Solution #1

(a) Exp. Asset 1/1/2002 = 565,609,298 × 1.0883 = 615,552,599
Exp. Liab. 1/1/2002 = 551,277,751 × 1.07 = 589,867,194
Exp. Surplus 1/1/2002 = 615,552,599 – 589,867,194 = 25,685,405
Surplus Withdrawal = 25,685,405 – 14,331,547 = 11,353,818

Revised Expense 2001:

SC:	31,214,805	No change
IC:	40,297,079	No change
EROA:	(50,291,037) + 510,924	Less assets, so EROA will decrease by 0.09 × ½ × 11,353,818
PSC:	0	No change
Amort. G/L:	(1,710,452)	No change, determined @ BOY
Revised 2001 Expense:	19,510,395 + 510,924 = 20,021,319	Increase

Accrued liability 1/1/01:	(63,096,894)	
+ Expense 2001	(20,021,319)	
– Contribution	(11,353,818)	Surplus withdrawal is negative contribution
Accrued liability 1/1/02:	(94,472,071)	

Net increase of 11,864,782. An increase in pension expense increases the accrued liability (same for a surplus withdrawal).

(b) Model is inappropriate.

Liability is underestimated because:
- Current service cost (plus interest) is not included
- Benefit payments not taken out (plus ½ year interest)
- Discount rate to be used @ year-end may change
- Gains and losses in 2001 (noise) not considered

Asset is overstated because:
- The mid-year surplus withdrawal (plus ½ year interest) is not considered
- Benefit payments not taken out
- Actual asset return may differ from expectation.

Should consider other liability measures, such as funding and/or termination basis.

Solution #2

(a) Methods of increasing post-retirement benefits:

1. Link benefits to asset values.
   - Allows retirees to participate in productivity gains
   - Retirees are now exposed to investment risk
   - Not indexing method.
2. Adjust benefit with an automatic cost of living (COLA) increase.
   - Can use consumer price index (CPI) to determine the amount of increase
   - Relatively easy to administer because the rate is published
   - The costs may be unpredictable during periods of high inflation
   - May be able to use some fraction of the increase in CPI to control costs and have a minimum increase percent so the increase is still valuable.
3. Formula escalation.
   - Increase benefit by fixed (pre-specified) amount each year.
   - Easy to administer because the increase is not tied to any index.
   - Increases are usually based on the original benefit, not the increased benefit.
   - Good for NOC because it's easy to administer and costs can be controlled.
4. Ad hoc increases in benefit amount.
   - Requires plan amendments so this method requires more administration.
   - Increases are not guaranteed.
   - Can link the increase to increase in some index since the last increase but retirees may lose out due to the time lag.
   - Can increase benefits when have funds to do so.
5. Supplementation contingent on actuarial gains.
   - Advantage is that the company can contribute when gains realized.
   - Not method of indexation.
6. Wage indexation.
   - Link retirees benefit to a wage index.
   - Allows retirees to participate in productivity gains because wages include productivity.
   - Administration would be the same as automatic COLA.
   - Cost control = similar issue with automatic COLA.
7. Recomputation
   - Not applicable here because it is not a method of indexation and usually applies to firefighters, police, and military.

Solution #2 – Continued

(b) Current mix: Equities -- Domestic large cap 35%
-- Domestic small cap 25%
-- International 9%
69%

-- Fixed income 25%
-- Real estate 3%
-- Cash 3%

- Real estate good inflation hedge, but less liquid. Perhaps increase to 5%.
- Equities also can protect against inflation, but already very high portfolio.
- Consider demographics (active average age – 44) and lack of plan maturity (i.e., retirees only ¼ of liability).
- Also consider long time investment horizon of pension fund. → Can stand some risk for higher return and since fixed income not really protection anymore due to noise (inflation) in liabilities. I would suggest shifting to 72% equities, 20% fixed income (for diversification), 5% real estate, and 3% cash.
- Could think about derivatives as hedge.
- Reduce duration of liabilities since an increase in COL + inflation will be accompanied by an increase in interest rates. Overall, effect ⇒ plan's liabilities based on larger cash flows more deeply discounted. Net effect: larger, smaller or similar value as before.
- COL increases apply to historical inflation while bond prices reflect expected inflation. Unexpected inflation can increase liabilities and decrease assets simultaneously.
- Since liabilities are less sensitive to changes in interest rates, indexing liabilities to inflation may lead to asset allocation decision that hardly differs from asset only optimization.
- Indexing increases plan liabilities which decreases surplus.
- Minimize long-term cost. Minimize short-fall risk. Produces stable contributions and expense.

In considering asset allocation, address:
- Reflect investment objectives and risk tolerance
- Type of plan (DB, DC) and design
- Nature of industry
- Demographics of workforce
- Possibility of plan termination.

- Changing plan to index benefits for retirees changes the nature of liabilities.
- Want investments that protect purchasing power.
- So in times of higher inflation, assets will increase with liabilities.
- Before, pension was fixed obligation similar to bonds → exposed to interest rate risk.

Solution #2 -- Continued

- To have less volatility, better to have some fixed income investments (bonds) to better match assets and liabilities.
- Introducing "noise" into liabilities, we will want to diversify and look for investments more correlated to inflation.
- Also, consider increasing cash flow (i.e., liquidity) needs as pension payments increase.

(c) If NOC adopts automatic post-retirement indexing, might want to add an assumption to reflect this new provision. Should cost this benefit when doing actuarial valuations and evaluating the liabilities since it could impact on the funded status and therefore, the contributions required.

If the post-retirement indexing is linked to the CPI, should review this assumption to make sure it reflects current conditions. The inflation rate will also affect the salary scale and interest rate. Use building block approach.

Make sure retirement age reflects experience and future expectations. There have been gains in previous years. This is more important now. Should also review the mortality table to make sure it is appropriate. Might want to include mortality improvements. More important to be accurate since automatic post-retirement indexing increases retirement liabilities.

NOC already has implicit assumption for inflation. Was not explicitly used in the valuation.

If indexed to wage increases:

- Indexing assumption would differ from salary increase assumptions if the indexes were based on general or industry-wide (rather than a NOC-specific) wage increase and NOC felt their pay increases wouldn't match a general or industry-wide index.
- Pay increase assumptions are for individuals; wage index considers dynamic population.

May change investment return assumptions based on revised asset allocation.

Solution #2 – Continued

(d) 100% of CPI means a 3.5% increase in benefit each year. Under IAS 19, immediately recognize prior service cost (PSC) change for retirees and vested actives. Can amortize on linear basis for non-vested actives over prior to vested status.

- Funded Status Reconciliation

	Before Change	Effect of Change	After Change
PBO	(551,277,751)	(132,037,500)	(683,315,251)
Assets	565,609,298	0	565,609,298
Funded Status	14,331,547	(132,037,500)	(117,705,953)
Unrec. Trans. Oblig.	0	0	0
Unrec. PSC	0	132,037,500*	132,037,500
Unrec. (G)	(77,428,441)	0	(77,428,441)
Prepaid/(Accrued)	(63,096,894)	0	(63,096,894)

75,000 × 3.5 =	262,500
550,000 × 3.5 =	1,925,000
31,000,000 × 3.5 =	108,500,000
6,100,000 × 3.5 =	21,350,000
	132,037,500

*Of which 1,925,000 + 108,500,000 + 21,350,000 = 131,775,000 must be recognized immediately.

	Expense (Before)	Expense (After)
SC	31,214,805 × [1+0.07(3.5)] =	38,862,432
IC	40,297,079 + 9,777,959 =	50,075,038
EROA	(50,291,037) + 0 =	(50,291,037)
Amort. PSC	0	132,840,625†
Amort. (G) IL	(1,710,452)	(745,649)††
	19,510,395	169,741,409

Δ SC = 38,862,432 – 31,214,805 =	7,647,627 × 0.07 =	535,334
Δ PBO =	132,037,500 × 0.07 =	9,242,625
	139,685,127	9,777,959

Solution #2 – Continued

Also need to have impact on different discount rate and expected return rate applied to expected benefit payments, but effect should be minimal so it won't include:

† $131{,}775{,}000 + (262{,}500)\,4) = 131{,}775{,}000 + 65{,}625 = 131{,}840{,}625$

†† $\left[(77{,}428{,}441) - 68{,}331{,}525\right] \div 12.2 = (745{,}649)$

Final effect on 2001 expense = 169,741,409 – 19,510,395 = 150,231,014 → Increase

Solution #3

(a) **Pension and Medical Coverages**

- Demographics of Employees:
  - Age
  - Service
  - Pay
  - Total population
  - Number employed
  - Sex
- Demographic assumptions
- Actives determine in-flow (contributions); Retirees determine out-flow (payments)
- Birth rates
- New entrant demographics
- Economic assumptions
  - Inflation
  - Salary scale
- Mortality – for workers and for retirees. Can improve for retirees because of BelairCare.
- Termination – Doesn't affect government plans provided employee finds a new job. Leaving workforce will impact cash flow, also assumption for returning to work.
- Immigration/Emigration
- Disability – If disabled employees are covered, higher health care costs, mortality, also incidence and recovery rates.
- Retirement – Age at retirement may impact mortality rates. Need rates for each age.
- Need assumptions about population growth/decline.

Assumptions for Medical

- Health care trend – Should be consistent with inflation
- Incurred versus paid claims
- Current costs – Age-related changes in cost after age 70
- Utilization, technical advances, epidemics, other factors
- Increases in contribution rates
- Are spouses or dependents covered? Coverage period for dependent.
- Gross versus net costs
- Leveraging – Not applicable.

- Participation – Assume everyone participates.

Solution #3 – Continued

(b) **Pension Segment**

- This will provide great help to the relatively low-paid workers because it will provide them with a much increased retirement income, but only taxing 6% of their (small) salary. They get the same benefit as everyone else, but pay less tax.
- Flat-dollar benefit, but earnings-related contributions.
- The high-paid employees will not be happy because their benefit will be small relative to the 6% they pay on such a high salary. This program seems to target a benefit amount of the minimum necessary for survival rather than a replacement ratio.
- All workers will be happy to have more inflation protection because their employer does not provide post-retirement inflation protection. Wage-related increases aren't necessary – should index to consumer prices.
- Benefit is low – only $7,200 per year if work 30 years.
- The higher paid employees will want the tax to be on capped wages.
- The younger workers pay the same amount as the older ones but they must wait longer to get the benefit.
- Normal retirement age is late, may not be the same as private plans (e.g., NOC).
- Workers may want employer plans to add a bridge benefit to the optional benefit forms so they can integrate their benefits with BelairCare.
- Employees forced to participate. The employees may get reduced raises because cost of employing them has just increased by 6%. Benefits can be reduced also. Are contributions tax-deductible?
- No death benefits, spouse benefits.
- Fully portable. Doesn't cover part-time workers.

Health Segment

- May not be well-integrated with employer plans. Employees would rather see their total costs about the same before and after age 70.
- High-paid and younger employees dislike the tax as a percentage of payroll.
- This helps out the over-70 crowd a lot, but most people want to retire before 70 so it does not work well during the first few years of employment.
- The employees will be happy that there are not restrictions on the care they can get or the doctors they can see but, in the long run, they will pay higher taxes because of this.
- It is not clear what expenses are covered. Are prescription drugs covered? Is long-term care covered?
- Socialized medicine can lead to fewer constraints on spending.
- Employers are forces to contribute to BelairCare. Effectively pushes costs to retirees who didn't have to contribute before.

Solution #3 – Continued

(c) **Alternative Integration Possibilities**

There are three different possibilities: integrate the payment of a medical expense (M) with BelairCare. In all cases, I have assumed that BelairCare would be the primary payer with the NOC plan being secondary.

- Option #1: Standard Coordination of Benefits (COB):

  Amount paid by NOC plan
  = Min (NOC formula on M, amount not paid by BelairCare)
  = Min ($0.75M - 100$, $0.5M$)
  NOC usually pays 50%.

  This generally is the most expensive form of integration and results in the ***least*** benefits payable by the member (therefore highest cost to company). Retiree is usually reimbursed for entire cost.

- Option #2: Exclusion

  Amount covered by NOC plan
  = NOC plan formula on expense ***not*** covered by BelairCare
  = $0.75M(0.5M) - 100$
  = $0.375M - 100$

  Results in higher cost to members than Option #1 (cheaper to company than Option #1).

- Option #3: Carve Out

  NOC plan pays: NOC plan formula on full amount less BelairCare
  = $0.75M - 100 - 0.5M$
  = $0.25M - 100$

  As we can see, this results in member paying the most (NOC paying the least).

Solution #3 -- Continued

Example on $1,000 Expense

	COB	Exclusion	Carve-Out
BelairCare	$ 500	$ 500	$ 500
NOC	500	275	150
Member	0	225	350
	$1,000	$1,000	$1,000

Which design is best depends on from whose perspective you look at it. In general, employees prefer COB because it costs the least. NOC may prefer carve-out because the cost to the company is the lowest.

- Can reduce NOC coverage of 50% and use standard coordination.
- Only need to do this after age 70.
- Can use different methods of coordination for different benefit types.
- NOC is paying for part of BelairCare through payroll tax.
- NOC should reduce spouse coverage over age 70 – already covered in BelairCare.

Solution #4

(a) Does the forced retirement of the CEO cause a curtailment? According to IAS 19, a curtailment occurs when a commitment is made to make a material reduction in the number of employees covered by the plan or if the plan is amended so that a material amount of future service no longer qualified for benefits or qualifies for reduced benefits. In our problem, no amendments are made and one person out of 41 participants is not a material reduction. Therefore, there is no curtailment.

The change in PBO (before the enhancement) of $255,000 ($1,225,000 – $970,000) is an actuarial gain. Since no curtailment occurs, it is not recognized immediately but becomes part of the unrecognized gain/loss. We now have an unrecognized (gain)/loss of $(243,853) – from $11,147 – $225,000.

Since the CEO is retiring before normal retirement date, with an enhanced pension, a special termination benefit occurs. The enhancement is $265,000 ($1,235,000 – $970,000) and as a special termination benefit, must be recognized immediately.

Change in expense for 2001:

- Service Cost reduces $70,000
- Interest Cost reduces $4,200
  PBO increases $10,000 in total, so $10,000 × 0.07 = $700 increase
  Interest on Service Cost = $70,000 × 0.07 = $4,900 decrease
- Still no amortization of unrecognized gain, since well within 10% corridor.

Therefore, expense for 2001 increases $190,800 ($265,000 – $70,000 – $4,200).
New 2001 expense equals $2,007,001 ($1,816,201 + $190,800)

The 2001 balance sheet started with an accrued expense of $15,724,387. For 2001, it will increase by the 2001 expense of $190,800 and decrease by benefit payments. The benefit payments shown are $126,500, so $15,724,387 + $190,800 – $126,500 = $17,604,888. There may be a further adjustment due to additional benefit payments for the retiring CEO.

Solution #4 -- Continued

(b) NOC should consider that the CEO will want benefits that are both competitive and adequate. NOC wants to provide benefits that are competitive, but also will be sensitive to the cost of the benefits.

NOC could design a CEO package that is better than the benefits other employees of NOC have. For instance, NOC might provide an unreduced retirement benefit prior to the normal retirement date because they want the CEO to leave prior to normal retirement.

The package should make up for benefits the new CEO will be losing at his prior employer when he takes this position at NOC. The new CEO probably is not vested in the Supplemental Plan at his prior employer. The new CEO will also lose due to the final average earning at his prior employer being frozen. NOC should consider granting prior employer service in the new CEO's retirement benefit, offsetting for the prior employer benefits. NOC must understand that under IAS 19, prior service benefits must be recognized under the vesting period. Therefore, the expense amounts could be high in the initial years.

Al alternative might be to design a different plan for the new CEO that makes up for lost benefits with a higher accrual rate for future years of service (such as 3% per YOS). Additional benefits could also be included in the employment agreement, instead of the SRP.

Other things to consider might be providing immediate vesting, using variable pay in the definition of earnings and providing retiree health benefits.

Solution #4 -- Continued

(c) There are no tax-effective funding alternatives in Belair, since contributions are not deductible until benefits are paid to employees. Therefore, NOC is not likely to want to fund. However, executives like to have benefits pre-funded, especially since they lose control of the company after they leave.

If NOC would like to fund, even though it will not receive tax advantages, they might consider:

- Purchasing Corporate-Owned Life Insurance: Here the company uses the cash value of the policies to fund benefits at retirement. The company would receive a deduction once the money is turned over to the employee at retirement. At the same time, the employee would be taxed.
- Company-Owned Trust: The company could set up a trust and make contributions annually to fund benefits at retirement. This trust being company-owned would be assets of the company. The company would get a deduction when money is removed from the trust and given to the employee. At the same time, the employee would be taxed.
- Trust Owned by Employees: The company makes annual contributions directly into a trust in the employee's name. The company would get a deduction (same as salary deduction) and the employee would be taxed for the income when the contributions are made.
- Spring Funding: A trust is funded when a trigger event (e.g., a change in control or bankruptcy) occurs. The funding could be made by the company (as a change in control) or a third party (as in bankruptcy). The third party could be a surety bond, a third party guarantee or a bank letter of credit. If the company funds, there would be a deduction. The employee is taxed when the account is funded.
- Buy an annuity or provide a lump sum at retirement. The company receives a deduction when annuity is purchased or lump sum given. The employee is taxed at the same time.
- Retiree health benefits could also be funded through a trust.

Solution #5

(a) DB and DC plus have relative merits that highlight the differences in philosophy between the two.

- Older employees do better under DB, younger under DC. The proposal would probably be welcomed by younger, more mobile employees, especially the significant number of new hires out of college.
- Employee appreciation is typically greater in DC than DB, and so the proposal would enhance morale and motivation probably. The DB plan in place is likely not appreciated by the many younger or shorter-service employees.
- The cost will overall be somewhat more predictable since, while the DB cost can be quite variable (though sometimes this variability is seen as desirable flexibility), the DC cost is straightforward and easy to budget for.
- The well-educated staff probably would relish the opportunity to take charge of their own retirement. However, it is implied that there could be no employee choice of investment and that, furthermore, all investments would be in GICs. A financially-savvy employee group, with many younger, presumably more aggressively investing employees, would be best served with a choice of investment funds. Therefore, I would strongly suggest changing this provision of the proposed DC plan to more properly align the plan with the plan's demographics and presumed investment goals.
- Administration can become much more complex, of course, when there are both a DB and a DC plan to manage. NOC should be sure to consider needed enhancements in their management information systems in order to accommodate the new plan.
- Since the motivation of the proposal is probably to enjoy advantages of both DB and DC plans, we could instead consider a hybrid plan. For example, a cash-balance plan, or a pension equity plan, are DB plans that give younger employees relatively greater DC-like accruals and the account balance visibility makes them especially attractive to the younger employees. A floor offset plan could give the security of a DB plan floor, while affording the participant an opportunity to get larger benefits through the DC plan. DC hybrid options will include target benefit plans (which base contributions on a DB funding method on age-weighted or new comparability profit sharing plans) giving different accruals to different groups. Of course, there would be much work involved in converting from the current DB plan to any of these alternatives.
- Anti-selection, when employees are given a choice between two plans, would be avoided here since the two plans will both be available to all selected employees.

Solution #5

(b)

- As mentioned, the design feature most in need of reconsideration is fund investment. Only GICs are allowed in the second plan. A savvy, well-educated employee group should have the ability to choose their own investment funds. Also, GICs are very conservative and most employees, especially those still far from retirement, would be better served with more aggressive investments.
- Immediate eligibility and vesting is a very good feature and reflects that NOC must want to provide significant wealth accumulation through the DC plan to even the shorter-service employees. The company has had more turnover recently than it wants. As a recruitment and retention tool, a DC plan can be very effective, but NOC might consider increasing the vesting requirements, as an incentive for employees who might otherwise have to stay long enough to set a vested benefit.
- Participant loans should be considered, as competitor firms, in all likelihood, have this feature in their plans.
- 3% of pay is a goal contribution. It's not much for the older employees, but they have good accruals in the DB plan so that the proposal will not give rise to any serious issues of equity amongst either segment of the employee population.
- Termination and death benefits are average and no need for change.

(c) For DC ERP:

- Employer is always responsible for selection of investment choices and monitoring of funds' results.
- In the U.S. under 404(c), which is a safe harbor and not mandatory, an employer is absolved of <u>further</u> fiduciary responsibility if at least three investment funds are available, transfers are allowed at least quarterly or more frequently if fund-appropriate, and the employee is given educational materials on investing with more information (about funds, expenses, managers, etc.) upon request.
- If 404(c) is not followed, sponsor could be liable even if employee makes investment choices.
- We are not told Belair's specific fiduciary requirements, so the above analysis, applicable to U.S., is illustrative of what the requirements might be.

For DB again using U.S. rules as a benchmark, we note that U.S. trust law under ERISA requires the flooring fiduciary duties:

- Duty of care investing under prudent man rule
- Duty of loyalty (to plan participants)
- Duty to delegate (if lack some necessary expertise)
- Duty of impartiality (with respect to different participants)
- Duty of co-trustees (don't allow others to break rules)
- Duty to diversify (using modern portfolio theory as a guide)
- Duty to make assets productive
- Duty to follow trust agreement (but duty of loyalty is higher!)
- Duty to observe statutory constraints (e.g., transactions with portion of material)

Solution #6

(a) The deficit on the basis of the actuary hired by NOC's union is higher than that shown in the 1/1/2001 valuation, $150M vs. $35M.

On a termination basis, liabilities are calculated assuming the plan is terminated and all benefits accrued to date are paid out. The 1/1/2001 valuation assumed the plan continues and takes into consideration current benefit levels as well as future negotiated levels.

Assumptions differ from termination basis to going concern basis. On a going-concern basis, the actuary's best estimate assumptions are used and should be reasonable both individually and in aggregate.

Termination assumptions will differ likely due to:

- Discount rate which reflects current rates at which liabilities can be settled
- Mortality as prescribed by the plan or law
- Recognition of most valuable retirement benefit for those eligible for subsidized benefits.
- Recognition of actual benefit forms elected and actual data for spouses/beneficiaries.

Valuation methods can also contribute to difference in deficiency. Both valuations, however are employing unit credit liability valuation and market value of assets.

(b) The plan will initially have a large underfunded liability.

- Consider funding for this over a number of years.
- Employer contributions will therefore increase.
- Can employer handle this increased level?

Plan will always be funded on a termination basis so there will be greater benefit security for participants.

Plan will be overfunded vs. going concern valuation.

- Pressure from union will increase to raise benefits.
- Gains will occur as the long-term rate of return exceeds settlement rate.

Higher contributions will also be volatile.

- Affect on accounting will be to lower balance sheet liabilities and decrease expense due to higher interest on assets.
- Normal cost will change as population changes.
- May crease tax issues due to large deductions and thus less tax revenue for Belair.
- May crease surplus ownership issues – company vs. union vs. government.

Need to try to match assets and liabilities to control volatility and preserve funded status.

Pressure on actuary will be increased to modify assumptions in order to reduce contributions.

Solution #7

(a) $$FRR = \frac{\text{Funding ratio end of period} - \text{Initial funding ratio}}{\text{Initial funding ratio}}$$

$$\text{Funding ratio} = FR = \frac{\text{Asset}}{\text{Liability}}$$

$$FR_{1/1/2000} = \frac{MVA_{1/1/2000}}{PBO_{1/1/2000}} = \frac{551{,}990{,}760}{450{,}808{,}138} = 122.4\%$$

$$FR_{12/31/2000} = FR_{1/1/2001} = \frac{565{,}609{,}298}{551{,}277{,}751} = 102.6\%$$

$$FRR_{2000} = \frac{102.6\% - 122.4\%}{122.4\%} = -16.2\%$$

(b)

$MVA_{1/1/2001}$	565,609,298
Benefit payments – 2001	(13,640,000)
Contributions – 2001	0
Investment return	0
Exp. Assets @ 12/31/2001	551,969,298

$PBO_{1/1/2001}@7\% = 551{,}277{,}751$

Duration of $PBO = 10 \Rightarrow$ liability will change by 10% if discount rate changes by 1%.
Duration of $SC = 14$.

$$\Rightarrow PBO_{1/1/2001}@7.5\% = \frac{551{,}277{,}751}{\left(1 + \frac{0.1}{2}\right)} = 525{,}026{,}430$$

Service Cost @ 7% = 31,214,805

$$\Rightarrow \text{Service Cost @7.5\%} = \frac{31{,}214{,}805}{\left(1 + \frac{0.14}{2}\right)} = 29{,}172{,}715$$

Solution # 7 – Continued

$$\text{Expected } PBO \text{ @ } 12/31/2001 = (525{,}026{,}430 + 29{,}172{,}715) \times 1.075 - \underbrace{(13{,}640{,}000)}_{\text{Benefit payments}} \times \underbrace{\left(1 + \frac{0.075}{2}\right)}_{\text{Assume mid-year}}$$

$\therefore$ Expected PBO @ 12/31/2001 = 581,612,581.

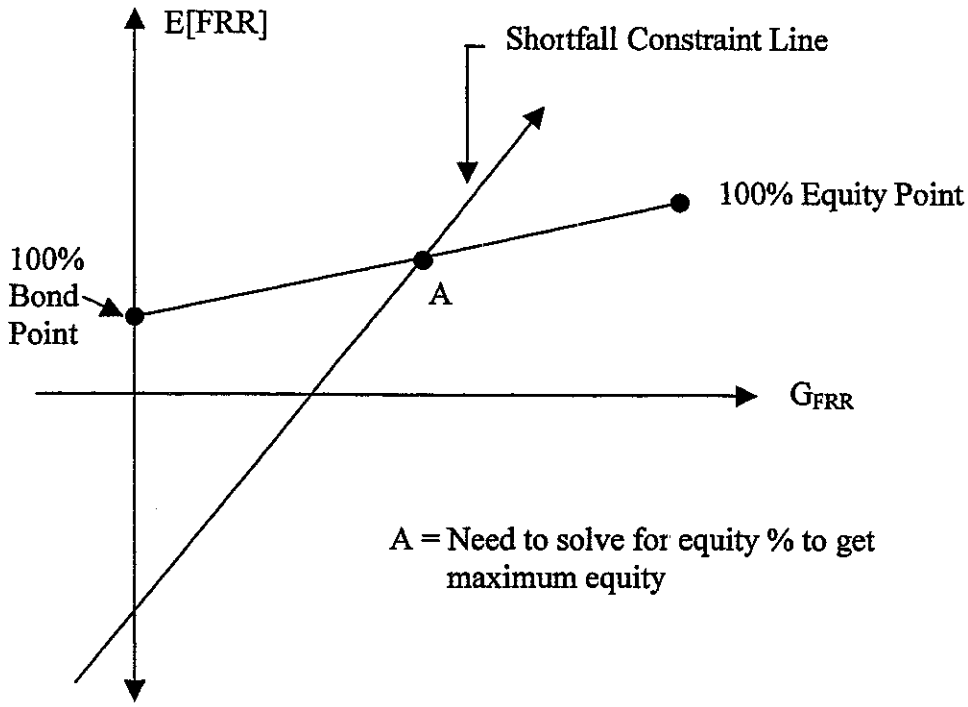
Expected Funded Status:

$MVA_{12/31/01}$	551,969,298
$PBO_{12/31/01}$	(581,612,581)
Exp. Funded Status	(29,643,283)

(c)

CFO's Objective: 95% probability that surplus ≥ 0.

$$FRR \text{ Threshold} = \frac{FR_0 - FR_1}{FR_0} \text{ where } FR_1 = 100\%$$



All portfolios with risk/return above shortfall constraint will be okay.

Solution #7 – Continued

100% Bond/0% Equity:

- From a surplus standpoint, such allocation is dangerous if the duration of bonds is a lot different than the PBO.
- If dur (PBO) = dur (Bonds), then surplus protected.
- Investing only in bonds considerably decreases returns on assets.
- Returns will depend on duration of bonds.

50% Bond/50% Equity:

- Better return than 100% bond portfolio. The variability of returns increases as well.
- Must take bonds of longer duration to balance.
- Is this portfolio above shortfall constraint?

0% Bond/100% Equity:

- Too risky.
- Difficult to protect surplus with a 95% certainty.

Solution #8

The government's goal seems to be at odds with itself. By increasing tax revenue, the government seeks to remove tax-favored status or room for retirement savings, which may discourage savings.

There are ways in which their goal may be achieved:

- Create a combined plan limit.
- Limit both the accrual rate and maximum pension (currently $3,000). A 2%-3% accrual limit may reduce benefits for some employees not captured by the $3,000 limit.
- Reduce the DC/PPA account balances to be a percentage of income (e.g., 20%) or a dollar maximum, possibly lower than $20,000.
- Introduce rules for highly compensated employees/owners. By limiting plans primarily in existence for the benefit of the highly paid, these plans may disappear or broaden to include all employees. Care must be taken to create simple rules that are easy to administer.
- Introduce guidelines for actuarial assumptions, possibly requiring funding interest rates to be market-based so one can avoid overly conservative assumptions.
- Change funding rules to require funding on a different basis such as only funding the ABO or funding on a termination benefit.
- Introduce a national pension scheme and require integration making contributions to the national pension scheme less tax efficient (no deduction or partial deduction).
- Index benefit maximums and/or reduce the current DB limit of $3,000 and DC/PPA limit of $20,000.
- Introduce limits on what type of earnings are to be covered by an ERP. For example, exclude bonus/incentive pay.
- Introduce limits on post-retirement indexing. Once retired, a company could grant over-generous ad hoc increases to individuals.
- Limit portability by taxing benefits transferred out of DC/DB plans (in effect, this will limit termination benefits offered).
- Limit the forms of pensions in the normal form. Impose something like a life-only or life-to-standard and require actuarial equivalence for all other forms.
- Limit early-retirement subsidies. Introduce a rule similar to Canada's 3% from the earliest of age 60, 80 points or 30 years of service, to prevent subsidies from allowing more dollars to be tax sheltered.
- Tax investment earnings.

Solution #9

(a) In the OWU plan, there will be cross-subsidies between employers.

To protect against adverse fluctuations, the OWU plan will likely be funded conservatively.

The OWU plan will not align as well with NOC business strategy.

The future funding cost of the frozen plan is uncertain.

Use immunization.

NOC will need to administer the frozen plan and coordinate with the OWU plan.

- Will need new employee communications on the frozen plan.
- Will require staff knowledgeable in both plans.
- Will require systems for both plans.

In an oil market downturn, there will be no employer backing of OWU benefits for NOC employees.

(b) NOC has an interest in any surplus in the NOC plan.

The NOC plan assets will purchase a level of benefits that will depend on the conversion basis negotiated with the OWU plan.

Benefit level that can be purchased with the assets may be less than the NOC plan benefit.

Communicate with employees to ensure understanding of the trade-off.

Solution #10

(a) Pension issues:

- WOC has DC arrangements (3%).
- NOC has DB arrangements (currently contributing ≈ 11% of pay for normal cost).
- Need to integrate these benefits.
- Would be good idea to look at pension design in general design issues.
  a. Adequacy of benefit
  b. Tax issues
  c. Length of career encouraged
  d. Equity amongst employees.

- Could do one of the following:
  a. WOC keeps DC arrangement (increase 3%) or NOC converts to DC arrangement.
  b. Add DB component to DC for WOC or add DC component to DB for NOC.
  c. Leave both plans alone.
     - Many employee communication issues to resolve
     - Many amendments to pension plan texts, trust agreements.
     - If plans are combined, what about asset allocation of combined fund.

Compensation issues:

- Total compensation philosophy includes pay, pension, health, life insurance.
- Must balance all of these
- Average pay for salaried NOC -- $61,500
- Average pay for salaried WOC -- $41,500
- Must make total cost as a percentage of pay for pay, pension, health, and life insurance.

Health care/life insurance benefits:

- WOC has more generous benefits than NOC
- However, NOC has higher average pay (maybe these two are meant to offset)
- Pick total compensation philosophy and all benefits will fall into line.

General issues:

- Could show scenarios with financial impacts of:
  a. NOC adopting WOC benefits
  b. WOC adopting NOC benefits
  c. Compromises between the two.
- Could have employee meetings to see what they want.
- Will there by layoffs for redundant positions? (What types of enhancements to pensions will be offered?)

Solution #10

- Purchase agreements should clarify:
  a. Type of transaction (share purchase, etc.)
  b. Continuity of employment relations.
  c. Intentions regarding pension plan.
- Should update all latest valuation numbers (try to harmonize assumptions before assessing costs)

(b)

- What Social Security/social insurance programs do employees working abroad participate in (home or host country)?
- What pension benefits should they provide?
- What about other types of benefits (housing, health care)?
- Above should be (1) easy to understand; (2) cost effective; and (3) tax effective.
- There are several approaches to answer the above questions.
  a. If Belair has an agreement with other countries regarding social insurance programs, it can follow:
     - Territorial rule for long-term
     - Detached worker rule for short-term.
  b. Health care benefits:
     - Could pool all international workers' health care liabilities into "international pool, thereby spreading cost.
     - Should provide these benefits. Country where you're working may not offer very good local, government-sponsored health benefits.
  c. Pension benefits. There are several approaches to provide pension benefits:
     - Ad hoc plan:
       1. Very expensive
       2. Tailor to specific needs of employee.
     - Home-country plan:
       1. Employee remains in home-country plan.
       2. There are tax issues for company and employee.
     - Host-country plan:
       1. OK if planning to retire in host country.
       2. Difficult if not.
     - Umbrella plan:
       1. Fairly difficult to administer
       2. Pick a target replacement ratio for all plans (e.g., 70%)
       3. Company makes sure all benefits earned in all countries add to 70% (makes up short fall if not).
     - DC plan. These employees are:
       1. Highly mobile
       2. Highly paid
       3. Not potentially loyal.

       A DC plan is a simple alternative.

Solution #10 - Continued

- Housing benefits – Typically all such employees are provided housing assistance.
- General – Be aware of currency issues in all these benefits.