, 2016	5,895	1,380	7,275

National Oil Full-Time Hourly Union Pension Plan
Age/Svc/Earnings as of January 1, 2016

		Service (Years)					Totals	
		< 5	5-10	10-15	15-20	>20		
Age (Years)	< 25	# Participants	150	60	-	-	-	210
		Average Salary	42,900	48,500	-	-	-	44,500
	25-35	# Participants	270	100	80	5	-	455
		Average Salary	44,300	49,800	54,400	57,600	-	47,400
	35-45	# Participants	210	330	330	550	390	1,810
		Average Salary	53,300	50,400	57,900	60,200	60,900	57,300
	45-55	# Participants	130	170	310	555	990	2,155
		Average Salary	53,200	53,600	60,700	61,500	62,600	60,800
	55-65	# Participants	25	80	100	260	790	1,255
		Average Salary	52,800	54,900	62,800	63,700	66,300	64,500
	> 65	# Participants	1	7	2	-	-	10
		Average Salary	54,500	56,800	65,000	-	-	58,200
	Totals	# Participants	786	747	822	1,370	2,170	5,895
		Average Salary	48,200	51,400	59,200	61,400	63,600	58,900

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

	2013	2014	2015	2016
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Participant Summary - January 1

<i>Active Participants</i>				
(a) count	6,300	6,315	6,290	5,895
(b) average age	46.3	46.2	46.8	47.0
(c) average service	16.6	16.6	17.0	17.7
(d) average future working lifetime	10.7	10.9	10.9	11.0
(e) average plan earnings (prior year)	56,500	57,900	58,500	58,900
<i>Deferred Vested Participants</i>				
(a) count	-	-	-	-
<i>Pensioners (incl beneficiaries)</i>				
(a) count	1,190	1,225	1,280	1,380
(b) average age	67.8	68.2	68.8	68.7
(c) average annual benefit	14,200	14,300	14,900	15,200
(d) total annual bridge benefit	n/a	n/a	n/a	30,240

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	693,567	817,919	995,757	1,149,697
Employer Contributions during prior year	95,000	95,000	100,000	160,000
Benefit Payments during prior year	(19,500)	(19,500)	(25,000)	(65,000)
Expenses during prior year	-	-	-	-
Investment return during prior year	48,852	102,338	78,941	8,141
Market Value of Assets at January 1 of current year	817,919	995,757	1,149,697	1,252,838
Rate of return during prior year	6.7%	12.0%	7.6%	0.7%
<i>Average Portfolio Mix During Prior Year:</i>				
(a) Domestic Large Cap Equities	32%	32%	32%	32%
(b) Domestic Small Cap Equities	8%	8%	8%	8%
(c) Domestic Fixed Income	40%	40%	40%	40%
(d) International Equities	16%	16%	16%	16%
(e) Real Estate	0%	0%	0%	0%
(f) Cash	4%	4%	4%	4%
(g) Total	100%	100%	100%	100%
<i>Asset Class Returns during Prior Year:</i>				
(a) Domestic Large Cap Equities	7%	13%	11%	-8%
(b) Domestic Small Cap Equities	7%	38%	-2%	-13%
(c) Domestic Fixed Income	4%	-1%	9%	3%
(d) International Equities	14%	32%	4%	19%
(e) Real Estate	8%	8%	10%	-5%
(f) Cash	1%	1%	1%	1%

* numbers may not add due to rounding

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

2013 2014 2015 2016

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

**2016
Interest Rate
Sensitivity**

1. Actuarial Accrued Liability:										
Active Multiplier	\$	80	\$	80	\$	80	\$	80	\$	80
(a) Active participants		688,339		730,256		859,362		938,043		1,175,234
(b) Deferred vested participants		-		-		-		-		-
(c) Pensioners		221,364		233,282		269,585		302,577		331,555
(d) Total		909,703		963,538		1,128,947		1,240,620		1,506,789
2. Actuarial Value of Assets										
		817,919		995,757		1,149,697		1,252,838		1,252,838
3. Unfunded Actuarial Accrued Liability: (1d)-(2)										
		91,784		(32,218)		(20,751)		(12,219)		253,951
4. Normal Cost (beg. Of year)										
		41,466		43,991		50,551		52,997		66,397
5. Change in Unfunded AAL during prior year:										
(a) Unfunded AAL at prior valuation date		75,235		91,784		(32,218)		(20,751)		
(b) Adjustment for Interest		4,514		5,048		(1,853)		(1,193)		
(c) Normal Cost w/interest less contributions		(61,579)		(53,866)		(59,025)		(111,143)		
(d) (Gain)/Loss on investment		(4,973)		(55,276)		(19,529)		60,698		
(e) (Gain)/Loss on termination		7,000		(6,000)		900		3,000		
(f) (Gain)/Loss on plan amendment		-		-		31,542		-		
(g) (Gain)/Loss on mortality		(9,000)		(5,000)		(3,200)		(2,900)		
(h) (Gain)/Loss on retirement		(6,000)		(9,000)		(7,300)		1,700		
(i) (Gain)/Loss on assumption changes		80,000		500		69,416		59,022		
(j) (Gain)/Loss on expenses		-		-		-		-		
(k) (Gain)/Loss on all other factors		6,587		(409)		515		(652)		
(l) Change in active benefit multiplier		-		-		-		-		
(m) Unfunded AAL at current valuation date		91,784		(32,218)		(20,751)		(12,219)		
6. Actuarial Basis										
(a) Interest		5.50%		5.75%		5.75%		5.50%		4.50%
(b) Salary scale		N/A		N/A		N/A		N/A		N/A
(c) Consumer Price Index		2.50%		2.50%		2.50%		2.00%		2.00%
		1994 Uninsured								
		Pensioner		CPM 2014 Private		CPM 2014 Private		CPM 2014 Private		
(d) Mortality		Mortality -		- Generational		- Generational		- Generational		
(e) Turnover		GAM 1994				with scale CPM B		with scale CPM B		
(f) Retirement age		Based on NOC experience for 1996 - 2006								
(g) Proportion married and age difference		Age 62, with the appropriate early retirement reduction, if any								
(h) Expenses		80% married; male spouses are 3 years older								
(i) Post-retirement indexing		Assume all expenses paid by company								
(j) Asset Valuation Method		1%								
(k) Actuarial Cost Method		Market value of assets								
		Unit credit								

* numbers may not add due to rounding

National Oil Full-Time Hourly Union Pension Plan
Solvency Valuation Results

	2014	2015	2016	2016 Interest Rate Sensitivity
Solvency Valuation - January 1 (numbers in \$000's) *				
1. Actuarial Accrued Liability:				
(a) Active participants	942,512	1,281,243	1,385,136	1,721,425
(b) Deferred vested participants	-	-	-	-
(c) Pensioners	253,923	323,957	381,769	423,757
(d) Total	1,196,435	1,605,200	1,766,905	2,145,182
2. Market Value of Assets	995,757	1,149,697	1,252,838	1,252,838
3. Solvency Deficiency: (1d)-(2)	200,678	455,502	514,066	892,344
4. Actuarial Basis				
(a) Interest - Benefit paid by lump sum	3.1% per year for 10 years 4.6% per year thereafter	2.4% per year for 10 years 3.7% per year thereafter	1.9% per year for 10 years 3.6% per year thereafter	0.9% per year for 10 years 2.6% per year thereafter
(a) Interest - Benefit settled by annuity purchase	3.9%	2.6%	3.1%	2.1%
(b) Mortality	UP 1994 - Generational	UP 1994 - Generational	CPM2014 Combined - Generational with Scale CPM-B	
(c) Retirement age	The age that produces the largest value			
(d) Proportion married and age difference	80% married; male spouses are 3 years older			
(e) Asset Valuation Method	Market value of assets			
(f) Actuarial Cost Method	Unit Credit			

* numbers may not add due to rounding

National Oil Part-Time DC Pension Plan

Eligibility	Immediate
Vesting	Immediate, effective July 1, 2012
Employer Contributions - Base	3% of base pay
Employer Contributions - Match	100% on the first 3% and 50% thereafter
Employee Contributions	Up to 6% 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.
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

2013 2014 2015 2016

Participant Summary

(a) number participating during prior year	7,100	7,200	7,300	7,100
(b) average age	31.4	31.0	31.6	31.2
(c) average base pay	31,900	32,000	32,300	32,200

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	137,575	160,752	189,569	216,083
Employee Contributions during prior year	9,060	9,216	9,432	9,145
Company Contributions during prior year	14,722	14,976	15,326	14,860
Benefit Payments during prior year	(7,881)	(8,849)	(10,059)	(11,044)
Expenses during prior year	-	-	-	-
Investment return during prior year	7,276	13,474	11,815	4,451
Market Value of Assets at January 1 of current year	<u>160,752</u>	<u>189,569</u>	<u>216,083</u>	<u>233,495</u>
Rate of return during prior year	5%	8%	6%	2%

** numbers may not add due to rounding*