1992 VALUATION ACTUARY
SYMPOSIUM PROCEEDINGS

SESSION 13

Practical Considerations of Actuarial Opinions and Memorandums

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PRACTICAL CONSIDERATIONS OF ACTUARIAL OPINIONS AND MEMORANDUMS

MS. JACQUELINE M. KEATING: The outline for this session poses the question, how does the valuation actuary ensure that his or her work stands up to regulatory and professional scrutiny? To begin looking at this question, I first want to review the current status of the regulatory and professional requirements or standards. Then I will discuss how these requirements and standards interrelate. And finally, I will consider the various situations that may confront the valuation actuary at year-end 1992.

First, I will review the current regulatory and professional requirements or standards that apply to the valuation actuary focusing on the need for an asset adequacy opinion. In trying to understand the regulatory and professional standards, I found the first step of the process to be just locating and organizing the relevant material. With respect to the asset adequacy opinion, there are five such documents that I will discuss:

1. Model Standard Valuation Law (SVL),
2. Model Regulation -- Actuarial Opinion and Memorandum Regulation,
3. Actuarial Standard of Practice (ASP) No. 7 (Performing Cash-Flow Testing),
4. Actuarial Standard of Practice No. 14 (When To Do Cash-Flow Testing), and
5. Exposure Draft on Standard for Statutory Statements for Appointed Actuaries.

I'd like to begin by briefly reviewing some of the issues covered under each of these documents and indicate where these standards may overlap or complement one another.

But before I do that, I want to caution you that some of the professional and regulatory standards are in a state of change. Many states have not yet adopted the amended Standard Valuation Law and Model Regulation. Variations by state have and will continue to appear in the adoption of the Standard Valuation Law and Model Regulation. Also, the Life Committee of the Actuarial Standards Board (ASB) is proposing changes to the draft standard for appointed

actuaries. These changes and future changes will affect the interaction of the valuation laws, regulations and the professional standards.

The Model Standard Valuation Law was amended by the NAIC in December 1990, and the Model Regulation was adopted by the NAIC in June 1991. I am not going to go through a detailed discussion of these items; rather, I will highlight certain areas pertaining to asset adequacy analysis and how they relate to the professional standards developed in the Actuarial Standards of Practice.

The key issues I want to address with respect to the Model Standard Valuation Law as adopted by the NAIC in December 1990 are:

1. An asset adequacy opinion is required for all companies, except for those companies exempted by the Model Regulation.
2. All reserve opinions, both those based on an asset adequacy opinion and those not based on an asset adequacy opinion, must meet the standards adopted by the ASB and any additional standards imposed by the regulations prescribed by the commissioner.

As I mentioned, the Standard Valuation Law provides that some companies may be exempt from an asset adequacy opinion. The Model Regulation contains the exemption criteria. Companies that met the exemption criteria file what is known as a Section 7 opinion which is *not* based on asset adequacy analysis. All other companies file a Section 8 opinion which is based on an asset adequacy analysis.

Both Section 7 and Section 8 opinions must conform to the Standards of Practices adopted by the ASB and additional standards imposed by this regulation. This is according to the Model Regulation adopted by the NAIC in June 1991. Also, according to the Model Regulation, the analysis should be based on methods deemed appropriate by the ASB.

One final comment I will make on the Model Regulation to illustrate the relationship of the regulatory and professional standards pertains to choice of interest scenarios. The Model Regulation describes certain considerations in developing an asset adequacy analysis. In this analysis the actuary is expected to follow standards adopted by the ASB, but nevertheless, the actuary should consider the effect of seven specified interest scenarios.

The Standard Valuation Law and Model Regulation rely heavily on the standards adopted by the ASB and allow for other standards to be included in the Model Regulation. Later on in this discussion, I will talk about a change in this reliance on the ASB that may come about as a result of the Standards of Practice.

With respect to methods of analysis, the Standard Valuation Law and Model Regulation rely on methods deemed appropriate by the ASB. Finally, with respect to scenarios, the Standard Valuation Law and Model Regulation rely on the ASB as well as those scenarios specified in the regulation.

With respect to Actuarial Standards of Practice, we have ASP No. 7 -- Performing Cash-Flow Testing for Insurers. The stated purpose of ASP No. 7 is to set out recommended practices and considerations in the area of cash-flow testing. This standard focuses on some of the same considerations described in the Model Regulation, such as the allocation of assets and the scenarios to be analyzed. For example, the ASP when discussing scenarios states:

1. The scenarios chosen should be consistent with the purpose of the test. (In some cases, the scenarios may be specified by regulation.)
2. The actuary should consider the relative importance of the risk in choosing the number of scenarios.
3. The actuary should disclose any limitations in the choice of scenarios.

In general, ASP No. 7 appears to complement the considerations outlined in the Model Regulation and the actuary would need to comply with both ASP No. 7 and the Model Regulation.

ASP No. 14 -- When to Do Cash-Flow Testing for Life and Health Insurance Companies. The effective date of the ASP was July 1990. The stated purpose of ASP No. 14 is to provide guidance to the actuary in determining whether or not to perform cash-flow testing as part of forming a professional opinion or recommendation. The ASP states that the need to do cash-flow testing depends on the nature of the risk. Some risks can be analyzed without cash-flow testing.

The ASP outlines various instances when cash-flow testing would be necessary and goes on to state that cash-flow testing might not always be necessary. It gives specific examples.

Finally, we have the Exposure Draft on the Actuarial Standard of Practice for Statutory Statements of Opinion by Appointed Actuaries. The exposure draft was circulated in April 1992 with a deadline for comments of August 15, 1992. A hearing on the Exposure Draft was held in June. As a result of the comments received on the exposure draft, the Life Committee of the ASB has revised the draft standard and I'll refer to this revision as the revised draft standard. In my discussion of this draft ASP, I will highlight some of the recent revisions in this draft standard. However, this revised draft standard has not been approved by the ASB and might change. I believe the revision will be presented in a new exposure draft.

The purpose of the standard as stated in the revised draft is to specify the responsibilities of the appointed actuary in providing a reserve opinion in accordance with the model Standard Valuation Law and with Section 8 of Model Regulation.

The exposure draft circulated in April set out certain provisions for Section 7 and Section 8 opinions. There was concern that the Standard of Practice would force the actuary to do cash-flow testing for companies that would qualify a Section 7 opinion by nature of the professional

standards when the intent of the Standard Valuation Law and Model Regulation was to exempt these companies. The revised draft standard addresses only Section 8 opinions. Section 7 opinions will be addressed in compliance guidelines and I believe will not require cash flow-testing. Compliance guidelines are used in situations where the actuaries' work is constrained by regulations or requirements of other professions. This may require a change in the Model Regulation, because, as I said previously, the version adopted by the NAIC says Section 7 opinions need to meet standards of the ASB and doesn't mention compliance guidelines.

So, one major change in the revised draft standard concerns the treatment of Section 7 opinions. The Exposure Draft circulated in April of this year pointed the actuary to professional standards to determine if asset adequacy testing was required. The revised draft standard is now consistent with the intent of the model Standard Valuation Law and Model Regulation and points the actuary to a compliance guideline for Section 7 opinions which will not require an asset adequacy opinion. Here the actuary may be doing a reserve certification, and not expressing an opinion on the adequacy of reserves.

Another revision to the exposure draft that has been made is to exclude all references in the standard of practice to probabilities and confidence levels. There was a recognition that the state of the art of asset adequacy analysis is not at a point where we can assign probabilities and confidence levels.

With respect to Section 8 opinions, where the Model Regulation requires an asset adequacy analysis, the revised draft standard lists methods that may be used in asset adequacy analysis. As I mentioned before, the Model Regulation states that the methods of asset adequacy analysis must be deemed appropriate by ASB. These methods include cash-flow testing, gross-premium-reserve tests, demonstrations that a product is risk-controlled, or there is sufficient conservation in the reserve bases or market-value analysis. Acceptable methods include other methods specifically related to health insurance products.

The revised draft standard includes considerations that also are addressed in ASP No. 7 and in the Model Regulation, such as development of assumptions, aggregation of results, and developing an opinion.

In many cases the professional and regulatory standards overlap or complement one another. The actuary must look to all the relevant standards to be comfortable with his opinion.

Another way of looking at the issue is to ask the question, where does the actuary look for guidance on a particular topic? For example, suppose the actuary wanted to be sure that his or her report detailing asset adequacy analysis met professional and regulatory standards. Well, a discussion of the report or memorandum is contained in the Model Regulation, ASP No. 7, ASP No. 14 and the revised draft standard of practice. Similarly, if the actuary wanted to be sure that the results of asset adequacy analysis on which he is basing his opinion meet professional and regulatory standards, he or she would need to refer to ASP No. 7, the revised draft standard and the Model Regulation. With respect to the appropriate method of asset adequacy analysis, the actuary needs to refer to ASP No. 7 and the revised draft standard.

So, what does all this mean for the valuation actuary at year-end 1992? It appears that there will be three situations facing the valuation actuary at year-end 1992.

1. First, a few states will have passed the Standard Valuation Law and also adopted the Model Regulation. In this case, the actuary would need to comply with the state's version of the SVL and Model Regulation and the corresponding standard of practice. The draft standard for appointed actuaries may or may not be adopted by the ASB by year-end. For any state that has adopted the Model Regulation, there may be a conflict between the regulation and the revised draft standard pertaining to Section 7 opinions.

2. Second, some states will have passed the Standard Valuation Law but will not have adopted the Model Regulation by year-end. The Standard Valuation Law requires an asset adequacy opinion for all companies, except those exempted by regulation.

However, in this situation the Model Regulation, which contains the exemption criteria, has not been adopted. It is not clear to me what the requirement will be in this situation and will likely vary by state.

3. Finally, many states will not have passed either the Standard Valuation Law or Model Regulation by year-end 1992. The actuary would need to comply with the existing valuation laws and regulations of the state as well as meeting the applicable Standards of Practice No. 7 (Performing Cash-Flow Testing), No. 14 (When To Do Cash-Flow Testing), and Recommendation VII.

PRACTICAL CONSIDERATIONS OF ACTUARIAL OPINIONS AND MEMORANDUMS

MS. MARIA N. THOMSON: I will address the following three topics: (1) considerations in forming an opinion, (2) the content of the opinion, and (3) the content of the memorandum.

Considerations in Forming an Opinion

When your cash-flow testing work is complete, you will have results for multiple lines of business under a variety of scenarios. In Table 1, I have an example of possible results. Note: I have only included the base case (expected scenario) and adverse sensitivity tests, because it is these results that will be used to determine if reserves are adequate. The "Excess Reserves" shown in this chart are the present value of accumulated surplus at the end of the projection period. The "Assessment Spiral" scenario combines high lapses with high claims.

TABLE 1

Range of Results
Excess Reserves (000)

	Interest Scenarios			
General Account	1	3	5	7
1. Base Case	$41,427	$71,666	($20,583)	($58,749)
2. Up Lapse	44,527	73,140	(17,803)	(58,942)
3. Assessment Spiral	9,422	48,303	(33,648)	(71,416)
Separate Account				
1. Base Case	45,638	43,505	43,945	45,180
2. Up Lapse	39,274	37,427	37,755	38,794
3. Assessment Spiral	22,571	21,810	20,752	21,183

Note that the general account business is showing deficiencies under some scenarios, whereas the separate account business does not. You may choose to have adequate reserves for each separate line of business but that is not required by the new opinion regulation. Reserves only have to be adequate in the aggregate. Thus, you must decide how to combine results for your different lines in order to form an opinion. In other words, should you combine all "like"

scenarios for each line (e.g., all "bad cases" or all "up lapses"), or should you combine, say, the "up lapse" for the general account with the "base case" for the separate account?

Once you have decided on what combinations to use, you will have a set of results upon which to base your opinion. Table 2 shows the combinations I have chosen to use for an example -- these are the extremes of the possible combinations. I have shown the best and the worst results. You should know that this range of results came from a "real life" exercise -- these numbers were not invented to make a point. Before I address what you should do if your results look like this, I will go over some simpler cases with you.

TABLE 2

Combination of Results
(000)

	Interest Scenarios			
	1	3	5	7
1. GA Base Case	$41,427	$71,666	($20,583)	($58,749)
SA Base Case	45,638	43,505	43,945	45,180
Total Excess Reserves	$87,065	$115,171	$23,362	($13,569)
Deficit Years				10 on
2. GA Assessment Spiral	$9,422	$48,30	($33,648)	($71,416)
SA Assessment Spiral	22,571	21,810	20,752	21,183
Total Excess Reserves	$31,993	$70,113	($12,896)	($50,233)
Deficit Years	3,4	2-5	16 on	3 on

1. The Best Situation

All of your results are like number one of Table 2 (Base Cases), Interest Scenarios 1-5. In this situation, you have a surplus at the end of your projection period and no interim deficits at any point in your projection period. Clearly, if this occurs, your reserves are adequate. No strengthening is required.

2. The Controversial Situation

You get some results like number two, Interest Scenarios 1 and 3. Here, you have a surplus at the end of the projection period, but there are interim deficits in the early projection years.

Table 3 shows the surplus accumulation by year for the first five years, for each combination given in Table 2. Number 2 in columns 1 and 2 is what is under discussion.

TABLE 3

Combination of Results: First Five Years
Surplus (000)

		Interest Scenario			
	Year	1	3	5	7
1. GA and SA	1	$8,459	$5,990	$10,001	$12,884
Base Cases	2	11,559	6,547	15,870	11,489
	3	16,948	10,884	24,248	9,996
	4	21,378	14,820	31,606	6,699
	5	27,410	22,553	39,576	3,837
Excess Reserves		87,065	115,171	23,362	(13,569)
2. GA and SA	1	3,807	1,331	5,357	8,246
Assessment	2	138	(4,649)	4,896	394
Spirals	3	(167)	(5,496)	8,380	(6,057)
	4	(1,556)	(6,810)	10,737	(14,198)
	5	353	(2,769)	15,408	(20,012)
Excess Reserves		31,993	70,113	(12,896)	(50,233)

I was a faculty member for the cash-flow testing seminars earlier this year, and I learned that actuaries are split about 50/50 on whether this situation calls for strengthening. What are the issues? If these interim deficits represent an absence of sufficient assets to meet obligatory payments to policyholders, there is no issue. If these scenarios are viewed as being reasonably likely (given your view of how conservative reserves should be), then reserves must be strengthened prior to the occurrence of the projected deficits. The additional reserves can be released as needed to eliminate the deficits.

However, in many cases these deficits simply represent a situation in which assets temporarily fall below the level of required statutory reserves. There is no cash-flow problem -- there are

enough assets on-hand to pay policyholder benefits, so reserves are adequate on a cash-flow test basis. For this reason, many actuaries feel no strengthening is called for in this circumstance.

The other school of thought is that in addition to protecting policyholders' benefits, reserves are now intended to have a role in preventing insolvencies. If this is the case, then additional reserves should be established when the in-force business is generating earnings to be released when the business is generating book losses to mitigate strains to surplus.

At this time, Actuarial Standards of Practice provide no clear guidance on how to resolve this issue -- so it's up to you. Some of your considerations might be:

- How far in the future are these projected deficits?
- How likely are the deficits? Are a number of scenarios showing deficits over the same period?
- What is your company's current surplus position? Is it strong enough to withstand the projected losses?
- Would your management prefer taking the chance of realizing future statutory losses over reducing current statutory income?

3. The Toughest Situation

This is the situation where you get the full range of results shown in Table 2. With such extreme results, how do you close in on a decision about what your reserve level should be?

First, establish your criteria for strengthening. For instance:

- Do you want to "pass" a certain number of the required seven interest scenarios?
- How conservative do you want reserves to be? Should they be adequate 60% of the time? 80%? 95%?
- Do you want to eliminate deficits in interim years?

Next, establish the ballpark likelihood of each scenario. For interest scenarios, this can be done fairly scientifically by running your cash-flow tests for a large number of random interest scenarios and comparing the results to those for the required seven.

For other assumptions, you can get a feeling for what is likely by reviewing historic events, examining current trends, and reviewing your products' features and company practices to determine where the company is well protected and where it is vulnerable.

I would recommend that you establish a "benchmark" scenario(s) that will determine the amount of strengthening needed, if any. A few notes on mechanics:

1. Be sure that you are discounting your accumulated deficit on exactly the same basis that you accumulated at (e.g., after-tax earned yield rate), if possible.
2. This amount is, theoretically, the amount of strengthening required. Put it into the model and run the cash-flow test, because you will find that it will not give you a surplus of 0 at the end of your projection period, like it should because:
   a. The assets you put into the model for the additional reserve won't exactly match the mix of the rest of your portfolio.
   b. You did "1" imperfectly.

   Thus, solving for the correct amount of strengthening involves some trial and error.

Note: The Model Law permits a three-year phase-in for 1992 strengthening.

I would like to close this part of my talk with a brief discussion of how to do the strengthening. If the reason for the strengthening is a near-term interim deficit, then you should examine the cause of the problem. If it is related to expenses or assets, then the strengthening should probably be taken in the form of an expense or asset reserve.

If you are not certain that the strengthening need be permanent, then you should treat it as a lump-sum additional reserve, and not re-value your existing policy reserves. This allows you

to release the reserve if it proves not to be needed, or to release it to offset losses as they develop (if the reserve was being held for that purpose).

Finally, if strengthening is required, or you feel that it is close to being needed, then you should do a reserve analysis more than once a year, so that the reserves can be adjusted during the year as needed.

Content of Opinion

Three sample Opinions were included in the handouts, all of which include strengthening:

1. Unqualified, non-New York -- This includes a few paragraphs required by New York, relating to expenses, reinsurance, cash flows, etc.
2. Unqualified, New York -- This is distinguished by a section describing how the methodology for this asset adequacy analysis differs from the previous year's analysis. Note: it appears that Regulation 126 will still be in effect this year, as the New York Insurance Department has not completed their modifications to the Model Law. Thus, this sample Opinion may not be applicable for this year.
3. Qualified, non-New York -- It is a difficult decision to qualify an Opinion:
   a. You may have many concerns about various aspects of your asset adequacy analysis -- what types of things merely merit a mention in the memo and what merits a qualified opinion? That's a matter of degree -- how great is the risk, and how likely? One must consider that the new Opinion is very sweeping in scope: it says you have evaluated assets, liabilities, and cash flows, and everything is fine. Qualifications that are noted in the Actuarial Memo, only, may not acquit you of your liability if the reserves prove to be inadequate.
   b. Most major concerns can be addressed through strengthening or changes in management practices. Following are some examples of issues which can't be dealt with in that way:
      - A significant amount of business has been ceded to a reinsurer which is having major financial problems.
      - There is not enough asset liquidity to withstand a "run-on-the-bank," and your company's ratings are about to be lowered.

- Your company's interest crediting practices for its adjustable-rate products, in conjunction with its investment policy, lead to severe losses under many likely scenarios. You have been unable to persuade your management that their practices need revision, and if you strengthen reserves by the amount that is indicated, you would seriously impair your firm.

There are a few ways an Appointed Actuary can deliver an unqualified Opinion, and still mitigate his personal liability:

1. *Reliances* -- Be sure to get a "reliance letter" from anyone whom you have relied upon for information or an opinion (perhaps an opinion regarding the appropriateness of certain assumptions).
2. *Scope* -- Use the scope section of the Opinion to carefully define the exact liabilities you are expressing an Opinion about.
3. *Disclaimer* -- Some sort of cautionary language might be wise such as:

> This opinion will be updated annually. The impact of events unanticipated in the projections, and occurring subsequent to December 31, 1992, is beyond the scope of this opinion. However, to the best of my knowledge, there have been no material changes from December 31, 1992 to the date of the rendering of this opinion which should be considered in reviewing this opinion. This opinion should be viewed recognizing that the company's future experience may vary from the assumptions used in the cash flow projections.

Finally, if you are having any difficulties arriving at an opinion, or you feel you may have a difficult time with your management over it, I would recommend you discuss the issues with some peers. One of these peers should be your auditor's actuary. Peer review will provide you with some support for your opinion, which will help you with your management and which will also help protect you in court if problems develop with the reserves. If you do this, you should take some care in selecting your "peers." Those who haven't personally acted as appointed actuaries might have difficulty appreciating the issues you are wrestling with and probably will not have the proper "mind-set" for making appropriate decisions relating to those issues.

Content of Memorandum

My final topic is the actuarial memorandum. You should not look upon this as simply being a mechanical requirement. This document is an important communication vehicle to management. It should tell them:

1. What your analysis consists of;
2. What your Opinion means;
3. Key assumptions that you made, particularly relative to matters that are largely under management control; and
4. Any concerns that you have relative to your opinion -- these may be matters that would have qualified your opinion if they had seemed highly likely to occur.

In addition, this document is a good place in which to raise related issues relative to the soundness of the company, which you may wish to go on record about.

I want this document to be as readable as possible, so I put all the data and most of the technical details in the latter sections. I also relegated the "Model Description and Assumptions" section to the back of the memo. I started the memo with scope, following with analysis methodology and progressing to results and conclusions in the middle of the memo. Thus, the information that I felt was most important to communicate was in the front and middle of the memo and the least important information was in the back.

There is a sample memo in Appendix A. At the bottom of each page I have listed particular points you might want to make or issues you should consider.

The first page is the beginning of the Scope of Analysis section, which is analogous to the Scope section of the Opinion. In my Scope section, I have chosen to highlight what is excluded from the Opinion, as well as what is included. We are only required to address what is included, with the exception of a provision in Section 5.2 of ASP 7 which states:

> In the case of a cash-flow test involving only a portion of the assets or a portion of the obligations, the actuary should disclose whether the adequacy of any remaining assets to support the remaining obligations has been examined and if not, why not.

By showing both the assets and the liabilities that were excluded from the analysis, I was in a position to make some observations about these items in relationship to each other. I have listed some considerations in determining which product lines will be included in your reserve analysis and opinion.

I have included a disclaimer about surplus in Section C. I did this because many people seem to have the impression that our analysis includes surplus and that an unqualified opinion means we expect the company to remain solvent. If you have reservations about surplus, you should probably mention them here (see the items listed for discussion in C). However, it may be wise to make it clear that your cash-flow analysis does not cover surplus.

The items for discussion in b. refer to II.A.1.b. The length of the projection period is raised as a consideration in II.B. The Exposure Draft of the proposed ASP on Statutory Statements of Opinion provides guidance on this issue in Section 5.4.2.c., where it states that the projection period should extend "to a point at which reserves on a closed block are immaterial in relation to the analysis."

The calculation of earnings is given in Section II, C, D and E. The actuary must make a number of decisions relative to this:

- Include asset valuation reserve (AVR)? Interest maintenance reserve (IMR)?
- Use market or book values? If market is used, should an attempt be made to value liabilities at market, as well as assets?
- Should annual earnings or end-of-projection period surplus be discounted to determine the excess reserve? Theoretically, the same result should occur either way.

The method of combining line of business results is given. All of the lines can be run simultaneously in each cash-flow test, which means that assets are not segmented by product line. If each line is tested separately, assets must be separated for the cash-flow tests. Issues to consider relative to this are given at the bottom of the page.

Section III discusses the scenarios that were tested. Note the disclaimer language in the discussion. It is my opinion that more professional scholarship is needed on the types of scenarios which should be tested. For instance: Should we be doing economic boom-and-bust scenarios, with asset values, health claims, lapses and expenses all tied to the boom-and-bust cycle? Should we project the occasional epidemic such as AIDS? The types of scenarios which are projected are key to the quality of the results.

The results are summarized in Section IV, and the conclusions (your opinion) are given in Section V. Great care should be taken in these sections of the memo to explain your rationale for the particular line of business scenarios you choose to combine, and to explain the basis for the conclusions you arrive at. These sections should be well-reasoned, as you may be closely questioned on your conclusions by both internal and external parties.

The "Special Qualifiers" section would include items that could lead to a qualified opinion, if your concern were great enough.

The rest of the Memo provides technical details on how the model was built and the assumptions that were used. In each section, space is given for a discussion of the risks associated with each line of business, the way you tested the exposure to such risk, and particular issues relating to the basic assumptions that you chose.

APPENDIX A

Actuarial Memorandum
Supporting the Actuarial Opinion with Respect to
Asset Adequacy Analysis for 1991 Statutory Reserves
and Related Actuarial Items

I. Scope of Analysis

A. Lines of Business

1. Included in analysis
   - Individual Life
   - Annuities
   - Individual Disability Income
2. Excluded from analysis

   All Group Life and Health business, for the following reasons:

   a. The amount of this business is too small to have much impact on total results, having reserves of $XX,XXX million out of a total of $XXX,XXX million General Account reserves, or 1.7%.

   b. In any case, the nature of this business is such that there is little necessity for cash-flow testing. This business is employer/employee group. The contracts can be cancelled and the premiums can be changed annually without limit.

Issues to consider:

- ASB Guidelines
- Materiality
- Need positive cash flows from line which it's not necessary to test, to offset negative results of other lines?

B. Types of Liabilities

1. Included in analysis

Exh. 8, Life & Annuity Reserves*	$
Exh. 9, Acc. & Health Reserves	
Exh. 10, Line 2.3, SCNI Reserves	
Exh. 10, Line 5, Ann. Certain & Lump Sum Res.	
Exh. 6, Sep. Acct. Reserves	
Total	$

*Includes $n million of 12/31/91 strengthening as result of asset adequacy analysis. Appendix 1 shows the method and basis for the determination of the reserves.

2. Excluded from analysis

Exh. 8, A., C-G, Col. 6, Group Life Res.	$
Exh. 11, Claim Liabilities	
Separate Account Exh. 6, Reserves on reins. ceded	
P.3, Lines 9 & 10, Premium Liabilities	
P.3, Lines 12, 12A, 13, 14, 14A, 15, 18 Exp., Allow., & Taxes	
P.3, Line 13A, Sep. Acct. Transfers Accrued	
P.3, Line 24.1, MSVR	
P.3, Lines 11, 17, 19, Miscellaneous	
Sep. Acct. p.3, lines 6-16	
Total	$

C. Surplus Account

Surplus adequacy was not covered by the Actuarial Opinion and no analysis of surplus was performed.

- Discussion

Items for discussion in C:

- Reservations about quality of assets left for surplus
- Reservations about adequacy of surplus for planned new business, corporate acquisitions, capital expenditures, etc.

D. Assets
   1. Identification -- see Appendix 2
   2. Source and Modeling Approach
      a. General Account assets
         A year-end inventory was made. These assets were projected in the model on an asset-by-asset basis.
      b. Separate Account Assets
         Individual assets were not projected, just total fund growth.
   3. Allocation by Line of Business (LOB) -- see Appendix 3.

II. Analysis Methodology
   A. Initialization
      1. Begin by setting assets = liabilities.
         a. Liabilities are those which are being subjected to the asset adequacy analysis. Testing was done without any assumed 1991 strengthening, to determine if strengthening would be necessary.
         b. Assets were segmented, for cash-flow testing purposes, by LOB. Preliminary testing was done by LOB. Final tests were performed with all General Account assets used for cash-flow testing combined into one portfolio, and cash flows for all related product lines projected simultaneously.
            - Discussion

Items for discussion in b.:
- Basis for determination of assets to allocate to each LOB.
- Nature of assets not used (allocated to surplus)

2. Purpose of initial testing is to determine if the assets, together with the income earned on them and the income from the in-force policies and contracts, is sufficient to cover the contractual obligations and related experience for these policies and contracts.
3. In the case of these tests, it was not. Thus, an additional *n* million of assets was allocated to LOB 1 in the form of cash for the final cash-flow tests. Reserves were not increased by *n* million for modeling purposes, because the additional reserve would have had to be released by the end of the projection period to achieve the full beneficial effect of the strengthening and to determine if it was adequate. The timing of this release does not affect the surplus result at the end of the projection period.

B. Projection Period
1. Ideally, this should cover the life of all the in-force business. 30 year period used, as little remains beyond this time.
2. Reserves outstanding at end of 30-year period considered to represent adequate approximation of present value of future policy cash flows for purposes of these tests.

Issues to consider:

- Length of projection period
- Provision for cash flows beyond projection period

C. Determination of Annual Earnings
   1. Calculated on statutory basis.
   2. Includes capital gains and interest on accumulated cash flows, as well as policy income.
   3. Policy obligations, expenses and all taxes are deducted.
   4. Effects of reinsurance are included.
   5. Mandatory Security Valuation Reserve (MSVR) is *not* covered.

D. Accumulation of Earnings
   1. Mechanics
      Annual earnings are accumulated with interest as a projected surplus or deficit. Surplus at any given time is book value of assets less book value of liabilities.
   2. Evaluation
      a. Surplus at end of projection period.
         Book surplus at the end of 30 years was chosen as the first measure of whether or not current reserves are adequate to provide for all future obligations to the policyholders. The book measure, instead of a market value measure, is chosen because it is not assumed that all the business will lapse at the end of 30 years.
      b. Annual Surplus
         If there is a deficit in any year, it indicates that reserves will be deficient in that year. If there is a surplus by the end of the projection period, that indicates that any earlier strengthening to avoid a deficit can ultimately be released. A few years of deficits over a long projection period, which are not repeated in the same time period under different scenarios, are not a matter of immediate concern if they don't occur soon. Temporary deficits which are projected to occur within the next few years, however, may indicate a need for immediate strengthening.

E. Discounting of Earnings
   If there is a surplus (deficit) at the end of the projection period, it means the current reserve is too high (too low). The amount of the excess (deficient) reserve is determined by discounting the surplus (deficit) at the end of 30 years using the after-tax projection interest rates.

Issues to consider:

- Definition of earnings
- Use market or book values?
- Discount earnings or surplus?

Note: *Must* discount on same basis as accumulate earnings (e.g., after-tax projection interest rates).

F. Frequency of Cash Flows
Cash flows are calculated quarterly.

G. Aggregation
1. General Account
All of the General Account business was combined in the final cash-flow tests. This means that assets were not segmented by product line, and overhead expenses were not allocated to product lines. Product specific assumptions were used to model the product cash flows, but the cash flows for all products were combined in each test.
2. Variable Products and Fixed Options
For variable products with a fixed fund option, the fixed and variable parts were treated as two separate policies. The fixed portion was modeled with the general account business and the variable portion was modeled separately.
3. Separate Account
Variable product (funds) were modeled separately from general account products (funds). There was no asset segmentation by variable fund or product.

Issues to consider:

- Does company manage assets on a segmented basis?
- Want to look at results/sensitivities by LOB?
- Combining lines in a cash flow test limits the combinations of scenarios you can look at for those lines.

III. Scenarios

A. Interest

The seven scenarios specified in the NAIC Model Regulation for Asset Adequacy Analysis (and also specified by New York Regulation 126) were used, plus *n* additional scenarios. Specifications are given in Appendix 4.

B. Other Assumption Sensitivities

See Appendix 5.

C. Discussion

It is impossible to test for all possible future events. The scenarios which were tested, in addition to the legally required seven interest scenarios, were chosen to determine the effect of "reasonable" extremes in key variables used to project cash-flow results. Reasonability was empirically determined, based upon a review of the fluctuations in the company's historical experience and upon my knowledge of what is typical within the industry.

Reserves are not intended to be adequate to cover disasters, such as an atomic bomb. While no amount of surplus can cover a disaster of that magnitude, it is important that the company maintain an appropriate level of corporate surplus to cover the occasional highly adverse event (such as a flu epidemic), or a rare confluence of negative events, or management error.

Issues to consider:

- Relationships between assumptions
- Sensitivities for assets as well as liabilities
- Economic events

IV. Summary of Results

Results are given in Appendix 6, in 3 Tables. Following is an explanation of each Table.

Table 1: Detailed Results

PV of 30 year surplus for each scenario tested

Table 2: Combination of Results-Excess Reserves

Various combinations of all the product lines are shown. The Base Cases are all combined to give a point of comparison, and this is followed by a variety of conservative combinations. Following is a discussion of the latter:

Explanation of reasonability for particular combinations chosen.

Summary of Results:

Ranges from worst to best

Table 3: Combination of Results-Short term Surplus

This table shows the first r years of surplus for adverse Combinations 2-4 from Table 2. The purpose of this table is to ascertain if reserves are adequate to cover obligations over the next r years.

Summary of results

Issues to consider:

- Scenarios to combine for each line
- Likelihood of each scenario, or combination of scenarios
- Degree of conservatism desired in reserves

V. Conclusions

A. Strengthening Criteria

My criteria for reserve strengthening was as follows:

1. There must not be a 30th year surplus deficiency under any reasonably adverse scenario, on a combined line of business basis.
2. There must not be any surplus deficiencies in the first *r* years under any reasonably adverse scenario, on a combined line of business basis.

B. Criteria 1: No deficit after 30 years

1. I viewed all the adverse sensitivity test combinations shown in Table 2 of Appendix 6 as having at least a 5% chance of occurring. In considered this to be reasonably likely, for reserve purposes. I did not believe any other, more adverse, combinations had as much as a 5% chance of occurring; therefore, I did not consider them to be reasonably likely.
2. Interest Scenarios X-Y produced the most adverse results. I considered all three of these to be highly unlikely, but of them, Scenario X seemed to be the most reasonable. My reasons for this view are as follows:
3. For Scenario X, Combination 4 from Table 2, Appendix 6 had the lowest excess reserve result. Thus, in order to meet Criteria 1, Scenario X of Combination 4 had to have an excess reserve result of 0 or better. The results given in Table 2 include the 1991 reserve strengthening. With this strengthening, the excess reserve under Scenario X, Combination 4 is positive.

C. Criteria 2: No deficits in the first *r* years.

For this criteria, Interest Scenarios b-c produced the most adverse results.

Examination of Table 3 will reveal that the 1991 strengthening did meet this criteria, as all deficits were eliminated.

Issues to consider:

- Which scenarios must show reserve adequacy? Pick percentage? Weight results?
- Want to eliminate deficits in all projection years, or just early ones? If latter, how many years must show surplus?

VI. Special Qualifiers
Risks not quantified (e.g., reinsurer insolvency).

VII. Model Description and Assumptions -- Company Level

A. Model Details

Appendix 8 shows details for:

1. Expense by product line
2. Reinsurance

B. Discussion

Issues to consider:

- Are expenses on going concern or closed block basis? Implications of each?
- How do projected expenses look relative to historical levels?
- Reinsurance recapture options

VIII. Model Description and Assumptions -- Annuities

A. Model Details

Appendix 9 shows details for

1. Model fit
2. Product descriptions
3. Assumptions

B. Market and Distribution

1. Deferred Annuities

These were distributed by the company's career force to professionals.

2. Immediate Annuities

Some of this was sold direct, and some of it is settlement options on deferred annuities and life insurance.

C. Underwriting

Guaranteed issue

D. Risks Which Could Cause Reserve Deficiencies for Product Line

1. Deferred annuities
   a. Expense

   This risk takes the following two forms:

   - Expenses higher than assumed in pricing for fixed funds,
   - Spreads between interest rates earned and credited are less than assumed, so that expenses are not covered.

   b. Disintermediation

   If the market value of the assets supporting the reserves for these funds is less than the surrender value of the funds, the company will take a loss upon surrender. Reserves could be insufficient to cover a high level of surrenders under these circumstances.

   c. Liquidity

   In this situation, assets are not sufficiently liquid to enable the company to make payments on surrenders within the time frame contractually required.

   d. Interest

   Interest earned is less than interest credited.

   - Discussion

2. Immediate Annuities
   The nature of the risks for these products is essentially the same as for deferred annuities, with the exception that for those products with life contingencies there is a risk of mortality being less than expected. For immediate annuities the payments to policyholders are scheduled vs. unscheduled surrender payments on deferred annuities, so management can more easily match the contractual cash inflows from the assets to the cash outflows from the liabilities than is the case with deferred annuities.

   - Discussion

E. Discussion of Assumptions

IX. Model Description and Assumptions -- Disability Income

A. Model Details -- see Appendix 10.

B. Market and Distribution
   1. Distribution
      Career agency force
   2. Market
      Professionals -- particularly in the medical field. High benefit amounts. Issue ages mostly between 30 and 60.

C. Underwriting
   For the most part, fully underwritten on an individual basis, with level of requirements increasing with age and benefit level.

D. Risks Which Could Cause Reserve Deficiencies for Product Line
   1. High expenses
   2. High morbidity
   3. Asset/liability mismatch on claim payments (e.g., disintermediation and liquidity risks)
   4. Interest below reserve requirements

   - Discussion

E. Discussion of Assumptions

X. Model Description and Assumptions -- Variable Life

A. Model Details -- see Appendix 11

B. Market and Distribution
Distributed by stockbrokers to clients. These are single premium, high amount policies sold primarily as tax-sheltered investments.

C. Underwriting
Fully underwritten.

D. Risks Which Could Cause Reserve Deficiencies for Product Line
1. High expenses
2. High mortality
3. The fixed funds on these policies have the same risks as the deferred annuities.

- Discussion

E. Discussion of Assumptions

Issues for discussion for VIII-X:

- Ways in which named risks were tested
- Degree to which company's particular products are protected from such risks due to product design, underwriting, marketing, investment policies, etc.
- Trends or cycles company or industry has experienced
- Confidence level in assumptions -- qualifiers
- Factors not considered and reasons

XI. Model Description and Assumptions -- Assets

A. Model Details -- See Appendix 12

B. Discussion of Assumptions

PRACTICAL CONSIDERATIONS OF ACTUARIAL OPINIONS AND MEMORANDUMS

MR. MARK A. DAVIS: My presentation will discuss how valuation actuaries can gain confidence that their work will stand up to regulatory and professional scrutiny. In the past few years I've had numerous assignments in which I've reviewed the work of other actuaries, often valuation actuaries. Typically, these assignments have included an actuarial review of reserves and related items leading to an independent Statement of Actuarial Opinion. Those actuarial opinions have been issued in conjunction with financial examinations conducted by state insurance departments. Thus, I have often been a professional and regulatory "scrutinizer," and I believe it would be helpful to share with you what I look for in conducting these reviews. In this manner, valuation actuaries and appointed actuaries can better prepare for the scrutiny that is to come.

The concept of the appointed actuary becomes reality for 1992 annual statement reserve opinions. I believe that many appointed actuaries will be new to the job -- either they are consultants or have new responsibilities resulting from their appointed actuary status. It is important that the appointed actuary "get their hands dirty," and not rely too much on others in the company since it is his or her responsibility to sign the opinion. Getting up to speed on a company's valuation systems and procedures can best be accomplished via an internal valuation audit.

An internal valuation audit could consist of many different steps, but in general terms it should (1) assess strengths and weaknesses of the valuation process, (2) evaluate what controls are in place relative to the system's flow of information, and (3) gain familiarity with the methods and procedures being employed. Typical weaknesses of a valuation would include any manual procedures, whether it be "off line" calculations or manual adjustments due to computer error, and the blind application of various "factors" whose source is unclear or unknown but has been used every year in the past. This type of analysis should lead to error discovery (usually there are errors, hopefully not material) and will formalize the "audit trail" making it easier for both

internal and external reviewers or auditors to complete their review. A formal audit trail should also make the appointed actuary's job easier each year.

We have found that the quality and integrity of an insurer's valuation varies widely from company to company. There are, however, certain areas that are more troublesome than others. Areas where we have found errors are briefly discussed below.

Reinsurance

Reinsurance for some insurers is a bookkeeper's nightmare, and I would categorize this area as more of an accounting problem than an actuarial one. The appointed actuary should be aware that it is the net reserve (after reinsurance), not the gross upon which he or she opines.

GICs

Since these contracts are so asset intensive, a small error can lead to a large (vis-a-vis surplus) reserve change. Many companies used the Commissioner's Annuity Reserve Valuation Method (CARVM) charge-in-fund basis for valuation. This type of calculation can be difficult to program and check, but it should be done vigorously. Also, there seems to be some diversity of opinion as to whether the cash value floor applies in the aggregate or on a contract-by-contract basis. In my opinion this floor applies contract by contract. Otherwise, a certain pattern of surrenders could cause next year's reserve to be partially funded by surplus, and not policy mechanics (premiums, interest, etc.). In general, funding reserve increases through the use of surplus funds violates statutory reserving principles; for this reason I believe the floor applies contract by contract.

Disability Income

For group disability and during the first two years of disability for individual, an insurer may use its own experience for computing Exhibit 9 claim reserves. If this is the case, such experience studies should be updated annually and changes implemented as necessary. In addition, adequacy analysis should be performed for whatever basis is being used to calculate

disabled lives reserves. I have seen cases where the approved valuation basis has been inadequate for some insurers.

"Cost of Collection" Liability

This item is often included in the actuarial opinion. Often, the calculation is not made by the actuarial department. The questions are, who is responsible for this calculation and do they know what they're doing? Are net-to-gross factors and average commission rates used? Is a premium tax allowance considered? Are these factors updated at each year-end? I've seen as many cost-of-collection liabilities done wrong as I've seen done right.

Universal Life (UL) Model Regulation CARVM Reserves

Due to the complexity of this calculation, approximate methods are often used. Prior to any outside review, the appointed actuary should prepare an analysis that demonstrates that the approximate method produces results at least as great as the model regulation calculation.

CARVM

As is the case for GICs, small errors here can have a large surplus impact. At a minimum, the appointed actuary should check for the proper determination of the contract classification, valuation interest rates, and that the contract features (i.e., bail-outs, free partial withdrawals, free-look period) have been properly reflected. The appointed actuary should also be aware of any special state requirements (i.e., continuous CARVM requirements).

Asset Adequacy Analysis

I have had a chance to review a few instances where asset adequacy analysis (i.e., cash-flow testing) was performed in support of the actuarial opinion. In these few cases, the work performed was, in my opinion, less than stellar. Hopefully, these efforts will improve for 1992 opinions. This area will be discussed at length later in this paper.

Now I would like to set the stage for the remainder of this presentation. Assume that I have been hired by your state insurance department to review your 1992 submission -- the opinion

and the supporting actuarial memorandum. In what remains of this paper I'll have my state regulator hat on. I will provide a framework to help appointed actuaries meet and pass regulatory professional scrutiny. I'll set forth what I, and other fellow professional scrutinizers, would look for in reviewing 1992 actuarial opinions and memorandums. Hopefully, this will assist appointed actuaries in their work and in the preparation of those documents.

My first topic is claim reserves -- Exhibits 9 and 11. I'll review very closely the methodology employed and adequacy analysis studies (i.e., claims run-out analysis) supporting the claim reserves amounts carried in previous years. I'll review the historical Schedule H tests and if the development is unfavorable year after year, I'll be questioning the methodology and looking for annual updates of trend factors, lag factors, etc. The appointed actuary should be prepared, in advance, to defend unusual methods that are not necessarily accepted standards of actuarial practice.

For CARVM reserve calculations, I'll look for the proper treatment of product features (as I mentioned) and a contract-by-contract application of the cash value floor. Change-in-fund calculations will be spot checked manually. Perhaps most important, I'll check the propriety of the valuation interest rates used by examining contract classification and issue year. I'll also check the calculation of fund values, since this is normally the starting point of the CARVM benefit projection. Last, spot checks of the calculations will reveal whether all of this information has been properly reflected in the calculations.

Similar review procedures would be employed to review other troublesome areas that were identified earlier. For the remainder of this presentation, I'll concentrate on asset adequacy analysis, more commonly referred to as cash-flow testing. Not all companies or lines of business will be subject to cash-flow testing. In some cases, other methods of asset adequacy analysis will be used. At the very end, I'll discuss what I would look for in these situations.

I'm somewhat concerned that some actuaries are not taking the new asset adequacy responsibilities seriously enough. I've heard discussions of a "meatball surgery" approach for

1992 and then gauging regulatory response. I've also heard instances where, for a company that is very surplus rich, the actuaries thought this entire exercise was a waste of their time. Also, since the memorandum is *not* required to be filed with the Annual Statement, some actuaries seem to doubt that their memorandum will be subject to regulatory scrutiny. I'm disturbed by these reactions to the new responsibilities actuaries have been given. If we are ever to move away from formula-based minimum reserve requirements to reserves determined (and certified) to be actuarially sound then the actuarial profession will have to prove itself worthy of such a responsibility. Actuaries in Canada and Great Britain have this responsibility and it has worked quite well -- very few insolvencies have ever occurred. Here in the U.S., it is vital that we, the actuarial profession, carry out our expanded responsibilities in such a way as to further the prestige and standing of our profession. We cannot afford to get off on the wrong foot with the appointed actuary role.

I recommend that appointed actuaries perform their duties assuming that state insurance commissioners *will* request actuarial memorandums. Furthermore, I suggest working under the assumption that actuarial memorandums will be reviewed by consulting actuaries who are expert in the area of cash-flow testing. Given this, the appointed actuary should prepare a well-written memorandum, which is thorough, precise, and a first-rate document in every respect. A high quality memorandum can do no harm; it may imply the same for the work performed in support of it.

For extensive cash-flow testing, asset/liability models and projection systems will be used. If the software is "homegrown," I will immediately be concerned as to whether it captures all the dynamics contained in the vendor software packages. Are lapse rates, policy loan activity, interest crediting strategy, investment strategy and asset prepayment rates related somehow to scenario interest rates? I am not aware of any "homegrown" systems that are as sophisticated as the vendor software packages in this regard.

Naturally, the representativeness of the asset and liability models will be assessed. Generally speaking, I don't like to see too much "modeling" of assets. I prefer to see a seriatum

projection. I would look at the mapping of liability plan codes in the model plan codes, and also a validation of initial values (reserves, premium, fund value, cash value) produced by the model against the actual values. Depending on the particular block of business being modeled, liability "modeling" can be very straightforward (i.e., almost all plans are model plans) or quite cumbersome, as could be the case for a large block of seasoned, traditional life insurance.

In the asset projection, I'll be especially interested in the projection of collateralized mortgage obligations (CMOs) and any assets included that are not fixed income. For CMOs, I'll look for how exotics are handled, such as inverse floaters, comparison tranches, ioettes, and jump and sticky-jump Z tranches to name a few. The complexity of most of the latest CMO deals nearly requires the use of a Wall Street firm for the CMO cash-flow projection since the vendor software packages cannot fully handle the exotic structures. If assets such as common stock, real estate, joint ventures and partnerships are included in the projection, I'll look at growth parameters and cash-flow assumptions and require some supporting information. I would also expect to see some sensitivity analysis since usually the parameters here are quite subjective.

As a reminder, don't forget to include any existing deferred acquisition cost (DAC) proxy tax balance and amortize it over the applicable period. I'll also be looking for the capitalization and amortization of new DAC amounts applicable to future premium income.

From the statutory balance sheet, I would like to see an allocation of the assets to the liabilities. The allocation should cover all entries, even the receivables/payables and accrual entries. Typically, insurers have cash and invested assets in excess of insurance reserve liabilities. The allocation should show which assets are supporting reserves that are included in cash-flow testing, and which assets are supporting other reserves and liabilities. I believe assets must be allocated to lines or reserves not cash-flow tested, since it would be quite inappropriate to have the home office real estate asset backing short term medical or life claim liabilities carried in Exhibit 11.

As for actuarial assumptions of mortality, morbidity, and persistency, I will assess reasonableness and look to supporting experience studies. A major focus of my review would focus on expenses. I will review how the unit costs were developed and assess whether all expenses attributable to the in-force block have been included. This job can be made easier if the appointed actuary prepares an expense reconciliation of the 1993 projected expenses to actual 1992 expenses included in the annual statement. This is more than just a simple exercise, as lines not included in the cash-flow projection should have an expense allocation and 1992 actual expenses will have to be split between maintenance and acquisition, and perhaps overhead as well. If overhead is included in cash-flow testing in less than the full anticipated amount (as it should be), I would look at the assumed split of overhead by in force and by future new business. In cash-flow testing work I have reviewed in 1992, an expense validation of this type was lacking in every case.

I will be looking for reasonableness in reviewing the unique assumptions to cash-flow testing, such as defaults, prepayments, yield-curve definition and asset parameters, interest crediting strategy, and investment/disinvestment strategies. Due to the lack of experience data, some of these assumptions must be judgementally set. Some of these assumptions should take into account current management strategies and should not be set independently merely in order to pass the cash-flow tests.

One issue that often arises and can impact the assumptions is the issue of whether the assumptions should be appropriate for an open or closed block. In many companies, items such as the corporate investment strategy are developed on a going-concern basis, and anticipated new business cash flow can have a great impact in deciding how to invest *investable* cash flow. In cash-flow testing for reserve adequacy, we have a closed block of business being projected. Assumptions or strategies appropriate for a closed block in isolation may differ significantly from those appropriate for the company as a whole. The appointed actuary, as well as any scrutinizer, should be aware of this issue and its impact on the determination of reasonableness.

The analysis and interpretation of the results of cash-flow testing requires actuarial judgment. It is in this area that many actuaries are uncomfortable, no doubt due to the novelty of the exercise as well as the inexperience in forming these opinions and judgments. In this area, I would look at the variability of the results (accumulated surplus at projection end). Large variability may indicate a need to use more scenarios. Very low variability raises questions about the assumptions employed or the dynamics of the model/projection system. Sensitivity analysis of key assumptions and strategies should be performed. The pattern of accumulated surplus should also be examined. Although accumulated surplus may be quite large at the end, losses experienced in the early projection years could threaten the solvency of the company. Here again, judgement is required.

Does a failed scenario indicate that additional reserves are required? Generally speaking, the answer is no but once again, judgment is required. The failed scenario should be considered in light of the results obtained in the other scenarios. The likelihood of the failed scenario materializing should be assessed. While this is not always possible, one could say at the present time that the 3% pop-down scenario is unlikely to occur. If this scenario has failed, but all others have passed comfortably, a reasonable judgment would be that no additional reserves are required. If a 1% pop-down also produces a negative result, I don't think I could make the same judgment.

In the course of an actual cash-flow testing assignment a state regulator suggested the following scenario: go back 15 years and repeat the actual treasury rate history going forward. This scenario is brutal! I suggest all appointed actuaries use this scenario as an acid test! It's very likely that the accumulated surplus will go negative (even on a book basis) when the wild swings of 1979-83 are encountered. One might argue that such a severe scenario is unlikely. That's probably true, but the scenario actually did happen! Give this scenario a try -- you'll be better for the experience.

One further point on results is that I would exercise caution when using a probalistic approach to determining if you pass or fail. I don't think it's as simple as saying that 80% or 90% of

the scenarios must be passed. I also would urge caution in making probalistic statements such as "I am 95% confident that the assets are adequate to . . ." Such a statement implies that results are normally distributed, which usually is not the case. The results from many scenarios will generally show a longer and more pronounced tail on the downside as compared to the classic bell-shaped curve. I prefer instead to make a statement that 95 out of 100 stochastic scenarios produced positive results.

For other asset adequacy methods, I would review the work in much the same manner. I would expect in the memorandum some discussion of the method employed and some justification that it is appropriate. More often than not, these other methods are primarily C-2 risk exercises. Additional reserve requirements may surface if pricing was inadequate. Since these methods generally would not include specific asset cash-flow projections, I would be especially interested in the assets allocated to these reserves. I would hope that by eyeballing these assets, I gain some confidence that cash flows are reasonably well matched. In other words, for a book of guaranteed renewable major medical business, I would expect to see income producing short- and medium-term assets standing behind the reserves. Assets such as real estate, 30-year zero coupon treasuries, and CMO Z tranches would cause me great concern in this case.

For expenses, I would go through the same exercise as for cash-flow testing. I would like to see a reconciliation of expenses included in the tests of reserve adequacy to actual levels of the previous year. Again, I would assess whether all expenses attributable to the in-force block have been covered.

I would look to the memorandum and the appointed actuary to explain and support the evaluation of results and the conclusions drawn. Once again, I believe sensitivity testing is required for key assumptions.

I believe the appointed actuary should perform the work and prepare the supporting documentation under the assumption it will be intensely scrutinized later. Thus, it is important

to be thorough, provide logical documentation, and establish a formal "audit trail," all of which will facilitate the review process. The appointed actuary should be prepared to defend any unusual items or any instances where deviation from standard actuarial practice has occurred. The appointed actuary role and the responsibilities contained therein should be taken very seriously, for the benefit of the insurance industry as well as the actuarial profession.