

SPRING 2013

EXAM DP-RU

**Design and Pricing
Retirement Benefits
U.S.**

CASE STUDY

DP-RU

Case Study - Course DP Retirement - US

National Oil Company - Background

National Oil Company (NOC) is a large well-established company that services oil wells all over the United States (US). 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 US. Although NOC is the largest player in the industry within US, 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.

United States 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) qualified plan for its full-time salaried employees;
2. a flat dollar DB qualified plan for its full-time hourly union staff;
3. a defined contribution (DC) qualified plan for its part-time workforce; and
4. a non-qualified pension plan (referred to as the SERP) for its executives that is supplemental to the salaried qualified plan. 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 5 years of plan membership
Normal Retirement Age	65
Early Retirement Age	55 with 5 years of plan membership
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 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 active participants and actuarial equivalent for terminated vested 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
Historical Actuarial Valuation Results

2009 2010 2011 2012

Participant Summary - January 1

<i>Active Participants</i>				
(a) count	4,286	4,251	4,076	4,046
(b) average age	45.5	45.4	45.2	45.1
(c) average service	15.4	15.3	15.4	15.0
(d) average future working lifetime	11.0	11.0	11.0	11.0
(e) average plan earnings (prior year)	65,000	68,300	67,400	68,000
<i>Deferred Vested Participants</i>				
(a) count	-	-	-	-
<i>Pensioners (incl beneficiaries)</i>				
(a) count	695	720	773	821
(b) average age	69.8	68.2	68.0	67.0
(c) average annual benefit	20,100	21,800	22,000	22,500

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	756,844	602,863	633,966	748,481
Employer Contributions during prior year	40,000	92,000	92,000	99,000
Benefit Payments during prior year	(20,500)	(21,000)	(21,000)	(22,000)
Expenses during prior year	-	-	-	-
Investment return during prior year	(173,480)	(39,898)	43,515	7,476
Market Value of Assets at January 1 of current year	602,863	633,966	748,481	832,957
Rate of return during prior year	-23%	-6%	6.5%	1.0%
<i>Average Portfolio Mix During Prior Year:</i>				
(a) Domestic Large Cap Equities	30%	32%	30%	30%
(b) Domestic Small Cap Equities	27%	25%	10%	10%
(c) Domestic Fixed Income	27%	23%	35%	40%
(d) International Equities	11%	15%	20%	15%
(e) Real Estate	3%	3%	0%	0%
(f) Cash	2%	2%	5%	5%
(g) Total	100%	100%	100%	100%
<i>Asset Class Returns during Prior Year:</i>				
(a) Domestic Large Cap Equities	-30%	-12%	12%	-9%
(b) Domestic Small Cap Equities	-45%	-5%	5%	-5%
(c) Domestic Fixed Income	8%	1%	1%	14%
(d) International Equities	-35%	-10%	10%	-10%
(e) Real Estate	5%	3%	3%	3%
(f) Cash	3%	1%	1%	1%

* numbers may not add due to rounding

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

2009 2010 2011 2012

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

1. Actuarial Accrued Liability:				
(a) Active participants	748,857	692,620	776,554	756,002
(b) Deferred vested participants	-	-	-	-
(c) Pensioners	163,443	185,213	210,874	229,059
(d) Total	912,300	877,833	987,429	985,061
2. Actuarial Value of Assets				
	602,863	633,966	748,481	832,957
3. Unfunded Actuarial Accrued Liability: (1d)-(2)				
	309,436	243,867	238,948	152,104
4. Normal Cost (beg. Of year)				
	48,627	45,269	50,426	50,400
5. Change in Unfunded AAL during prior year:				
(a) Unfunded AAL at prior valuation date	133,918	309,436	243,867	238,948
(b) Adjustment for Interest	8,705	20,113	15,851	14,337
(c) Normal Cost w/interest less contributions	10,373	(43,202)	(46,778)	(48,519)
(d) (Gain)/Loss on investment	223,309	81,391	-	39,743
(e) (Gain)/Loss on termination	(14,000)	(17,000)	(20,000)	(25,000)
(f) (Gain)/Loss on salary increases less than expected	(50,000)	(100,000)	(25,000)	(30,000)
(g) (Gain)/Loss on mortality	(6,800)	(6,900)	2,000	2,000
(h) (Gain)/Loss on retirement	50,000	25,000	23,000	(5,000)
(i) (Gain)/Loss on assumption changes	-	20,000	40,000	-
(j) (Gain)/Loss on expenses	-	-	-	-
(k) (Gain)/Loss on all other factors	(46,068)	(44,972)	6,007	(34,404)
(l) Unfunded AAL at current valuation date	309,436	243,867	238,948	152,104
6. Actuarial Basis				
(a) Interest	6.50%	6.50%	6.00%	6.00%
(b) Salary scale	4.50%	4.00%	4.00%	4.00%
(c) Consumer Price Index	3.00%	2.50%	2.50%	2.50%
		1994 Uninsured Pensioner Mortality -	1994 Uninsured Pensioner Mortality -	1994 Uninsured Pensioner Mortality -
(d) Mortality	UP 1994 AA15	Generational	Generational	Generational
(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
Reconciliation of Plan Participants (2009 - 2012)**

	<u>Active</u>	<u>Pensioners/ Beneficiaries</u>	<u>Total</u>
1. Participants as of January 1, 2009	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)
2. Participants as of January 1, 2010	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)
3. Participants as of January 1, 2011	4,076	773	4,849
- New Entrants/Rehires	250	-	250
- Terminated Nonvested	(100)	-	(100)
- Terminated Vested (Lump Sum Cashout)	(130)	-	(130)
- Retirement	(45)	45	-
- Death w/ Beneficiary	(5)	5	-
- Death w/o Beneficiary	-	(2)	(2)
- Net change	(30)	48	18
4. Participants as of January 1, 2012	4,046	821	4,867

**National Oil Full-Time Salaried Pension Plan
Age/Svc/Earnings as of January 1, 2012**

Age (Years)	# Participants	Average Salary	Service (Years)					Totals
			<5	5-10	10-15	15-20	>20	
< 25	200	36,500	90	-	-	-	-	290
25-35	260	48,100	120	80	55	-	-	515
35-45	205	60,400	178	166	191	201	941	941
45-55	184	63,500	143	165	285	739	1,516	1,516
55-65	193	63,200	77	67	70	369	776	776
> 65	4	48,200	2	1	-	1	8	8
Totals	1,046	53,800	610	479	601	1,310	4,046	4,046
			62,000	71,000	75,700	77,600	68,000	68,000
	Avg Age	45.1						
	Avg Svc	15.0						
	Avg Salary	68,000						

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

Eligibility	Immediate
Normal Retirement Age	65
Early Retirement Age	55 with 5 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 participants
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

2009 2010 2011 2012

Participant Summary

1. Active Participants				
(a) count	52	60	60	60
(b) average age	53.1	52.0	50.0	51.0
(c) average service	18.2	19.1	17.0	18.0
(d) average future working lifetime	6.3	6.3	8.8	8.8
(e) average earnings (prior year)	325,000	350,000	350,000	350,000
2. Deferred Vested Participants				
(a) count	-	-	-	-
3. Pensioners (incl beneficiaries)				
(a) count	30	30	30	30
(b) average age	66.0	66.0	66.1	67.1
(c) average annual benefit	22,000	22,000	22,000	22,000

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

1. Reconciliation of funded status at valuation date:				
(a) Accrued Benefit Obligation	(50,223)	(66,249)	(80,454)	(91,110)
(b) Fair Value of Assets	-	-	-	-
(c) Funded Status: (a) + (b)	(50,223)	(66,249)	(80,454)	(91,110)
2. Service Cost	1,508	1,841	1,791	2,041
3. Benefit Payments	660	660	660	660
4. Actuarial Basis				
(a) Discount rate	7.50%	6.50%	5.50%	5.00%
(b) Salary scale	3.50%	3.50%	3.50%	3.50%
(c) CPI	3.00%	2.50%	2.50%	2.50%
(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 10 years of plan membership
Normal Retirement Age	65
Early Retirement Age	55 with 10 years of service
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 actives participants and actuarial equivalent for terminated vested participants
Form of Benefit	With a spouse, 60% joint & survivor benefit without reduction Without a spouse, single life annuity.
Optional Forms of Benefit	Level Income Option, Lump Sum Option, and 75% Joint & Survivor Option
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
Historical Actuarial Valuation Results

2009 2010 2011 2012

Participant Summary - January 1

<i>Active Participants</i>				
(a) count	6,321	6,395	6,225	6,285
(b) average age	46.0	46.1	46.1	45.8
(c) average service	17.0	17.3	17.3	16.8
(d) average future working lifetime	10.8	10.8	10.8	11.0
(e) average plan earnings (prior year)	49,500	51,000	53,100	54,300
<i>Deferred Vested Participants</i>				
(a) count	-	-	-	-
<i>Pensioners (incl beneficiaries)</i>				
(a) count	1,081	1,120	1,135	1,150
(b) average age	70.0	68.0	68.0	67.0
(c) average annual benefit	12,200	13,400	13,400	13,600

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	471,638	432,988	488,942	606,421
Employer Contributions during prior year	100,000	100,000	100,000	100,000
Benefit Payments during prior year	(15,000)	(17,000)	(17,000)	(19,000)
Expenses during prior year	-	-	-	-
Investment return during prior year	(123,650)	(27,046)	34,479	6,146
Market Value of Assets at January 1 of current year	432,988	488,942	606,421	693,567
Rate of return during prior year	-24%	-6%	6.5%	1.0%
<i>Average Portfolio Mix During Prior Year:</i>				
(a) Domestic Large Cap Equities	32%	30%	30%	30%
(b) Domestic Small Cap Equities	25%	10%	10%	10%
(c) Domestic Fixed Income	23%	35%	35%	40%
(d) International Equities	15%	20%	20%	15%
(e) Real Estate	3%	0%	0%	0%
(f) Cash	2%	5%	5%	5%
(g) Total	100%	100%	100%	100%
<i>Asset Class Returns during Prior Year:</i>				
(a) Domestic Large Cap Equities	-30%	-12%	12%	-9%
(b) Domestic Small Cap Equities	-45%	-5%	5%	-5%
(c) Domestic Fixed Income	8%	1%	1%	14%
(d) International Equities	-35%	-10%	10%	-10%
(e) Real Estate	5%	3%	3%	3%
(f) Cash	3%	1%	1%	1%

* numbers may not add due to rounding

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

2009 2010 2011 2012

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

	\$	80	\$	80	\$	80	\$	80
1. Actuarial Accrued Liability:								
Active Multiplier								
(a) Active participants		496,187		543,526		587,192		574,865
(b) Deferred vested participants		-		-		-		-
(c) Pensioners		146,389		172,592		182,508		193,936
(d) Total		<u>642,576</u>		<u>716,118</u>		<u>769,700</u>		<u>768,801</u>
2. Actuarial Value of Assets		432,988		488,942		606,421		693,567
3. Unfunded Actuarial Accrued Liability: (1d)-(2)		209,588		227,176		163,279		75,235
4. Normal Cost (beg. Of year)		29,187		31,418		33,942		34,218
5. Change in Unfunded AAL during prior year:								
(a) Unfunded AAL at prior valuation date		88,853		209,588		227,176		163,279
(b) Adjustment for Interest		5,775		13,623		14,766		9,797
(c) Normal Cost w/interest less contributions		(75,896)		(72,165)		(69,790)		(67,022)
(d) (Gain)/Loss on investment		157,069		57,888		-		32,670
(e) (Gain)/Loss on termination		(6,000)		(8,000)		12,000		8,000
(f) (Gain)/Loss on salary increases less than expected		-		-		-		-
(g) (Gain)/Loss on mortality		(1,900)		(3,900)		(28,000)		(21,000)
(h) (Gain)/Loss on retirement		(400)		(600)		(26,000)		(26,000)
(i) (Gain)/Loss on assumption changes		-		-		33,000		-
(j) (Gain)/Loss on expenses		-		-		-		-
(k) (Gain)/Loss on all other factors		42,087		30,742		127		(24,489)
(l) Change in active benefit multiplier		-		-		-		-
(m) Unfunded AAL at current valuation date		<u>209,588</u>		<u>227,176</u>		<u>163,279</u>		<u>75,235</u>
6. Actuarial Basis								
(a) Interest		6.50%		6.50%		6.00%		6.00%
(b) Salary scale		N/A		N/A		N/A		N/A
(c) Consumer Price Index		3.00%		2.50%		2.50%		2.50%
(d) Mortality		GAM 1994		GAM 1994		GAM 1994		GAM 1994
(e) Turnover		Based on NOC experience for 1996-2006						
(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%						
(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 (2009 - 2012)**

	<u>Active</u>	<u>Pensioners/ Beneficiaries</u>	<u>Total</u>
1. Participants as of January 1, 2009	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
2. Participants as of January 1, 2010	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)
3. Participants as of January 1, 2011	6,225	1,135	7,360
- New Entrants/Rehires	300	-	300
- Terminated Nonvested	(50)	-	(50)
- Terminated Vested (Lump Sum Cashout)	(130)	-	(130)
- Retirement	(60)	50	(10)
- Death w/ Beneficiary	-	-	-
- Death w/o Beneficiary	-	(35)	(35)
- Net change	60	15	75
4. Participants as of January 1, 2012	6,285	1,150	7,435

**National Oil Full-Time Hourly Union Pension Plan
Age/Svc/Earnings as of January 1, 2012**

Age (Years)	# Participants	Average Salary	Service (Years)					Totals
			< 5	5-10	10-15	15-20	>20	
< 25	240	41,000	109	-	-	-	-	349
25-35	336	45,200	95	91	62	-	-	584
35-45	265	51,000	320	300	649	441	56,900	1,975
45-55	170	51,000	150	305	678	885	57,800	2,188
55-65	115	50,000	62	86	170	744	59,800	1,177
> 65	7	52,000	4	1	-	-	-	12
Totals	1,133	47,100	740	783	1,559	2,070	58,300	6,285
	Avg Age		47,300	55,500	56,800	58,300		54,300
	Avg Svc	45.8						
	Avg Salary	16.8						
		54,300						

National Oil Part-Time DC Pension Plan

Eligibility	Immediate
Vesting	Immediate
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 out 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

2009 2010 2011 2012

Participant Summary

(a) number participating during prior year	6,500	7,000	6,800	7,200
(b) average age	28.9	29.2	30.8	31.0
(c) average base pay	29,000.00	30,000.00	31,000	31,000

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	73,760	71,556	96,044	119,341
Employee Contributions during prior year	7,540	8,400	8,432	8,928
Company Contributions during prior year	12,253	13,650	13,702	14,508
Benefit Payments during prior year	(5,850)	(6,300)	(6,120)	(6,480)
Expenses during prior year	-	-	-	-
Investment return during prior year	(16,146)	8,737	7,284	1,278
Market Value of Assets at January 1 of current year	71,556	96,044	119,341	137,575
Rate of return during prior year	-20%	11%	7%	1%

** 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% of cost paid by the employer
Death benefit	Coverage continues for the life of the spouse after death of an eligible employee
Benefits Covered - Pre 65	\$0 deductible; \$0 copay No lifetime maximum Office visits Hospital visits Surgery Prescription drugs
Benefits Covered - Post 65	\$0 deductible; \$0 copay No lifetime maximum Office visits Hospital visits Surgery Prescription drugs Government Benefits carve out

**Retiree Health and Welfare Program
Historical Valuation Results**

	2009	2010	2011	2012
Valuation Results - January 1 (numbers in \$000's) *				
1. Reconciliation of funded status at valuation date:				
(a) Accrued Benefit Obligation				
(i) actives	-858,653	-1,396,669	-1,929,494	-2,460,040
(ii) retirees	-585,386	-719,754	-923,781	-1,185,274
(iii) total	-1,444,039	-2,116,424	-2,853,275	-3,645,314
(b) Market Value of Assets	0	0	0	0
(c) Surplus: (a) + (b)	-1,444,039	-2,116,424	-2,853,275	-3,645,314
2. Service Cost (beg. of year)	53,666	87,292	148,423	189,234
3. Benefit Payments	30,000	32,000	40,000	40,000
4. Actuarial Basis				
(a) Discount rate	7.50%	6.50%	5.50%	5.00%
(b) Return on assets	N/A	N/A	N/A	N/A
(c) Medical trend				
Initial rate	7.00%	10.00%	10.00%	10.00%
Annual decrease	0.50%	0.50%	0.50%	0.50%
Ultimate rate	4.50%	5.00%	5.00%	5.00%
Year ultimate trend rate reached	2014	2020	2020	2020
(d) CPI	3.00%	2.50%	2.50%	2.50%
(e) Per capita claims cost	10,500	12,000	12,000	13,200
(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