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ASSET/LIABILITY PROJECTIONS AND CASH FLOW ANALYSIS

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Cash-flow Analysis and Asset-Liability Projections

MR. DAVID F. HOWE: My fellow panelists and I felt that the first step in preparing our discussion of asset-liability projections and cash-flow analysis would be to define what we mean by these terms. Actuaries have attached a number of different meanings, and the words may mean something quite different outside the actuarial profession. We agreed that the basic purpose of the projection process is to simulate the result of a series of future actuarial valuations based upon a given set of parameters.

Information which is valuable in providing a history of the development of a pension fund can be divided into three basic categories. The first category consists of financial information - the dollar contributions to the plan, the contributions as a percentage of payroll, the progression of funded ratio, gross assets of the plan, the asset mix, the investment returns, etc. The second grouping consists of information on changes in plan conditions - plan amendments and changes in actuarial assumptions or methods. The third consists of information concerning the economic factors which operate in the period being considered - the rate of inflation, salary escalation for covered employees, growth in the company and the plan membership, and overall investment returns.

A single projection, estimating the results of a pension fund of one set of assumptions concerning the future behaviour of these parameters, is obviously of limited value, but a series of such projections, showing the results of variations in this behaviour, can be a very powerful tool.

The next question to be asked is, "Why do it?" Life insurance actuaries have used techniques of this nature for many years, for example, in connection with model offices. There seems to have been little interest in these techniques among pension actuaries. I suspect that this apparent lack of interest is due to the fact that traditional actuarial methods seemed to be providing satisfactory projections in those circumstances where the actuary's clients felt that projections were of interest. Traditional methods do work fairly well in stable conditions, but they are not very useful when conditions are changing rapidly - as when the rate of inflation is increasing or decreasing.

The change in the economic climate, combined with the intrusion of governments everywhere into the operation of pension plans, has dramatically altered this lack of interest in a more sophisticated projection process. For example, the Canadian environment which encouraged the use of unit credit projected benefit cost methods and required five-year funding of experience deficiencies and fifteen-year funding of benefit improvements raised the visibility of pension plan funding. The prevalence of plan improvements and discretionary post-retirement benefit increases led many plan sponsors to feel a lack of control over pension plan costs. Clients began turning to their pension consultants with unspecified or indefinite concerns over the future,

and consultants responded by adapting actuarial techniques to reduce the risks of unforeseen financial changes. It is obvious that actuaries disagree about how studies of this nature should be done because an individual's viewpoint has grown out of a particular client's perception of his problem. Whatever that client's perceptions and objections, and however the actuary may choose to do the arithmetic, it is important to establish that these projections are the sponsor's projections, that it is he who chooses the assumptions and that the results are no more than the translation of those assumptions into the end result.

This sounds as if the actuary's role is relegated to that of technician, but it is actually elevated to that of advisor in establishing assumptions and interpreter of the results.

In addition to reducing the risk of unforeseen financial results, the technique is of enormous educational value. A client who actively participates comes to realize how various factors affect actuarial results and how a rational funding policy can be established to suit the individual circumstances.

Mr. Peter Rattee will now discuss the development and use of the economic and demographic assumptions necessary for such a projection, after which Mr. Bill Napoli will discuss some alternate ways of performing the calculations. We will then each provide an illustrative case study.

MR. PETER A. RATTEE: I would like to begin by drawing a distinction between the regular valuation assumptions and the forecast assumptions. The former are used to determine the liabilities at a particular valuation date, and to determine the contribution levels for the period ensuing to the next valuation. These have tended to be set with minimal involvement on the part of the client (the plan sponsor), and they have tended to be implicit rather than explicit. The forecast assumptions are used to project the employee population, the company and government plan provisions, and the assets of the fund. Regular simulated valuations are then conducted against this forecast real world. The forecast assumptions should incorporate year-by-year rate of investment returns and salary increases, the timing of company and government plan changes, and the growth and changes in the work force and plan membership. The last two are not considered in a regular valuation.

As David said, the forecast assumption must be set with the active participation of the client. If the exercise is to be educational, then the maximum benefit can be realized only if the client comes away with a better understanding of the interrelationship and the relative importance of the various assumptions. I would like to begin by discussion of the process of setting the forecast assumptions by listing the assumptions to be chosen, and some ways in which they might differ from the regular valuation assumptions.

For ease of discussion, they can be grouped into three categories: economic assumptions, demographic assumptions, and other assumptions. The first and most important economic assumption is the rate of investment returns. In the regular valuation, it is usually assumed to be a single rate which applies throughout the remaining lifetimes of all plan members. It can be just as simple in the forecast, but more often it is a rate which varies by year. It can be even more complex with annual rates varying by asset class, with the rates linked to inflation. In discussing this assumption with clients, I have found it helpful to speak in terms of three components of investment return, namely inflation, a real rate of return, and a risk factor.

If nothing else, this model helps to focus thinking and prevent the adoption of wildly inconsistent assumptions.

The second important economic assumption concerns salary increases. This is important even if the plan is a flat-dollar plan, because inevitably improvement in plan benefits will be linked to increases in wages. Once again the usual technique is to assume that a single rate applies throughout the period, with perhaps merit and promotional scales added on top. A similar approach can be applied for the forecast, but more often the rate is linked to inflation and varies year by year, again with merit and promotional scales in addition. Whatever rate is used should be determined in a manner consistent with that used in setting the assumed investment rate. Here it is helpful to consider inflation as being a component of salary increases, as are productivity and merit and promotional increases, and perhaps a "catch-up" peculiar to the company.

The third and last economic assumption is the change in government plan benefit levels. This is most important for integrated plans, but must be considered even for non-integrated plans, because changes in government plan benefit levels may have an impact on plan design. The components which usually affect these benefit levels are inflation, productivity and legislated changes in government benefits.

The most important of the demographic assumptions is the assumed rate of growth and change in the plan membership during the forecast period. This is usually stated as a percentage increase in membership which varies year by year. This assumption can generally be determined only by the client, who may or may not have made some similar projections for other planning purposes. Exits from the active work force must be replaced, if the forecast rates are to be met. This is usually done by constructing a model new entrant group, to be brought in each year to replace the required numbers of people. This group is usually based on analysis of recent hiring patterns, tempered by the possibility that these practices will be modified in the future.

The other demographic assumptions are those used in the regular valuation: rates of retirement, termination, disablement and death. If the plan has or is forecast to have a subsidized early retirement provision, then the most critical of these is the retirement assumption. The forecast assumption is usually more specific than the assumption used in the valuation. For forecast purposes, the retirement and termination assumption should be based on the client's experience in the recent past and expectations in the future.

By far the most important of the other assumptions is that concerning future changes in the Company's benefit plan. In setting this assumption, the client's industrial relations and personnel departments must be closely involved. For career average and flat dollar plans, it is necessary to predict the timing and extent of future updates. For all plans it is necessary to predict changes in eligibility requirements, increases to pensioners, and any other changes. Other assumptions which need to be made consist of things like utilization rates for subsidized retirement options, numbers of people married, ages of their spouses and expenses which may be charged to the fund.

Client involvement in choosing these assumptions is of paramount importance; the actuary does not hand them down on a set of stone tablets. The actuary may prepare a set of assumptions, but this is done only to stimulate discussion. Several approaches may be taken to the assumption-setting process,

but the result is usually a collection of three sets of assumptions: one pessimistic, one optimistic and one "best-guess" set. After projecting results on these three sets it may be desirable to "fine tune" the assumptions and play the "what if" game.

The assumption-setting procedure may follow a "smoke filled room" approach, in which the client and the actuary discuss the assumption to be chosen, with the actuary supplying a starting point for the discussions. With such an approach, the process may take several hours. Alternatively, if the client is a more diversified company, a more technocratic approach may be preferable. It may also be desirable to spend more time and effort in setting assumptions in order to secure a high degree of credibility for the results.

Regardless of the methods to be used in choosing assumptions, the purpose of the forecast must be taken into consideration. If the projection is being done primarily for setting investment strategy, particular attention must be given to the assumption concerning investment return. If it is to focus concern on future benefit improvements, that area must be paid particular attention. The best advice to be given here is: Do not over-engineer the input.

Bill Napoli will now discuss the mechanics of doing a forecast.

Mr. WILLIAM NAPOLI, JR: A cash flow study or forecast can be broken down into three phases. The first is the testing of the forecast assumptions. The second is the development of liability projections and the third is the projection of assets and pension expenses. As Peter mentioned, the degree of sophistication used in any phase depends on the purpose of the study. If the main purpose is a benefit study or a funding study, a considerable amount of attention should be paid to analyzing the population assumptions. Likewise, rather sophisticated methods will be used in projecting liabilities. If the main purpose of this study is to set an investment policy, the population and liability projection might be done on the back of an envelope, with more sophistication used in testing the impact of various asset mixes.

The degree of sophistication used depends on several additional factors. First, of course, is the price. Another is the degree of sophistication used by the client in other areas of financial planning. A third may be time constraints, and of course, the availability of appropriate tools. One pitfall to be avoided is precision without accuracy.

The first step in cash flow analysis is the projection of future valuation populations. We have already alluded to the distinction between the valuation assumptions and population projection assumptions. While an actuary might use implicit assumptions, which are accurate only in the long run or in the aggregate, in performing the actuarial valuation, population projection assumptions must be individually as realistic as possible in order to provide a reasonable basis for estimating future pension expenses.

The impact of demographic assumptions can be tested by making projections of the numbers of employees assumed to retire, terminate with and without vested rights, die, and become disabled, as well as the number of employees who are assumed to be hired each year of the projection period.

These projections can also break down the projected populations by sex and salary level.

An important point to remember is that cash flow studies should involve interaction between the actuary and the client as to the reasonableness of the projected future populations. While the client may not be able to supply the actuary with sufficient data for a detailed analysis of prior experience, the client is usually quite capable of reviewing the end result as to the number of employees leaving and joining the active workforce and the sex and salary distribution of the projected workforce, in order to assist the actuary in "fine tuning" his projection assumptions.

An example of the type of projections that can be made to test the reasonableness of the projection assumptions is illustrated as it applied to one employer.

We prepared a year-by-year projection of the number of active employees by pay level (low, middle and high) as well as a projection of the number of terminations during the year (itemized by cause: retirement, non-vested termination, etc.) and the number of new hires during the year.

In this example, the client gave us growth rates for the combined active workforce, but also indicated that there would be a gradual shift in his hiring practice to the employment of more skilled workers commanding relatively higher salaries. Thus, while the total workforce was projected to increase by 54% over the 20-year period, the lowest salary level was assumed to increase by only 33% with the middle and high salary levels increasing by 66% and 100% respectively. The projections of the numbers of employees who were assumed to retire, terminate and die each year, and of the numbers of new hires, were compared to recent trends to test the reasonableness of our projection assumptions. By modifying both the retirement rate assumptions and profiles of future hires, we eventually came up with projections of future populations which seemed reasonable to the client.

In addition to testing whether the total number of employees seemed reasonable, we also projected age/service charts for 1988 and 1998 and compared them to the age/service chart for 1978. These charts showed both the number of employees and average salary for each age/service cell. Separate charts were produced for males and females and for each of the three salary classifications.

One important by-product of producing these population projections, is that they can be very useful to the client in other areas, for example, estimating group insurance costs for future years.

Description of the second phase of the cash flow analysis as a projection of liabilities is an over-simplification. Many variables could be projected, including:

1. Annual payroll and present value of payroll.
2. Present value of future benefits.
3. Accrued liability under the funding method in use.
4. Normal cost.
5. Present value of vested benefits.
6. Expected benefit payments.
7. Change in accrued liability and present value of benefit as a result of plan changes.

In other words, projections are made of all the employee-related variables required to perform an actuarial valuation. These projections are made for three groups of plan participants: current actives, future hires and the current retired population.

At least three basic methods can be used in projecting liabilities. The back-of-the-envelope method provides a fairly good projection, without extensive computer cost. In this method, certain basic relationships are used to estimate future liabilities, normal costs, benefit payouts, etc. Alternatively, the projected populations may be saved in computer data files as separate valuation groups, and then actuarial valuations performed on these data bases. Or the valuation results desired may be projected as required with all the calculations being done without referring to any external data bases besides the one for the current year.

I feel the back-of-the-envelope technique should be used only when time and fee limitations do not allow more sophisticated techniques to be used. Thus, I will concentrate on examining the pros and cons of the other two methods. The main arguments I have heard, as to whether creating data files is more or less efficient than doing all the calculations internally in the memory of the computer, center around cost. This then draws attention to the factors which determine the cost of making the projections:

Computer Resources - The cost of making these projections varies considerably from computer to computer, and if you are leasing computer time, it also depends on the time-sharing vendor's pricing algorithm. I have used large Control Data systems for most of my projections, and find that computer costs tend to be very modest in comparison to the consulting time charges. Thus, whatever keeps down the consulting times charges, tends to be the more cost-efficient approach.

Valuation Techniques - If the basic valuation technique is already one which could be classified as a discounted emerging liability approach where the present value of all future benefit provisions is determined, then this tends to fit better with the third type of projection method, namely, where all calculations are done internally in the computer.

Number of Participants - Obviously the larger the number of employees included in the projection, the more expense involved. However, quite often the employees can be grouped by age, service, sex and salary level such that the number of calculations is held down to a minimum without distorting the results. This, if course, could be done for either method, but the creation of data files does create a new source of cost, namely, data storage.

I prefer the method where all the calculations are performed internally in the computer, because it dovetails very well with the discounted emerging liability approach I have taken in producing the valuation. In this approach I print out a data file of projection results separately for current actives, future hires and current retirees. For each group I print out arrays which contain the valuation results for each year, namely, the present value of future benefits, the accrued liability, etc. This data file is then read by another program which determines the annual pension expense, projects the assets and prints the desired output.

This brings us to the third phase of cash flow analysis, namely, the pension expense and asset projections.

Actuaries, because of their training, are looked upon by clients as the ultimate source for consulting advice as to the projections of future valuation populations and liabilities. When it comes to asset projections we are looked upon more as technical advisors who can tell the clients what the impact will be on future pension expenses if certain rates of return are realized on the invested assets. I think that most actuaries who have been involved with cash flow studies feel much more confident in their ability to project liabilities than they do about their ability to project future rates of investment return. Whereas, in performing our annual actuarial valuation, we make sure that the long-range assumptions for rates of salary increases are consistent with long-range estimates of future interest rates, in cash flow studies long-range may mean only 5 to 10 years. There is no assurance, as we have seen over the last 10 years, that the two will move in the same direction. Thus it is important that we work closely with the client and his investment advisors to illustrate the interaction of investment assumptions and the asset valuation method in determining the value of the plan's assets and the company's pension expense.

Typically the rate of investment return is assumed to remain constant throughout the projection period. Simulations are performed to see what the impact on the pension expense would be if a lower or higher rate of return were experienced than the one considered to be the "best estimate". However, it does not take much variation in the investment rate of return assumption to see widely different projected pension expenses, so it may be important to consider the rate of return as varying year by year.

As I mentioned earlier, the main purpose for performing the cash flow analysis will often dictate how much sophistication is needed in projecting investment rates of return. If one of the purposes of performing the cash flow analysis is the selection of various classifications of assets in which to invest, it is appropriate to simulate rates of return for each asset category (common stocks, bonds, etc.) and then measure the impact on the plan's pension expense and funded status. Once again, a range of possible investment returns should be used along with some measure of the confidence that the particular rates will be realized. If the client wishes to use the projections in order to project future pension expense as a budgeting tool as well as a pricing tool for determining the cost of manufacturing his products, then great care should be taken to make sure the assumptions are as reasonable as possible. One important point to remember is that, if the client is doing financial planning in other areas besides pension cost, the assumption used for the cash flow analysis should be consistent with his other financial planning assumptions.

In the cash flow projections which I have done, a computer program was written which determined the projected assets and pension expense and printed the results in a format that could then be reviewed with the client. The logic for determining the company's pension expense was programmed to include the amortization of increases in unfunded liabilities due to plan changes and actuarial gains and losses.

Once the first year's pension expense was determined, the market value of the assets was rolled forward and then the client's asset valuation method was used to project the actuarial value of the assets as of the beginning of the second valuation year.

This process was continued until the pension expense and asset projections were determined for each year of the cash flow study.

For every unique projection scenario, we produce two pages, one showing the development of the accrual cost and one showing the funded status of the vested, accrued and ongoing plan liabilities. Not only are the actual numbers shown in dollars or percentages, as appropriate, but the results are also plotted.

In discussing the results with our clients, more attention is paid to accrual cost percentages and the pattern of costs rather than dollar amounts. Sometimes these projections suggest more accuracy than is possible, so we like to concentrate on percentages and trends rather than dollar amounts.

MR. HOWE:

Case Study I: The Company was a Canadian subsidiary of a major American corporation and was a highly visible corporation in the political sense. Historically, it had provided generous benefits because of their relatively minor impact on profit. Narrowing margins and greater public scrutiny made it more sensitive than before. The plan's career average benefit had been regularly updated for active employees so that pensions were the equivalent of a final average benefit. After retirement, the pensions continued to be improved regularly to keep pace with about half the increase in the cost of living. Early retirement on preferred terms had been made available to almost 90% of the membership, although it was not part of the plan.

Because of the design and operation of the plan, the employer had become concerned over the trend in costs which were steadily rising and the trend in the ratio of the assets to liabilities which was steadily declining. They decided to undertake a cash flow projection to review these two items, together with the adequacy of the actuarial basis using three economic scenarios of their choice. The three economic scenarios considered were a minimum situation of slow growth, small salary increases, and low fund earnings; a maximum situation of rapid growth with large salary increases and high fund returns; and a most likely scenario falling somewhere between the two. The major factors in the projection were the assumptions regarding inflation, salary increases, the investment return, investment mix and change in population. The population projection recognized the age distribution of the present membership and recent turnover experience.

The first step was a projection of the population. This was presented, both for the active membership and the retired membership which hardly varied, whichever set of population projection assumptions were used. An interesting feature was the relative stability of the average age but there was a marked decline in average service.

The next step was to calculate the total employee costs as a percentage of payroll. The employee contributions were projected to decline quite substantially because they were expressed as a percentage of payroll less contributions to the Canada Pension Plan, which were forecast to rise rapidly in the short term. Total employer costs (under the unit credit cost method) as a percentage of payroll were only stable under the inflationary situation. The less inflation, the more rapidly this percentage rose. The unfunded liability for benefit improvements caused much of the increase, and this is a good indication of why any study of this nature should recognize future plan improvements.

It is interesting to note from the forecast valuation balance sheets how the unfunded liability grew. No matter which choice of projection assumptions was used, the funded ratio, that is the ratio of assets to liabilities, followed the same pattern: an increase from the then level of around 62% to about 73%.

In testing the appropriateness of the valuation assumptions, it was shown that only under the maximum inflationary situation did these assumptions produce neither a surplus nor deficiency. Under either of the other assumptions, the present actuarial valuation assumptions and funding method consistently produced experience deficiencies. Finally, an indication of the maturity of the fund was shown by the ratio of outgo to income which, under any scenario, was moving from about its then 40% to 50% or more.

The results of this study were that the company altered its funding policy with regard to funding of liabilities created by plan improvements and by the discretionary early retirement benefits. Funding was considerably speeded up. Subsequently, it was decided to provide the discretionary benefits as a right and to provide certain survivors' benefits. Additional figures were produced to estimate the long-range impact of these changes as well as an improvement in early retirement benefits at age 62 and 60. As a result of these studies, the client adopted the plan changes considered and relaxed the funding. The new funding rules included a strengthening in the actuarial assumptions.

It would be fair to say that the study has placed the client in a position to discuss intelligently with the actuary the assumptions and their impact. Also, he can now make logical and sensible business decisions regarding the funding of his program. The client sees these studies as an on-going process, and since the appropriate systems are established and the client understands the range of possibilities available to him, future results are relatively easy to produce.

MR. RATTEE:

Case Study II: The example I will discuss concerns a large company with a number of divisions and a number of operating entities within each division. All the plans for salaried employees are career average plans. Those for hourly employees are either career average plans or flat dollar plans. These are, of course, subject to periodic updates and negotiated increases. The company also has a practice of increasing pensions on a fairly regular basis.

Since the mid-1960's, the unfunded liabilities of these plans have increased essentially from zero to about \$25 million. The board of directors became concerned as to whether this funding policy was appropriate, whether their philosophy on benefits should be changed and whether they should change to a final average benefit formula in order to anticipate costs.

Once the assumptions were set, we did a forecast for each of the pension plans. It was then necessary to present the resulting numbers in sufficient detail so that they could be analyzed at the division level without overwhelming the corporate office with statistics. We developed fairly detailed results in four areas:

- financial condition, comparison of assets and liabilities
- build up of assets
- summaries of membership data
- cost of plan improvements (increases in liabilities and in contribution rates)

The results were presented in graph format. We identified four strategic issues (specified by senior management) and one or two critical measures to be used in analyzing each issue. The results of these measures were presented on low-, base- and high-growth assumptions.

As the assumptions which had been chosen were all more optimistic than the valuation assumptions, the valuation assumptions provided a margin of conservatism. The next questions were, how much margin, and what if the forecast assumptions were not met? We considered three variations of the forecast assumptions, for this purpose.

The result of the study was the formation of a sub-committee to consider each of the four issues which had been specified.

MR. NAPOLI:

Case Study III: This case study resulted from a situation which I am sure many of you have faced. It dealt with a large employer who was very concerned about the funding process of his negotiated pension plan for hourly-paid employees. The client was concerned with the fact that he was not making any progress with the funding of the plan's liability for vested benefits. This condition was not present, however, with his salaried pension plan. The chairman of the board of this client became even more concerned after reading the November '77 Fortune article which indicated that actuaries were vastly understating the cost of retirement benefits. After reading the Fortune article he became confused and wanted to understand first of all what was meant by unfunded liabilities and how they varied for their particular plans based on different actuarial cost methods. He also wanted to understand the relationship of the liability for vested benefits as compared to the plans' ongoing liabilities. Finally, he was concerned that, given the current framework of how their plans were updated every 3 years, was it even possible (given the IRS limitations on deductible employer contributions) to improve the funding status of their negotiable pension plans.

We selected two hourly plans which we felt were representative of the range in demographic characteristics. One of the plans was a very mature group with a large retired liability and a high average age and service, whereas the other plan was a relatively immature plan in the sense that the average age of the active employees was much younger and the liability for retired employees was only a small part of the total liability.

We did projections of the impact on pension costs for several actuarial cost methods such as entry age normal, unit credit, and aggregate funding. The plans were currently being funded by use of the entry age normal method. We did these projections only for the closed group of current participants mainly as an educational exercise to show that, if all the valuation assumptions were realized, when the last participant died there would be no more assets in the trust. This exercise greatly increased the client's understanding of the process of the advance funding of pension benefits.

Our next step was to develop population projections based on our best estimate assumptions for events like retirements, terminations, triennial benefit improvements and future hires. After reviewing these projections with the client and finalizing our population projection assumptions, we projected the costs of the two plans over a thirty-year period in an attempt to understand the pattern of the current costs as a percentage of payroll as well as the funding status of the vested liability and ongoing plan liability. To help in the communication of the results we plotted the accrual costs as a percentage of payroll, and the ongoing plan liabilities versus the vested benefit liabilities and the market value of the assets, as well as displaying the calculated values for each year.

We next prepared a chart in which we plotted the accrual costs in future years assuming that there would be no changes in the benefit levels. The costs consistently went down as a percentage of payroll from roughly 8% in 1978 to .2% of payroll in the year 2007. The client was using 25-year amortization of the initial unfunded liability in determining the accrual costs. Since the projection was being done on valuation assumptions there were no actuarial gains or losses.

Then we examined the funding status of the plan over the 30-year period, again assuming no changes in the current benefit level. We saw that the market value of the assets equalled the entry age liability after 25 years.

This is the basis upon which accrual valuations are typically done for negotiated pension plans. In theory the plan should be fully funded after a stated number of years. However, because of benefit updates, in fact, the plan never becomes fully funded unless there are significant actuarial gains.

The next step was to project the accrual costs and funding status on the assumption that every 3 years there would be a benefit update which would maintain the benefit rate as a percentage of pay equal in value to the percentage in effect in 1978. In our example we were assuming wages would increase at 7% per year and that every 3 years the benefit rate would go up by 7% compounded for 3 years.

In addition, we assumed that there would be discretionary cost-of-living increases for retired employees equal to 2% per year. The cost as a percentage of payroll over a 30-year period was projected to remain relatively constant as a percentage of payroll, fluctuating between 6½ and 7½% of payroll. That pattern of cost presented no problems except that, when we looked at the funded status, very little progress was being made since the difference between the vested benefit liability and the market value of the assets was increasing. The client was somewhat confused because for similar projections made for their salaried pension plan this condition did not exist. In fact, when they used a 25-year amortization of their initial liability, the market value of their assets exceeded the liability for vested benefits within about 10 years. This brought attention to the fundamental difference between pay related plans, where you can make assumptions for future increases in benefits due to salary increases, and flat dollar hourly pension plans where assumptions for increases in the benefit rate are not allowed.

One possibility which was considered was to add a final average pay minimum benefit provision to the hourly pension plan which, in fact, would never produce benefits in excess of the dollar-per-month benefit but, because it

was now part of the official plan provisions, would allow the actuary to make assumptions for increases in pay levels and thus advance fund for some of the expected increases in future benefits. As a result, the accrual cost projection jumped from 7.6% of payroll to 12.8% and gradually over the 25-year period decreased to 7.6%. This cost pattern was very similar to the one they had experienced with their salaried pension plan. As a result of adding the final pay minimum, the vested benefit funded percentage increased from 50% in 1978 to 100% by 1987, and over the 30-year period assets eventually exceeded 140% of the vested liability. Meanwhile, the funded percentage for the entry age liability went from 34% in 1978 to 90% by the year 2002 and tended to level off there. In doing these projections, a 25-year period was selected to fund benefit improvements.

After talking with the client's labor negotiators, it was decided it would be desirable to come up with an alternative method of meeting the funding objective, namely, to fund the vested liabilities over a reasonable period of time; this would not require adding a pay-related feature to the hourly pension plan. The client's concern was that this would open up the negotiations not only to what the dollar-per-month benefit should be, but also what the final average pay benefit percentage should be. Thus, we experimented with what flexibility we had in selecting a period for amortizing both the initial unfunded liability as well as increases in the liability due to benefit updates. We found that if we selected a 20-year period for funding the initial liability and funded all future benefit improvements over 10 years, we would develop costs which, initially, were less than the costs of going to a final pay minimum plan and which would remain relatively level during the first 20 years, and somewhat lower thereafter. The main point was that, after the end of the twenty-year period, the plan's vested liability for all intents and purposes would be fully funded each year thereafter. The interesting observation was that, after we fully funded the plan's vested liabilities, 10-year amortization of benefit updates tended to maintain that fully funded status.