

November 2002
Society of Actuaries

****BEGINNING OF EXAMINATION 8****
COMPREHENSIVE SEGMENT
MORNING SESSION

All Questions pertain to the Case Study

- 1.** (9 points) NOC and its union have negotiated the following changes to NOC's Full-Time Hourly Union Pension Plan:

Vesting	100% immediate vesting
Early Retirement Age	50 with 10 years of service
Normal Retirement Benefit	\$80 per month times years of service for terminations/retirements during 2003 and beyond.
Early Retirement Benefit	Unreduced benefit at age 62 with 30 years of service, otherwise reduced by 0.4% per month that early retirement precedes Normal Retirement Age.
Disability Benefit	Continued benefit accrual until participant commences disability retirement benefit. Disabled participants can receive their unreduced accrued Normal Retirement Benefit at any age.

(a) Describe issues associated with the design and introduction of this disability benefit.

(b) Describe the effect of these plan changes on the funding and expense actuarial valuations and their results.

All Questions pertain to the Case Study

- 2.** (8 points) NOC is acquiring SmallSub, a subsidiary of LargeCo. NOC is purchasing the assets of SmallSub. Employees of SmallSub will be offered employment with NOC after the sale.

The employees of SmallSub participate in a DB ERP, sponsored by LargeCo, with a benefit of 3% of best average earnings times years of service with SmallSub. All other provisions mirror NOC's Full-Time Salaried Pension Plan.

There are two options being proposed for pension benefits for employees transferring from SmallSub.

Option 1

All SmallSub employees hired by NOC join NOC's Full-Time Salaried Pension Plan. Their past service benefits remain with the SmallSub pension plan.

Option 2

NOC would become the plan sponsor of the existing SmallSub pension plan. The benefit formula would be amended to the greater of:

- the frozen accrued benefit on the date of sale, or
- 2% of best average earnings times years of service with SmallSub and NOC.

- (a) Evaluate Option 1 and Option 2 from the perspective of NOC.
- (b) Evaluate Option 1 and Option 2 from the perspective of the transferring SmallSub employees.

All Questions pertain to the Case Study
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3. (7 points) NOC is considering improving the early retirement benefit for the Full-Time Salaried Pension Plan.

The early retirement benefit after January 1, 2003 would be the greater of:

- (i) Accrued Benefit reduced by 0.25% per month that early retirement precedes age 62, or
- (ii) Accrued Benefit reduced by 0.25% per month that early retirement precedes 90 points (age plus service).

The following is a projected age/service table as at January 1, 2003 for the Full-Time Salaried Pension Plan provided to you by NOC.

Age (Years)		Service (Years)					Totals
		< 5	5-10	10-15	15-20	> 20	
< 25	# Participants	185	70	–	–	–	255
	Average Salary	29,800	43,000	–	–	–	33,424
25-35	# Participants	217	165	80	9	3	474
	Average Salary	43,400	53,700	59,000	61,600	55,000	50,037
35-45	# Participants	250	229	523	375	115	1,490
	Average Salary	55,000	62,000	64,500	71,300	72,000	69,396
45-55	# Participants	175	140	125	400	650	1,490
	Average Salary	58,700	62,000	65,900	71,900	73,000	69,396
55-65	# Participants	75	99	74	90	347	685
	Average Salary	54,800	63,100	63,400	69,700	70,200	66,687
> 65	# Participants	4	6	9	7	10	36
	Average Salary	45,100	48,100	44,200	54,000	49,800	48,411
Totals	# Participants	906	709	811	881	1,125	4,432
	Average Salary	47,730	58,228	63,848	71,172	71,780	63,124
	Average Age	44.6					
	Average Service	14.7					
	Average Salary	63,124					

3. (CONTINUED)

- (a) Assess the reasonableness of using this age/service table.
- (b) Using the table from NOC, evaluate the effect of the proposed improvement on the plan's funding results.

All Questions Pertain to the Case Study

- 4.** (10 points) Belair is introducing a public employees' pension plan to cover its firefighters and teachers.
- (a) Describe the factors that should be considered in establishing the funding policy for a public employees' pension plan.
 - (b) Describe the significant differences in the selection and review of actuarial assumptions for the valuation of public employees' versus private pension plans.
 - (c) Recommend design features for the plan to attract and meet the needs of
 - (i) firefighters, and
 - (ii) teachers.
 - (d) Belair's population is aging dramatically. Describe the particular design features to be considered for the public employees' pension plan.

All Questions pertain to the Case Study

- 5.** (12 points) Retiree medical premiums are expected to increase by 25% this year. The CEO of NOC is proposing to drop retiree medical coverage and increase pension benefits to replace the lost medical benefits.
- (a) Describe the effect of the CEO's proposal on pension expense and funding.
 - (b) Describe alternative retirement plan design options that could meet the CEO's objective.
 - (c) Calculate the 2002 expense for the retiree medical plan if coverage is eliminated for some of the active participants causing the active APBO and service cost to decrease by 60%.

Show all work.
 - (d) Evaluate other cost containment alternatives for NOC's retiree medical plan.

All Questions pertain to the Case Study
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- 6.** (14 points) NOC has declared bankruptcy. As a result, the government of Belair has imposed the termination of each of NOC's Eligible Retirement Plans (ERPs) effective January 1, 2002.

You are given the following information as at January 1, 2002:

	NOC Full-Time Salaried Pension Plan	NOC Full-Time Hourly Union Pension Plan
Total plan termination liabilities (000's)	\$450,000	\$480,000
• Active members	\$380,000	\$375,000
• Inactive members	\$70,000	\$105,000
Liability duration (years)		
• Active members	12	15
• Inactive members	5	8

You are given:

- Plan termination liabilities have been determined based on benefits accrued to January 1, 2002.
- Plan termination liabilities have been valued using the annuity purchase rate at January 1, 2002 of 6.25% per annum.
- Active members' termination entitlements will be paid on December 31, 2002. The amount paid will be the plan termination liability as at January 1, 2002 updated with interest at 6.25% per annum to the date of payment.
- Inactive members will receive an annuity purchased on December 31, 2002 from an insurance company on their behalf.

6. (CONTINUED)

- (a) *(4 points)* Assess the effect that the bankruptcy of NOC will have on the benefits provided to members of each of NOC's retirement plans.
- (b) *(3 points)* Formulate an investment strategy for the NOC Full-Time Salaried Pension Plan and the NOC Full-Time Hourly Union Pension Plan for 2002. Contrast this to the current investment strategy.
- (c) *(7 points)* Assuming that annuity purchase rates drop to 5.75% at December 31, 2002 and assets return 9% during 2002, calculate the 2002 expense and accounting disclosure for each of NOC's terminated ERPs.

Show all work.

****END OF EXAMINATION****
MORNING SESSION

****BEGINNING OF EXAMINATION 8****
AFTERNOON SESSION
Beginning With Question 7

All Questions pertain to the Case Study

- 7.** (12 points) Belair has just adopted a new Social Security Retirement System. Companies are allowed a one-time election to participate in the system or opt out. Companies that opt out are required to provide a mandatory minimum retirement benefit.

Social Security Retirement System Provisions

- Retirement benefits are payable at age 65.
- The retirement benefit is 0.5% of a worker's best 5-year average covered earnings times years of covered service, indexed for post retirement cost of living increases.
- Covered earnings are limited to \$50,000 per year, indexed for cost of living increases.
- A year of covered service is credited for each year in which a contribution is paid, to a maximum of 40 years.
- Covered Service commences on January 1, 2002.
- The system is funded by employer contributions of 4% of covered earnings matched by equal employee contributions.
- The contributions are tax deductible to the employer and the employee.

Minimum opt out benefit

- (i) a DC ERP with employer contributions equal to 6% of earnings up to the covered earnings limit, or
- (ii) a DB ERP paying at least 0.8% of best 5-year average earnings up to the covered earning limit times years of service after January 1, 2002, payable at age 65.

7. (CONTINUED)

- (a) Explain the issues NOC needs to consider in deciding whether to opt in or out of the Social Security Retirement System.
- (b) Evaluate NOC's ERPs with respect to opting in or out of the Social Security Retirement System and make a recommendation. Justify your response.

All Questions pertain to the Case Study
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- 8.** (11 points) NOC is converting its SRP to a DC ERP for future service effective December 31, 2001. SRP benefits are determined at the executive's retirement date, using earnings at that time, but service accrued to December 31, 2001.
- (a) What factors should NOC consider in determining an appropriate DC contribution formula?
 - (b) Evaluate this change from both the executives' and NOC's point of view.
 - (c) Analyze the effect of this change on 2001 and 2002 expense.
 - (d) NOC executives are offered the opportunity on January 1, 2002 to take their accrued SRP benefit as a lump sum cash payment. Calculate the effect on the 2002 expense given the following:

	Accepted	Declined	Total
Number	21	21	42
Average age	48.9	53.1	51.0
Average future working lifetime (years)	8.5	6.5	7.5
Average earnings (2001)	\$260,000	\$330,000	\$295,000
Projected benefits obligation prior to distribution	\$6,597,000	\$12,187,000	\$18,784,000
Lump sum distributions	\$5,867,000	\$0	\$5,867,000

All Questions pertain to the Case Study

9. (7 points) You are employed by Big Bank and are the actuary for NOC. The investment arm of Big Bank sends a proposal to NOC's CEO offering a bundled package of services if the pension assets are moved to Big Bank. The bundled services include better financing terms for NOC and a reduction in actuarial service fees.

- (a) Calculate the 2001 risk adjusted rate of return for each of NOC's retirement funds, given:

$$b = 0.9$$

$$R_f = 0.04$$

$$R_m = 0.03$$

Show all work.

- (b) Describe how a Statement of Investment Policy can help the CEO evaluate investment manager performance.
- (c) Describe the CEO's obligations to the plans and to NOC.
- (d) Describe your professional obligations to the plans and to NOC.

****END OF EXAMINATION****
AFTERNOON SESSION