

**November, 2001- Course 8R
Society of Actuaries**

****BEGINNING OF EXAMINATION**
MORNING SESSION**

Questions 1 – 6 pertain to the Case Study
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- 1.** (7 points) NOC's cash requirements have increased considerably in 2001.

The CFO proposed to make, on June 30, 2001 a surplus withdrawal from the pension fund of the National Oil Full-Time Salaried Pension Plan equal to the expected growth of the surplus during 2001.

The CFO's model for determining the surplus withdrawal is:

- Surplus withdrawal = [Expected Surplus @ 1/1/2002] minus [Surplus @ 1/1/2001]
- Expected Surplus @ 1/1/2002 = [Expected Assets @ 1/1/2002] less [Expected Liability @ 1/1/2002]
- Expected Assets @ 1/1/2002 = [Assets @ 1/1/2001] * [1 + expected return on the fund]
- Expected Liability @ 1/1/2002 = [Liability @ 1/1/2001] * [1 + discount rate used to determine the liability]
- The liability to be used is the projected benefit obligation determined under the expense valuation

The investment managers provided the CFO with an expected return on the fund of 8.83%.

- (a) Explain and calculate the effect of the CFO's proposal on the 2001 pension expense, and year-end balance sheet liability. Treat the surplus withdrawal as a negative contribution. Show all work.
- (b) Critique the model proposed by the CFO.

Questions 1 – 6 pertain to the Case Study
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- 2.** (11 points) NOC wants to introduce post-retirement indexing for participants in the National Oil Full-Time Salaried Pension Plan. NOC is looking for a provision that is relatively easy to administer and allows NOC to control cost in periods of high inflation.

You are given:

Participants	Years of Service	Average Years to Vesting	Projected Benefit Obligation (PBO) as at 1/1/2001	Increase in PBO for 1% per year indexing after retirement
Active	0 to 3	4	\$1,236,151	\$75,000
Active	3 to 5	1	8,000,000	550,000
Active	5 or more	-	446,500,000	31,000,000
Deferred vested	-	-	0	0
Pensioners	-	-	95,541,600	6,100,000
Total			\$551,277,751	\$37,725,000

The service cost increases by 7% for each 1% per year indexing after retirement.

- (a) Evaluate alternative approaches for indexing the National Oil Full-Time Salaried Pension Plan.
- (b) Describe how the plan's asset allocation should change if NOC adopts automatic indexation.
- (c) Describe how NOC's actuarial assumptions may change if NOC adopts automatic indexation.
- (d) Explain and calculate the effect on the 2001 pension expense of providing automatic indexation equal to 100% of CPI. Use the current actuarial assumptions.

Show all work.

Questions 1 – 6 pertain to the Case Study

- 3.** *(14 points)* Belair has introduced a mandatory social insurance program called "BelairCare". It provides a monthly retirement benefit payable at age 70 equal to \$20 per month times years of full-time employment over the worker's entire career. The \$20 is indexed annually by the percentage increase in the national average wage. It also provides all citizens age 70 or over with benefits equal to 50% of all covered medical expenses.

BelairCare is funded by a 6% employer plus a 6% employee payroll tax.

- (a) Describe the actuarial assumptions you would need to do a cash-flow projection for BelairCare.
- (b) Evaluate the BelairCare design from the perspective of the covered workers.
- (c) Given that NOC's Full-Time Salaried and Union Retiree Health Benefit Program provides benefits equal to 75% of all covered medical expenses, after a \$100 deductible, evaluate alternative approaches for integrating these benefits with BelairCare.

Questions 1 – 6 pertain to the Case Study

- 4.** (11 points) The Board of Directors of NOC has decided to force the current CEO to take early retirement on January 1, 2001. The Board will provide an enhanced pension benefit to the departing CEO.

Information on the current CEO as of January 1, 2001:

Age:	57
Service:	20 years
Average future working lifetime:	4.1 years
SRP Service Cost:	\$ 70,000
SRP PBO before departure:	\$1,225,000
SRP PBO after departure (before enhancement):	\$ 970,000
SRP PBO after departure (after enhancement):	\$1,235,000

The Board has decided to bring in a new CEO from the outside. The prospective CEO, age 45, has been participating for the last 20 years in retirement plans which are similar to those at NOC.

- (a) Determine the effect of the CEO's retirement on NOC's balance sheet and expense.
- (b) Describe the issues that NOC should consider in designing the new CEO's retirement package.
- (c) Describe ways to fund these benefits and their tax implications.

Questions 1 – 6 pertain to the Case Study

- 5.** (10 points) NOC's salaried employees are requesting a DC ERP in addition to the existing DB ERP.

NOC's CFO is considering the following for a new salaried employees' DC ERP:

- employer contribution rate of 3% of salary,
 - all other design features are the same as NOC's Part-Time DC Pension Plan, and
 - the plan will supplement the existing Full-Time Salaried Pension plan.
- (a) Explain the issues associated with supplementing an existing DB ERP with a DC ERP. Propose alternatives where appropriate.
- (b) Critique the design features in the proposed DC ERP. Recommend any changes. Justify your recommendations.
- (c) Identify the differences in fiduciary responsibilities in selecting investments for a DC ERP versus a DB ERP.

Questions 1 – 6 pertain to the Case Study

- 6.** (7 points) NOC's union employees hired an actuary to review the funded status of the National Oil Full-Time Hourly Union Pension Plan. In the actuary's opinion, the funding recommendation should be determined on a termination basis. On this basis, the plan is underfunded by \$150 million.

Assume that actuarial standards in Belair are consistent with those in the U.S. and Canada.

- (a) Explain the differences between the deficit on a termination basis and that shown in the January 1, 2001 funding valuation.
- (b) Describe the long-term consequences of funding the National Oil Full-Time Hourly Union Pension Plan on a termination basis.

****END OF EXAMINATION****
Morning Session

****BEGINNING OF EXAMINATION****
AFTERNOON SESSION
Beginning with Question 7

Questions 7 –10 pertain to the Case Study
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- 7.** (7 points) After a recent economic decline, NOC's CFO has stated that he would like a 95% assurance that the National Oil Full-Time Salaried Pension Plan will maintain a surplus on an expense basis in the short term.

You are given:

- The expense discount rate will be increased to 7.5% on December 31, 2001
- Benefit payments will remain level from 2000
- Active employees' service cost has a duration of 14
- The duration for the total Pension Benefit Obligation (PBO) is 10
- No contributions are to be made during 2001

Using the PBO as your liability measure:

- (a) (1 point) Calculate the Plan's Funding Ratio Return (FRR) for 2000.
- (b) (2 points) Estimate the expected funded status of the Plan at the end of 2001 assuming the return on assets is zero.
- (c) (4 points) Given the CFO's objective, evaluate the following asset allocations using the concept of FRR:
- 100% bond and 0% equity
 - 50% bond and 50% equity
 - 0% bond and 100% equity

Questions 7 –10 pertain to the Case Study

- 8.** *(7 points)* The government of Belair intends to change the tax status of ERPs and PPAs in order to increase tax revenue, without discouraging retirement savings in general.

Comment on the government's objectives and propose ways in which Belair's rules could be changed or clarified to meet these objectives.

- 9.** *(10 points)* NOC's union is proposing to freeze the NOC Full-Time Hourly Union Pension Plan and start participation in the multiemployer plan maintained for the members of the Oil Workers Union (OWU). The OWU Plan has a surplus on a going concern basis but a deficit on a termination basis.

- (a) *(7 points)* Analyze the risks and benefits for NOC if they accept the Union's proposal. Include both financial and operational considerations.
- (b) *(3 points)* Describe the additional considerations if the existing NOC Hourly Union Pension Plan were merged into the OWU plan.

Questions 7 –10 pertain to the Case Study

- 10.** (6 points) On January 1, 2001, National Oil acquired World Oil, a large refinery in Belair. National Oil will retain all of the salaried employees of World Oil.

World Oil has a number of salaried employees that are sent abroad for temporary assignments. Some, but not all of these employees are from Belair.

World Oil's current salaried employees' retirement programs and workforce are described below.

Retirement Income Benefit

- Defined Contribution
- Eligibility: Immediate
- Vesting: Immediate
- Employer contribution: 3% of pay
- Investment option: Balanced fund
- Loans: None permitted
- Account balance paid on retirement, termination, death or disability

Reconciliation of Plan Assets from 1/1/2000 to 1/1/2001

Assets as of January 1, 2000:	\$18,789,300
Employer contributions:	2,801,200
Benefit payments:	(1,550,100)
Expenses paid by the plan:	0
Investment return:	601,200
Assets as of January 1, 2001:	<u>\$20,641,600</u>

Retiree Healthcare

- Self-insured defined benefit plan
- Retiree contributions: None
- Eligibility: Retirement at or after age 55 with at least 10 years of service
- Hospital and major medical benefits: all fees paid by plan
- Dental: Plan pays 100% of preventive care and 50% of restorative care

Retiree Life Insurance

- Fully-insured benefit
- Eligibility: Retirement at or after age 55 with at least 10 years of service
- Employer-paid benefit: \$25,000
- Optional retiree-paid benefit: \$25,000 or \$50,000

10. (CONTINUED)

Census Data

	In Belair	<u>Abroad</u>
Number of salaried employees:	2,250	150
Average age:	36	43
Average service:	11 years	7 years
Average earnings	\$41,500	\$85,000

Retired participants in the life and health plans: 750 with family coverage, 150 with single coverage

Average age: 72

National Oil has asked you to integrate the NOC and World Oil retirement programs such that all salaried employees are receiving consistent benefits.

- (a) Describe the issues in integrating these programs.
- (b) Describe the additional issues for the salaried employees working abroad.

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