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**2003 VALUATION ACTUARY SYMPOSIUM**  
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**Session 36TS**  
**GAAP for Nontraditional Long-Duration Contracts**

**Moderator:** EDWARD C. JARRETT  
**Instructors:** LAURA J. HAY  
BRADLEY M. SMITH

*Summary: This session covers the practical aspects of implementing the Statement of Position (SOP) on accounting and reporting by insurance enterprises for certain nontraditional long-duration contracts and for separate accounts (SAs). Specific items include SA reporting, multiple account value products, guaranteed minimum death and living benefit reserves and sales inducements. At the end of this session, participants are better able to implement the SOP requirements.*

**MR. EDWARD C. JARRETT:** I'm a Fellow of the Society and a member of the Academy. I'm a consulting actuary with Actuarial Resources. We're fortunate today to have two experienced and talented panelists. Brad Smith is chairman of Milliman USA out of the Dallas office, and Laura Hay is a partner with KPMG in the New York office in its Actuarial Services Division. Both of our speakers have written and spoken extensively on financial reporting issues, including GAAP. They've consulted with actuaries and company managements on the impacts on financial reporting regulation and its results.

Laura is going to cover most aspects of the SOP, while Brad will be covering the reserves. Then we're going to have an extensive period for questions. Most of us don't have the luxury of spending hours and hours poring over the SOP, so part of this session is to help you avoid that task.

**MS. LAURA J. HAY:** I actually served on this task force, so I was privy to some very interesting discussions. It was almost exclusively accountants, and so there were some interesting dialogues as the actuaries piped up.

I'd like to give the background for this SOP. I've been working on the task force for several years now, but it existed even prior to my joining. It came about because of the innovative policy designs brought on by inconsistent accounting treatment in the industry. The Accounting Standards Executive Committee (AcSEC) was given that charge to give guidance on existing Financial Accounting Standards Board statements (FASBs). We were actually told that we don't have the authority to change or correct anything in the original FASBs and that caused some interesting discussion. It's not meant to supersede something in the FASB but to work together with the various FASBs. You probably have already heard numerous times during this symposium that the SOP 03-1 was approved and released on July 7, 2003.

The topics addressed for the nontraditional long-duration SOP include high-level SA considerations, valuation of liabilities, sales inducements, disclosures and effective date and transition. By the way, the area of disclosures is not an insignificant thing for actuaries working in this area. Don't think that somebody else will deal with it; you are going to have to deal with some of this. Effective date and transition are not small items either. It does impact how you're dealing with actually implementing this SOP and some of the transition rules. Let's start with the SA criteria. You may think this is not important, but it is important for some companies, and it will impact actuarial work product.

The portion of SA assets representing contract holder funds should be measured at fair value and reported in the insurance enterprise's financial statements as a summary total, with an equivalent summary total for related liabilities.

First, it validates that SA presentation will stay as it is, which means summary line totals on the asset and the liability side. There was debate as to whether or not it should be shown in more detail like general account assets, but at the end of the day they decided to keep the presentation the same. There is nothing exciting about that.

The exciting part comes with the criteria in ¶11, if I could use the word "exciting" when it comes to an SOP. We laid out these four criteria, and you must satisfy all four criteria to be called an SA. The criteria in ¶11 are:

1. SA must be legally recognized,
2. SA assets must be legally insulated from general account liabilities,
3. Allocation of SA funds must be directed by the contract holder, and
4. Investment performance must be passed through to the contract holder (net of fees and assessments).

You might be thinking that this is all obvious, but the legal aspect got a lot of debate, particularly with respect to companies that have unit-linked products in Europe, South Africa or Asia. We do see a preponderance of unit-linked products in some of the countries outside of the United States. This legal classification received a lot of comments in the comment letter period, and eventually they decided to go with this strict definition.

There are some ramifications for certain companies here in the United States. Some products will not be eligible. An example is the market-value-adjusted annuities (MVAs). Some companies have been treating them as SA assets and liabilities. Those will now have to be moved to the general account. They also clarified in the SOP that reserves for minimum guarantees related to the SA must be sitting in the general account. Again, there was some inconsistent treatment here, and it's now clear that it can't be sitting in the SA.

Insurer seed money also must be reclassified to be general account. This probably won't affect you so much on the actuarial side, but it sure will have an effect on the accountants when they try to figure it out. How you move money from the SAs to the general account is a bit of a sticky issue.

Finally, these transfers could create gains and losses. I'd like to make one more point on this. From the U.S. perspective, if you have these MVAs sitting in the SA, currently your assets and your liabilities are equal. When you move them to the general account, it's highly unlikely that will be the case. Now when you move the MVAs to the general account, it's not at market value. The assets also will be moving, and they will not necessarily be at market value. You can select "trading" as your asset classification. You might have some issues with corporate policy there. But not all assets are allowed at fair value, even if you call it "trading." An example is real estate. If you're moving real estate, you can't hold that as fair value on the balance sheet. My point is that if you do have this issue with MVAs, and you're moving them from SA to general account, in the past you would have had perfect matching, and now it's highly likely you won't. You're going to see some income effects going into the future, and, as well, it will impact your deferred-acquisition cost (DAC) calculations. You'll need to take a look at those.

The next section of the SOP deals with valuation of liabilities. This will largely be covered by Brad, but I'm going to cover the parts that don't specifically relate to guaranteed benefits, and there are some important parts that don't relate to guaranteed benefits.

**Accretion Model.** Accrued account balance equals

- Deposits net of withdrawals
- Plus credited amounts (contractual and additional)
- Less fees and charges
- Plus additional interest (persistency bonus)
- Plus other adjustments (return based on pool of assets)

In the accretion model—that's an old term you won't see in the SOP—the accrued account balance equals deposits net of withdrawals, plus credited amounts (contractual and additional), less fees and charge. Up to this point you might think that this is obvious; this is just how an account balance looks. What's the big deal? For the most part there's not much of a big deal.

But the fourth piece says "plus additional interest," and in the SOP it says, for example, "persistency bonus." This is saying that you have to include in your account balance, or your reserve, an element for persistency bonus. This seems logical, but what's a little bit troubling is that they say "plus interest." We're having an internal debate. Does that mean just persistency bonuses as they relate to interest? What about persistency bonuses that are effectively return of costs of insurance (COIs)? We're going through that discussion right now because we feel it's a little unclear in the SOP for persistency bonuses as it relates to the liability valuation. If you have that issue, especially in your universal life (UL) products, you might want to start thinking about that.

I have just a few more words on the liability account balance. It's accrued at the rate at which the balance is available in cash, or cash equivalents, at the earliest of the reset or the contract maturity date. This was on the table because there are some products that have multiple account balances. One example is a two-tiered annuity. There was some debate as to what to do if you have multiple account balances. Do you use a weighted average, or the highest, or the lowest? That's why this definition was clarified. It said that we're going to use the one that uses the rate that would accrue in cash or cash equivalents.

Basically it's saying that you can't consider the surrender charge because that's not available; you can't consider the account balance net of surrender charge because that's not available in cash or cash equivalents and you must use the highest account value available in cash or cash equivalents. Let's use the example again of two-tiered annuities. For two-tiered annuities, you have two account balances. One is available in cash or cash equivalents. The other one is available only at annuitization. This says that, for the liability part, you can only use the one that's available in cash or cash equivalents, not the annuitization piece.

A different part of the SOP deals with that annuitization piece. You do get it, but it's not officially in the account balance. Don't think you can't hold it; it's just treated in two different places in the SOP.

I'd like to make a few more points on valuation of liabilities. There is a section that talks about the account balance when it's a return based on a pool of assets or an index. If you have this kind of a situation, you have to use the fair value of the assets. Examples are the group pension participating or immediate participation guarantee (IPG)-type contracts. This only applies to those contracts where Financial Accounting Standard (FAS) 133 doesn't apply, but this is saying that you have to

hold them at fair value even if your assets are not. This could create a mismatch for you if you're not currently holding them at fair value. Be aware that you might see this mismatch.

At this point the SOP goes into all the minimum death benefits and the annuitization benefits. Brad will cover that very large section which tends to get more of the attention, and I'm going to cover the areas that perhaps we skimmed over but that are important as well.

At the end, they talk about sales inducements. Here is the definition of a sales inducement.

**Criteria.** Insurer must demonstrate that amounts are

- Incremental to amounts credited on similar contracts without sales inducements, AND
- Higher than the contract's expected ongoing crediting rates for periods beyond the inducement, as applicable.

The typical examples that come to mind are day-one bonuses, persistency bonuses and enhanced crediting rates. I'm going to come back to persistency bonuses because we see some strange things. Internally we're discussing the persistency bonus issue.

But first, let's focus on the criteria. It must be incremental to amounts credited on similar contracts without sales inducements. What happens if you're a company where all your contracts have sales inducements? Do you have contracts without sales inducements to compare to say that this is and this isn't? That issue has come up, and it's something to think about when you're justifying, for example, to your auditors. Think about that you have to show that there would be a sales inducement, that there is an incremental effect. It seems obvious to us, but just pay attention to the criteria as you go through.

The clear ones are day-one bonuses. When this part of the SOP was written, day-one bonuses were what we all had in mind. What it says, first of all, is that these are deferred and amortized over the period which the policy must remain in force for the inducement. We're creating this new item called the "deferred sales inducement" asset. Many of you probably have bonus products. Companies tend to treat them in one of three ways. One way is that you're not deferring them currently. The second way is that you're deferring them, and you're throwing them in with your DAC, just like everything else. It's currently part of your DAC calculations. The third way is that you're deferring them, but over a period different than your DAC. Maybe the period is seven years, and you're using some approximate approach or straight line. But generally, those are the three approaches that I'm seeing in the market.

If you're not deferring them, this SOP says that you should be deferring them, and we'll talk about what it means in terms of implementation. You get to defer them now. There's no debate there. You can't decide to continue your policy. If you have them, you have to defer them. If they're sitting there in your DAC, what do you do? We've put up this new item called a "deferred sales inducement" asset. That means you have to pull them out of your calculations. That's the practical issue for the actuaries today. If it's built into your calculations, and you say that you're doing what the SOP says, be careful because it's actually not supposed to be called "DAC." You need to work through if you need to spend that time to pull it out, go back and think about where it was and how much it was. That might be an onerous task if you haven't kept track of it separately. If you have them deferred, but they're over a different period, what do you do? We'll address that in terms of the transition rules in a minute.

You can't reflect lapses in determining the amounts to defer. If you only have day-one bonuses, you'd say, "The amount I defer is day one. So, what does this matter?" For me, this matters when I start to think about persistency bonuses. If I can't consider lapses when I'm determining the amount of the persistency bonus and deferred sales inducement asset, then that means that I'm setting up a deferral bigger than I expect to pay. That's a fact; that's in the SOP. What happens to that asset? What happens is that, as your inforce changes, your lapses do come through because you're amortizing over estimated gross profits (EGPs). They're being amortized in a similar way as your DAC. The issue is that, as the lapses occur, your inforce changes. That's when you'll get the release. You don't get to build in expected lapses upfront to figure out the amount to defer. It comes in slowly as the lapses occur. You'll be having sort of an overstated asset being accrued, but you'll have the releases coming through prior to the persistency bonus being paid. It's a strange result.

I want to just recap this persistency bonus issue. There's a lot of clarity in the SOP in many areas, but this is perhaps a less clear area. On the persistency bonus on the liability side, they said that the account balance includes this little piece for interest, i.e., persistency bonus. You have some interest component there, so you have a liability side happening. Then on the deferred sales inducement side, you also have something going on for persistency bonus, but in that one you're not allowed to include lapses. They're slightly different calculations. You might get some noise between the two when it comes down to the net income effects. It's something to pay attention to. Think about what solutions you might have now for that issue, especially if you have some decent persistency bonus blocks.

Disclosures don't sound like an exciting topic, but the disclosures—of course, with everything else—are increasing in the market. I believe that these new disclosure requirements are going to impact actuaries. Perhaps you haven't been impacted so much in the past with disclosures, but I think now you will be. Do not skim over that part of the SOP. The first part may or may not have an impact on you. It basically says that for the SAs you have to share the general nature of the SA and

the basis of presentation, and you have to share where gains and losses due to transfers come through. Dealing with this particular aspect of the disclosures might not impact you personally.

It's really the second aspect that I want to discuss. I'll talk about guaranteed minimum death benefits (GMDBs) just a little bit. When it comes to disclosures for the additional reserves you're holding either for mortality or for annuitizations, the first thing says you have to include a description of the liability methods and assumptions used in estimating these liabilities for the additional insurance benefits and any minimum guarantees. I think it's going to be fascinating to see what kinds of descriptions people put into their disclosures because, as actuaries, we think of hundreds, and maybe even thousands, of assumptions that could go into it. It will be very interesting to see just how detailed or not detailed these sections are, and I think that analysts will be paying close attention to these new disclosures.

You also have to disclose the amounts related to minimum guarantees. You have to show the balances subject to various types of benefits. Again, you don't know how detailed companies are going to be. Some companies are very detailed already, if you've taken time to compare some of the 10ks and Qs coming out. You have to report the additional reserves for mortality and for annuitization features. You also have to give some disclosures of the net amount at risk and the average attained age for these contracts.

You're doing all these models, but don't forget that you need to pull out some of this information. This might come up. It's very much a company decision. If you haven't entered into dialogue with your chief financial officer (CFO) about what kind of disclosure he or she anticipates, it might be worth your time to press the point so that you know at the busiest time of year you're pulling out the right information and not scrambling at the end.

You also have to disclose the aggregate fair value of the assets supporting the SAs. This basically says that you have an SA line item that shows the total liabilities. But there's probably a subsegment that has these minimum guarantees, and so you just have to disclose that subsegment that relates to all those guarantees. Then they have something relative to compare it to the balances.

The last topic is effective date and transition. I don't like some of the transition rules, and I'm more than happy to share with you why not, and I will also share that I had vehement arguments on some of them. Effective date is the fiscal years beginning after December 15, 2003. What does that mean? That means for most calendar-year companies, it's first quarter 2004, but that means you really need to have balances at the end of this year in order to do the first-quarter financials. All of us, if we have this issue, are probably dealing with it already. Early adoption is encouraged. I'd be careful about this point because it says when you adopt, you have to go back to the beginning of the fiscal year. If you adopt in fourth quarter, effectively that means you have to go back to the beginning of the year, and there

could be ramifications there. It says you cannot apply it retroactively. You have to report cumulative effects as a change in accounting principle, and pro formas are optional.

The transition rules for SAs are not that exciting, and they probably won't impact us that much. These relate to reclassifications to general account and FAS. There might be some FAS 115 effects that we have to deal with. Before, if we had something in an SA, there would be no FAS 115 impacts because FAS 115 impacts only exist to the extent that you have realized gains or losses coming through equity as opposed to income. If you move something from SA to general account, there's a chance you might have to do some FAS 115 calculations—for example, on MVAs—that you never had to do before. You might want to pay attention there.

Let's talk about transition rules. There are two parts to the reserves. One is determining the significance of mortality or morbidity risk. We haven't spent much time thinking about that part. In the past, implicitly we've been doing it, but now you really need to spend time on this thing called the significance test. You're supposed to re-perform it at adoption for all contracts. Here's the sticky point about this significance test. For inforce contracts, you're supposed to perform it using actual experience in the past. If you have a contract that just started three years ago and actual performance has been poor for three years, then the guarantee is going to be pretty much in the money. You could say in that case the mortality risk is quite significant, whereas for my new business, it might not be.

So there might be this strange disconnect. Then you get into the question: At what level do you aggregate for significance testing? I'm not going to go into that topic, except to point out that at adoption there's this rule for inforce that you have to consider actual. That's one area I'm not too fond of. I think it should be at issue based on your reasonable expectations, but the reality is that it's something to pay attention to. I'll take it a step further and say some companies have raised with me their concern about it. They could actually have a different result for their inforce and their new business. They could say that for the inforce, it's significant; and for the new business, it's not. They could have this mix, which is a very strange result ongoing, but it's possible. It's all about your corporate policy on that significance test.

There's an adjustment to liabilities as well as DAC due to this change. We're not just talking about reserves. If you're setting up reserves for the guarantees, it impacts DAC. To the extent that there are reserve and DAC impacts, those would all be considered cumulative effects going through and showing up as a change in accounting. We're expecting to see a lot of that from a lot of different companies.

The area of transition rules on sales inducements is a little unique compared to the other ones. First of all, it says that the initial costs that you deferred prior to adoption are not adjusted. If Company A didn't defer anything in the past, it's not allowed to then defer under this SOP and get the cumulative effects of that. If you

didn't do that, you lose. If you did do that, you're allowed to keep those deferrals. Basically, the slate is clean—whatever you deferred in the past and wherever it is unamortized—that's your starting point at adoption. It almost forgets what you did in the past. Just pull it out, and that's your starting point. So you can't retroactively capitalize, but then it also says, "Okay, here we are at our starting point. Now you have to use the SOP."

The SOP doesn't care if you were deferring over a shorter period, over straight line or over EGPs. It doesn't care what you were doing in the past. But you have a balance starting now, and from this moment on, prospectively, you have to use this SOP. That means amortizing over EGPs from this moment on. There are some components where you pull out the sales inducements, you say this is the balance and you're going to worry about SOP implementation prospectively. That's different than the other parts. The other parts were cumulative effects. That's a little bit different because it's a prospective type of calculation based on where you are at this moment.

I hope I've brought to life some of the aspects that perhaps you're gliding over in the SOP.

**MR. BRADLEY M. SMITH:** I'm going to talk about the reserve requirements for guaranteed minimum income benefits (GMIBs), guaranteed minimum accumulation benefits (GMABs) and GMDBs. The SOP is pretty straightforward in a number of areas, and so I'm going to go over the theory pretty quickly and focus on a bunch of the practical issues that you face in the implementation.

Let's say that you have a contract, and you think it may or may not fall under the SOP. The first thing you have to do is determine whether it's an investment contract or an insurance contract. That classification occurs at inception, and you don't reassess whether it's an investment contract or an insurance contract during the accumulation phase. You make that determination at the time the contract is issued.

The primary difference between an investment contract and an insurance contract is that, in an investment contract, the mortality and the morbidity risk is "nominal," an "insignificant amount" or a "remote probability." All of those are phrases contained in FAS 97. There is an important part of the SOP that I think actually will dictate a lot of the decisions.

There is a rebuttable presumption that a contract has significant mortality risk where the additional insurance benefit would vary significantly in response to capital market volatility.

Basically, it says that if your GMDB for a variable annuity varies with capital market volatility, the presumption is that it falls under this SOP, and you have to hold another reserve.

If that presumption is rebuttable—there's a test that you have to perform—let's assume that in fact it is an insurance contract. It would be accounted for under FAS 97 UL-type contract. Basically, the mortality and morbidity risks are not nominal. Fees are assessed or insurance benefits are not fixed or guaranteed, and it's a long-duration contract. If your variable annuity contract has not nominal mortality risk, fees are not guaranteed, and it's a long-duration contract, you would account for it under FAS 97 under the methodologies outlined in the SOP.

What is the test? The test is straightforward. It's present value of expected excess payments under the insurance benefit divided by the present value of expected amounts to be assessed to the contract. Those amounts include the investment margin, and they consider the frequency and severity under a full range of scenarios. What does that mean? It means two things. You need to either do stochastic analysis or you need to have multiple deterministic scenarios in order to make the determination as to whether it's an investment contract or an insurance contract.

There are a couple of practical issues that come out of this. A number of clients have asked me whether the death benefit that occurs because you waived the surrender charges is part of the benefits that go in the numerator of this equation. The answer is no. Excess benefits are benefits in excess of the account value. That's an easy one. The more difficult question is, and I'm sure that we all have an opinion on this, what level does this have to be in order to be significant? It's a low number, in my opinion. The example in the SOP, and I would encourage you to view the example because you'll get the mechanics down very quickly, has a 5.8 percent benefit ratio. (Essentially you're calculating the benefit ratio at issue of the contract.) Clearly, 5.8 percent would be deemed significant in the author's mind. I think it's substantially lower than that.

You can think of these typical contracts where the present value of profit that ekes out after amortization of acquisition expenses as a percent of the present value of assessments is typically somewhere in the neighborhood of 10 to 20 percent. If you also assume that the reason you're setting up this reserve is that you're making assessments before you have costs, that if this ratio is not less than 1 percent, I think that you're fighting a difficult battle. How did I come up with the 1 percent? If the profit margin is 20 percent and the benefit ratio is 1 percent, and you choose not to set up that 1 percent as a reserve, you're going to overstate earnings by 5 percent. If profit is 10 percent of assessments, you're overstating earnings in the first few years by 10 percent. I've heard people say that they use the 5 percent rule. I don't think you can use the 5 percent rule directly on this. I think you have to look at the 5 percent rule as it applies to the emergence of earnings. Again, if the benefit ratio is above 1 percent, I think you're going to have a very difficult time rebutting the presumption. Obviously there's a qualifier that if this particular product is insignificant for your whole line of business, or for your entire company, then the level of presumption is going to differ.

We've determined that we have to establish a reserve. We've determined what our benefit ratio is. We have to establish a liability (in addition to the account value), reflecting the portions of the policy assessments that compensates the insurance enterprise for benefits to be provided in future periods. Basically it says that we don't want what you're assessing that's going to offset benefits in future periods to be leaking into profit in the early years. We want you to establish a reserve that reflects that. Again, I'm going to go through the methodology here, but the methodology is theoretically very straightforward, theoretically very simple, and we're going to focus on some of the practical issues.

The calculated benefit ratio, which is essentially the ratio you calculated to determine whether you had a significant benefit, equals A divided by B. A is the present value of the expected excess payments, and B is the present value of the total assessments. Those total assessments include everything that you would expect them to include. They include policy loans, mortality charges, expense charges, surrender charges and investment margin.

Again, exactly analogous to the significance test, "expected experience should be based on a large range of scenarios rather than a single set of best estimate assumptions." You can't use a best estimate assumption in the calculation of this. You're going to have to use a number of deterministic—either equally weighted or not—scenarios or stochastic testing.

The practical issue then becomes, how is the benefit ratio set? Is it set as the mean of all of the deterministic runs? Is it the weighted average mean of the deterministic runs? Is it the mean of the stochastically generated runs? Is it a certain percentile of the stochastically generated runs? It's been my experience that typically the mean of stochastically generated runs in this puts you somewhere between the 60<sup>th</sup> and the 70<sup>th</sup> percentile, so that actually using the mean, if you wanted to set it at that percentile, makes sense from a practical standpoint. Companies that I've talked to that are big in variable annuities have focused on the mean of stochastically generated or a number of deterministic scenarios.

The SOP says assumptions used (interest rate, discount rate, lapse rate and mortality rate) should be consistent with assumptions used in estimating gross profits used in amortization of capitalized acquisition expense. What that says for the most part is that the stochastic nature of your testing is going to focus on capital market movements. The practical issue becomes: What other assumptions in my stochastic analysis become a function of my capital market movements? Obviously, the death benefit that's created is a function of my capital market movements, but do I change lapse rates in relation to how far under water I am? For instance, will my lapse rate change if the contract has a 20 percent death benefit? It's hard to see economically why the policyholder would lapse that contract. Would the lapse rates be higher if I'm 20 percent over water? Will they

think that there's no benefit to this GMDB they're receiving, so they are going to roll this contract into another one and start from scratch?

What about partial withdrawals? There was an article a couple of weeks ago that basically said you maximize your death benefit on these contracts by taking away partial withdrawals so that the absolute amount of the death benefit is staying the same. In other words, you're getting advisors to policyholders essentially telling them how to anti-select on these. Do our stochastic analyses reflect the potential for anti-selection if they were working in their best interest and look to see the anti-selection as far as persistency goes with respect to the policyholder?

It's interesting because in the industry we've actually seen the exact opposite of what I would call typical economic behavior. A couple of companies have gotten into financial distress because of these benefits, and what has happened is that contracts that were severely under water were lapsed off en masse because the brokers essentially went to those policyholders and told them that this company is in trouble. Essentially they lapsed themselves out of trouble through excess lapsation. It's not as clear as you would think, although I wouldn't want to be the actuary doing the analysis and saying that we're going to have substantial lapses if we get under water because we're going to be in financial distress and may not be supportable.

The additional liability equals  $A$  minus  $B$  plus  $C$ , where  $A$  is equal to the current benefit ratio times the cumulative assessments,  $B$  equals the cumulative excess payments, and  $C$  is accreted interest. This is very simple. You calculate the benefit ratio, and essentially all you're going to do is a retrospective reserve calculation. You're going to take the benefit ratio times the assessments, accumulate them with interest, subtract out the payments accumulated with interest, and your reserve is going to build up because you're not going to have many payments early. Your reserve is going to go down over a period of time. It's a very straightforward calculation.

Let's talk about some of the limitations. The additional liability that you establish can never be less than zero. The change is reflected as a benefit expense in your income statement. The change is reflected in gross profits used to amortize the capitalized acquisition expense and the unearned revenue liability. These limitations all lead to very practical issues and practical questions. Maybe the biggest one that you'll face is: What level of aggregation? It doesn't say that if you're doing a seriatim calculation, that if you have a negative reserve, that you bring them to zero. Obviously there's some offsetting of positives with negatives.

The question is: Do you offset it for a contract? Do you offset it for a year of issue? Do you offset it for the entire line of business? There's no real guidance given in the SOP with respect to that. I think you're going to see many different levels of aggregation—that is, negatives offsetting positives, particularly given that we're in a period over the last three or four years where, depending upon which investment

advisor you talk to, we're in the 100-year storm or the 10- or 12-year storm. We've had a terrible capital markets movement, and, quite frankly, a lot of these contracts, because of the movement and the death benefits paid in the early years, could have a substantially lower reserve than what you would otherwise expect.

I was reading the other day that the industry has approximately \$900 billion of assets, and we have estimated that the shortfall is somewhere between 15 and 20 percent as far as the current hole between the benefit and the account value. Let's use round numbers and say that the shortfall is \$200 billion. These contracts are primarily issued to very older ages. There are some issued to 45- and 50-year-olds, but the average age of these people is somewhere between 65 and 75, typically around 70 years old. If you look at an average mortality rate for an uninsured general population of say 1.5 percent, and apply it to the \$200 billion shortfall. I'm talking about a \$3 billion death benefit that's being paid on these contracts, which is as much as what happened on September 11, 2001. It's a substantial amount, and my only point here is that given the historical payments that have been made, I think that the initial reserve that we establish January 1, 2004 is going to be lower than what a number of people are prognosticating.

The "insurance enterprise should regularly evaluate estimates used and adjust the additional liability balance with a related charge or credit to the benefit expense if actual experience or other evidence suggests that earlier assumptions should be revised." You need to reassess what your benefit ratio is on a regular basis. It doesn't say every quarter; it doesn't say every year. It's basically when the change in experience tells you that they should be changed.

If you're a big variable annuity writer and you have to implement this, given the accounting cycle of three or four days turning around the results by the end of the quarter, nobody can do stochastic analysis in a production mode, in a real-time mode, in the typical accounting cycle. But we have very volatile capital markets. That would lead you to say to do the analysis in August, before the end of September. But if there's a 10 percent drop in capital markets or in the stock market between August 30 and September 30, what are you going to do? It obviously affects the level of reserve that you should be holding and leads me to some conclusions. Essentially, you need to be doing this analysis off quarters and develop kind of adjustment factors to say you have your benefit ratio as of the end of August, and as of the end of August you had a certain relationship between your death benefit and your account value. You also do the calculation as of the end of August assuming that you had a different relationship. Maybe that relationship is more under water. Maybe the relationship is less under water. I think that you develop kind of those adjustment factors so that on a real-time accounting cycle basis, you can make an adjustment to the benefit ratio and reflect what has actually happened as of the end of the quarter.

Another practical issue is: Do you do the calculation on a group or seriatim basis? Don Skokan is going to come out, if it hasn't already, with an article in *The*

*Financial Reporter* describing the anomalies you can have if you use group data and the underestimations that you can have if you use group data. Obviously there are pros and cons to each method, and it's an estimate. Reserve by definition is an estimate anyway, but I'd encourage everybody to read that to understand what can happen if you're grouping at too high of a level.

Another very practical issue, particularly given what I've talked about before, is the level of historical benefits. A lot of companies haven't captured historical death claims. In fact, a lot of companies have spousal riders where the spouse's account value is trued up, and the contract is transferred to the spouse. It's trued up to the account value on death of the original insured. Those aren't captured typically in the ledger. Given the level of payments that have been made, it seems to me that most companies are going to have to make an estimation of actual payments, but they haven't typically captured those. They aren't going to be able to go to the ledger and add them up. There's going to have to be an estimation of historical claim payments.

When you look at the SOP and the example in the SOP looks so clean, the first time you read it you think that this is going to be straightforward and easy. They say you have to use multiple scenarios, either multiple deterministic or stochastically generated. You come out with this benefit ratio, and then you calculate retrospective reserve. The problem is that you also have to calculate the reserve to the end of the life of the contract, because those reserve increases affect the estimated EGPs in later years that are used to amortize the acquisition expenses and the unearned revenue liabilities.

The problem is, unless you use weighted average deterministic on a real-time basis or stochastic on a real-time basis, and those are consistent with your estimated EGPs, you're going to have a benefit ratio that's inconsistent with your projected EGPs. For instance, a lot of companies are going to have estimated EGPs used in the amortization of acquisition expenses on a single deterministic scenario basis. Those estimated EGPs will have estimated excess claim costs, but those estimated excess claim costs discounted to the valuation date divided by the projected assessments isn't going to be the same benefit ratio that you calculated stochastically the month before or the year before. You're going to have a difference in the benefit ratio that's applied to your estimated EGPs, and mechanically your reserves aren't going to go to zero because it's a retrospective accumulation that was developed with a ratio that's being applied to a different stream.

What are companies going to do about that? One approach is to hold the reserve over the DAC amortization period and hope or assume that the reserve goes to zero at the end of the DAC amortization period. That doesn't strike me as a particularly good solution. I think that there's an alternative. Say my stochastically generated benefit ratio was 6 percent, and my deterministic benefit ratio was 4 percent. I'm going to multiply my expected under the deterministic scenario by six divided by

four, or 150 percent, so that at that point I would get the same benefit ratio as I did stochastically, and my reserve would come out to be zero.

The problem with that approach is that for new issues on a deterministic basis, you probably don't have any excess benefits paid. You have a stream of zeroes. Until you actually have some projected payments in that, it's difficult to even adjust them to some level of stochastic or expected in pricing.

The bottom line is that there are a lot of practical issues. Again, the SOP looks very clean because it shows you one chart that shows your expected gross profits, the expected assessments and the expected death claims, and you calculate the benefit ratio by discounting and dividing. In practice it's not going to be so simple even if you were using the same basis because you're not going to re-determine your benefit ratio each period of time, presumably.

I'll touch briefly on reinsurance contracts because the SOP does touch on reinsurance contracts. Essentially the reinsurance contracts are handled similarly, but the determination as to whether it's an investment contract or an insurance contract is not necessarily consistent with the primary issuer. That's from the reinsurer's standpoint. Obviously, if the reinsurer is just reinsuring the excess death benefit, and it's not a coinsurance of the annuity itself, the determination as to whether it's an investment contract or an insurance contract is going to be different.

Let's talk about contracts that provide annuitization benefits. The methodology here is very simple. There are a few additional practical issues that I want to touch on. When does this apply? It applies to benefits payable only in annuitizations. We're talking about purchase guarantees. We're talking about GMIBs. We're talking about two-tiered annuities. The SOP says if it's not accounted for under FAS 133, an additional liability should be established if the present value of the annuitization benefit exceeds the expected account value at annuitization.

The benefit ratio equals A divided by B, where A is equal to the present value of the annuity payments, plus any incremental claim adjustment expenses, minus the expected account balance (essentially the present value of your claim payments minus the account balance at the time of annuitization). B equals the present value of total expected assessments during the accumulation period. What's interesting is that A would be discounted at a rate to estimate investment yields during the annuitization period. Let's say that your annuitization period was 10 years out. You would reflect interest rates 10 years out to calculate the present value of your annuity payment, then you would discount using typical FAS 97 method and using the same discount rate from that 10-year period that you're applying the assessments to.

That creates some practical issues. Specifically, if you think of stochastic analysis or multiple deterministic scenarios, obviously the difference between the present value

of the annuity benefits and the account value is going to be substantially different depending upon what the interest rate environment is at the time of annuitization. If interest rates drop tremendously, the present value of that annuity benefit is going to be substantially higher. If interest rates go up, it's going to be substantially lower. It strikes me that we've now entered a new realm. Not only are we in a position of capital market volatility and stochastic analysis or multiple deterministic analysis during the accumulation phase, but we're also talking about interest rate generation during the time of annuitization, and we don't know when they're going to annuitize. It strikes me now that we're talking about economic scenario generator that's generating capital market movements along with interest rate movements. This could get to be very complicated.

Total expected assessments are exactly what you would expect them to be. Expected experience is based on a range of scenarios that considers volatility and the assumptions, rather than a single set of best-estimate assumptions. Again, there are all of the questions that were brought up before—are we going to use the mean, median, or weighted average?—but what is clear is that you can't use one set of best-estimate assumptions. Assumptions used should be consistent with the assumptions used in estimating gross profits used in amortization of capitalized acquisition expense. Again, it's "consistent with" that, not exactly equal, but "consistent with." If you're doing stochastic analysis using lapse rates, you're most likely not doing that in your estimation of gross profits, in your deferred acquisition expenses or the amortization of those. Does that mean that they're inconsistent? They could be, but they may not be.

When determining expected excess payments, the expected annuitization rate is one of the assumptions that need to be estimated. Essentially you have capital market movements both in stock prices or equity prices, interest rate movements and you have a variable with respect to when they annuitize. You can see where this could again become very complicated.

Again, when you read the SOP, the example that they show is very straightforward; the actual arithmetic the theory are quite easy. The implementation is what's difficult. The additional liability equals  $A + B - C$ , where  $A$  is equal to the accreted interest,  $B$  is equal to the present value of expected annuity payments plus related claim adjustment expenses minus the account balance at annuitization (essentially the present value of that excess), and  $C$  is equal to the current benefit ratio times the cumulative assessments. It's strictly a retrospective accumulation reserve.

Additional liability is never less than zero, bringing up the question of: What level do you aggregate? The change is reflected in benefit expense. The change is reflected in the gross profits used to amortize capitalized acquisition expense and unearned revenue liabilities. The amortization period excludes the annuitization phase. You need to regularly review the estimates used in calculating the estimates that are necessary. The three key variables, it seems to me, are annuitization rate,

interest rate at time of annuitization and capital market movements, making for a potentially complex model.

I'm certainly not a FAS 133 expert, but this makes it quite easy. FAS Derivative Implementation Issue B8, "Identification of the Host Contract and Nontraditional Variable Annuity Contracts," specifies that GMAB is an embedded derivative subject to requirements of FAS Statement 133. So, an accumulation benefit that can be net settled is a derivative. For the exact same reason, GMIB does not meet that definition because it cannot be net settled, but essentially there's a stream of payments after the period of annuitization.

The point I want to leave you with is that the theory is very straightforward. The formulas are not complicated. It's not an issue. It's basically a retrospective accumulation of a percentage of the assessments. The implementation issues and the practical issues that you're going to face are substantial, and they can have an impact on how you're going to operate. I think that this is critical for the actuarial profession because the one thing that we have to avoid in this is some arbitrary nature of the development of results—the black box syndrome. If we aren't developing timely results for management to use, and the results aren't at least somewhat predictable or somewhat expected, and the process that we undertake on a real-time basis becomes so complicated and cumbersome that we don't have enough time to review the results and understand them ourselves, we're going to look bad to senior management, to stock analysts or to any of the external world. It's clearly not a place that we want to be.

The real challenge for us is to implement the theory and the intent of the SOP, meet the requirements of the SOP, but make sure that we implement a process that allows enough analysis and enough time for us as professionals to be able to communicate our results effectively. Thank you very much.

**MR. JARRETT:** We did have a couple of questions that were pre-submitted. One dealt with no-lapse guarantees on UL contracts. Does the SOP apply?

**MR. SMITH:** It's an interesting question because the SOP is clearly focused on death benefits created by variable annuity guarantees. Having said that, the simple answer is, yes, I think it does apply. If you look at Paragraph 26 of the SOP, it says if policyholder assessments result in profits early and losses later, a liability should be established. If you think of a typical no-lapse, term UL-type product, that's what happens. Absent setting up some reserve in the early durations, that's what happens. So I think the answer is yes. Like they talk about in the introduction, FAS 60 and FAS 97 were developed before all of these specialized products, and they didn't anticipate these, and they mention no-lapse guarantee. There are about two sentences on no-lapse guarantee UL.

Then they devote an entire appendix to the description of other things they mention in the introduction, with a pretty extensive review of those types of benefits. What's

not mentioned in there is no-lapse guarantee. Laura can talk about the intent. The intent, I think, was clearly to address benefits generated from variable annuities. But I think that you would be hard-pressed, if you're not doing it so already by saying it's essentially a FAS 60 contract and you set up a FAS 60-type reserve, not to establish a reserve for no-lapse guarantee, term UL-type products, given this SOP. The methodology in the SOP lends itself to the generation of a reserve that would essentially be a FAS 60-type reserve. I don't know what multiple scenarios I would use in the calculation.

It seems to me that if I had a typical no-lapse guarantee, term UL-type product where I have a certain level premium that has to be paid every year, and if it's not paid, I lapse, and if it is paid, I pay these death benefits, then the SOP methodology works. You calculate the present value of the expected death benefit payments divided by the present value of the expected assessments, which are essentially COI charges and policy fees, and amortize the benefits on a retrospective accumulation basis using that benefit ratio. It's important to say that all of the opinions that I've expressed today are my opinions and not the official position of Milliman USA.

**MS. HAY:** I would echo what Brad just said. I would expect a reserve as a result of the SOP for no-lapse guarantees. The one area I might think of is in terms of the scenarios. I'd like to mention as a sidebar that KPMG performed a survey recently of some leading variable writers and had a tremendous response. One of the questions was, "Do you intend to use stochastic or deterministic?" I truly expected everybody to say "stochastic." A third of the group said that they were going to use deterministic scenarios. That surprised me.

We also asked in our survey a question about, whether it's stochastic or deterministic, when you interpret, it says "expected benefits." Does that to you mean that you're going to assign equal value, take a straight mean or are you going to use something different, like a percentile? I would say half of that group said—again, these are some of the largest variable writers in the country that participated—they were going to use a straight mean, and then the other half said that they were still trying to decide if they were going to use a straight mean or a percentile higher, not a percentile like a conditional tailed expectation (CTE) up in the 80s or 90s, but something higher, 60 or 70 percent.

The reason I bring that up is to bring it back to the no-lapse guarantee. You do come up with reasonable scenarios. They're not economic scenarios but other scenarios, and you may or may not equally weight those scenarios. In other words, you might have 50 percent weighting on your most reasonable scenario and some other scenarios weighted 25 percent or 10 percent. I think you can give some thought to what scenarios make sense. Don't think in terms of just one expected. I think it's reasonable to also think about what weighting makes sense to get to an expected level for those scenarios. I'd spend some time on both of those in thinking through the interpretation for no-lapse guarantees.

**MR. JARRETT:** Would it also apply to any product that has secondary guarantees? No-lapse guarantee is one we're familiar with, but it could also apply to almost any contract with secondary guarantees. You need to think about it, look at it and compare how significant those cash flows or those risks are. That goes back to Brad's statement earlier about significance. Has anyone in the audience done some of that testing and can offer some comments along those lines?

**MR. PAUL BELL:** I'm not going to answer that quite yet because I don't want to let Brad off the hook yet.

You said on the no-lapse guarantee you're going to calculate a ratio of death claims to assessments. Are those the death claims from the beginning of time, or are those the death claims projected which will occur because I have a no-lapse guarantee which means those death claims that I'm going to pay after my account value runs out?

**MR. SMITH:** This gets into the fuzzy area. Clearly it would be the death benefits in excess of the account value. It's very clear with respect to that. If you take the pure case where you have a term UL product, and obviously there are other products with no-lapse guarantees that the no-lapse guarantee has never hit, that is projected to have some de minimis account value in the early years and go negative eventually, I would say that you calculate your present value of expected excess payments, which is death payments over the account value, and divide them by assessments.

**MR. BELL:** But in FAS 97, the only definition of a death claim is the excess amount over the account value. The account value is a part of your death claim. That's a return.

**MR. SMITH:** I understand that. It sounded like your original question assumed that when I was calculating present value of death benefits, I meant present value of the entire death benefit, not the net amount at risk. So, it's the present value of excess payments over the present value of assessments.

**MS. HAY:** I think that's a tough question. We've been talking about that. Do you include all the death benefits or just the piece attributable to the no-lapse? This is a personal opinion, I am certainly not speaking for my firm, but in my mind it's probably just the sliver above because the rest is covered somewhere else. That's the path that I'm going down because that's the part that generates the profits in early years and losses in later years that the SOP is addressing.

**MR. JARRETT:** I'm thinking about the pricing of that feature. When I added a no-lapse guarantee or added a secondary guarantee, when we price it under a stochastic scenario basis, there's going to be some associated cost with that. A single-scenario approach under FASB doesn't capture that cost. It doesn't capture the events that have occurred over the last three years. What we're trying to do is

set up a reserve methodology that captures that risk. You set up a reserve for it, and we're going to run it off. Do we have all the answers? No. But that's the reserve the SOP is trying to identify. Does it apply to all of our secondary guarantees? I would say you have to think about it. Does it pass the threshold? Yes or no. But the SOP is trying to address the problem that existing practice does not adequately address these extra benefits and features we have in our contracts, with a single scenario over stochastic scenarios.

**MR. SMITH:** If you did what I was saying, essentially you're going to come up with, if it's a 20-year term, a 20-year kind of FAS 60-type generation of a reserve. In the periods where you have a positive accumulation value, that reserve would be offset by the positive accumulation value which is essentially what you would get to if you did this, where you held the accumulation value plus an incremental reserve in those early durations. You can do the calculation both ways.

**MS. HAY:** I would agree with that. I would also say that it's interesting because of the significance test and the percentage. I won't comment on the 1 percent because there have been wild views all over the place. I'm not calling 1 percent wild, but there have been quite variable percentages flying out there. I'll say one more thing, though. If you take that sliver, and you call that the excess benefits, think about it in the significance test. Does that make it go really low if you're only taking that piece? Are you then going to conclude that that's not significant? I think that's a possibility. I don't like that answer, by the way, but I think that's a possibility because the base of that significance test is total assessments, not EGPs.

**MR. DAVID SCHEINERMAN:** I'm from Pricewaterhouse Coopers, and I speak for myself, not my firm. When I think about that significance test, I think it is only a product classification issue. A traditional UL contract has significant death benefits, and it's not just the no-lapse guarantee that you would look at. Once you're into UL, I think you need to ask, is there a profits followed by losses from this insurance benefit feature? An interpretation—Laura, I personally tend to agree with you—is that you can view the no-lapse guarantee as a different benefit feature from the other death benefits. So for a variable universal life (VUL) contract with that secondary guarantee, you can end up just reserving for that small piece because if you take all the death benefits, you will significantly change your emergence of profits.

**MS. HAY:** I agree with you. You're saying that you consider the others for the significance test but not for the liability.

**MR. SCHEINERMAN:** I just want to follow it up. We talked about no-lapse guarantees. What about a reverse select and ultimate COI charge schedule? What are your thoughts about how that might have profits followed by losses? Should you use the SOP accounting?

**MR. JARRETT:** Let me back that up in terms of a simpler question first, and we'll talk about the reverse select and ultimate. Does the SOP apply to UL contracts where the COI charges in any way, shape, or form differ in slope than the expected mortality? I think the answer is universally no. It doesn't apply in that case. The question now is on something like reverse select and ultimate. In some of those cases, you're already setting up an unearned revenue reserve, but are you going to be doing something else for that type of product?

**MR. SMITH:** I think that for reverse select and ultimate you continue to set up the unearned revenue liability. As in FAS 97, you amortize it using your expected EGPs, but the problem is that there's a circular nature with respect to that calculation, if you had an additional reserve that you expected. That additional reserve comes into the amortization of the unearned revenue liability. You have to start someplace. When you're calculating your expected assessments, you need to take into account the amortized value of the unearned revenue liability, that you don't take it into account at time zero. If you have a front-end load and miss it prospectively, I think you take into account the release of the unearned revenue liability in your present value of expected assessments, which would affect your reserve, but your reserve is going to affect EGPs, which are going to affect the amortization of that unearned revenue liability. So, it's a circular calculation.

**MS. HAY:** I'm not sure I agree with that. In the first SOP, we felt that there was a flaw in that we hadn't defined assessments well enough, so that circular part was in there. The final draft lays out what's included in assessments, and that's missing from the list. That was purposeful, but I feel like there is a lack of clarity around the point because it says assessments, then it talks about assessments broadly in another part of the SOP. In my personal view, the circularity is not there, but the SOP is not clear because I don't feel that the unearned revenue liability should be sitting in there. It wasn't in there before, and I don't think it should be after. I think the change in the GMDB liability should be there but not that unearned revenue liability. I think there's a lack of clarity in the SOP on that point.

**MR. SMITH:** The difference in our opinions is that at time zero, if you had a front-end load, present value would be the same, but after I get beyond the first duration I would be taking into account the amortized unearned revenue liability and the present value of my assessments, and you would not be.

**MS. HAY:** We never put them in before. The unearned revenue liability was excluded from the EGPs, and I think that the SOP hasn't changed that. But I'd be interested to hear what other people's views are on it because we did get a question on this potential circularity.

**MR. DICK SUTTON:** I was considering that circularity as well. We have two-tier annuities that have a front-end load. Do you take just the load in year one into your assessment stream, or do you amortize it into the assessment stream? It sounds like the two of you are opposites in that regard.

**MR. JARRETT:** I think if you take the comment literally that the assumptions are going to be consistent, I think mathematically you may be able to come up with an approach that's consistent with the fact that the front-end load is, indeed, a big dollar amount at issue by reflecting the fact that the unearned revenue balance is the same as a front-end load at that date. You need to play around with the arithmetic and the algebra a little bit and see if you're comfortable with that idea, but I think mathematically it works.

**MR. SMITH:** I think the difference between the SOP and FAS 97 in my mind is that in the SOP we're talking about assessments, and in FAS 97 we're talking about gross profits, with gross profits being used to amortize the unearned revenue liability. Assessments, it seems to me, have to include the unearned revenue component.

**MS. HAY:** There was discussion about that, and I feel that that's why the list was clarified there, but I do think that if the intent of the SOP— was to remove the circularity (in my view, it was), it should have been more clear. Because it's not clear, I think we might have some different interpretations with different companies.

My view would be that the load would be left out of the assessments and the base of determining the benefit ratio and amortizing the liability.

**MR. JARRETT:** I'll ask the obvious question. What happens if the load is so substantial that you don't have any assessments left?

**MS. HAY:** That's the European problem.

**MR. SUTTON:** I did have a separate question on sales inducements and the period over which you recognize that expense. It talks about recognizing it over the period at which the contract holder earns the inducement.

Here are two examples. You'd earn a first-year interest rate bonus all in the first year. You probably don't amortize it over the entire first year. Would it be instead your DAC amortization period? Say the second type of inducement is a persistency bonus at year 15. Would you accrue for that cost over 15 years? It does say use methods and assumptions consistent with DAC.

If you're amortizing DAC over a longer period, would you accrue a liability and then amortize an asset after 15 years?

**MS. HAY:** That's an excellent question. There are two schools of thought on that question, and I think that either interpretation is possible. I'm still grappling with a response to that myself. I'm not going to answer it, but I'd like to hear if other people think that it's very clear.

**MR. JARRETT:** My school of thought is that it's very clear that you do have a different amortization stream for the liability buildup versus the DAC runoff. They're different amortization streams and different periods as well. The period of the DAC amortization is going to be consistent with your DAC amortization schedule, whatever that period is. There's an example in last year's session similar to this that puts forth that idea. I encourage you to look at that example as one school of thought.

**MR. SUTTON:** I heard a third school of thought, which is that you amortize it and then capitalize it into DAC and run it off over 40 years, or whatever that DAC period is.

**MS. HAY:** That's a possibility.

**MR. MIKE DUBOIS:** Am I correct in interpreting that there's no specific direction on what level of aggregation that you calculate the benefit ratio on? I haven't seen anything that says the benefit ratio has to be seriatim; it doesn't say that the benefit ratio is at the uppermost level. Second, regarding the disclosure requirements, how much detail would be required on your aggregation policy? Will they potentially be looking for disclosure as to if you aggregated at a lower level, so that there's some disclosure on the negatives offsetting the positives?

**MS. HAY:** On the disclosure issue, it doesn't specifically say that you have to talk about the aggregation levels. I think it's up to you to decide. The importance of the aggregation levels really comes into play with that floor of zero and whether or not you're offsetting the positives and the negatives for purposes of aggregating to ultimately get to that floor. Ultimately, whether you use positives and negatives, even at the model cell level, for example, if you combine issue years where some are in the money and some are out, are you letting them offset or do you feel that you have to value each and every individual one? The answer is that there's no specific guidance.

In the survey that we performed, we asked about aggregation levels. About half of the respondents said they intend to aggregate at the provision type and possibly issue-age levels. Within that, we asked about the question of floors of zero, and there was mixed response. Again, that floor of zero and where you put it can produce very different reserves, and yet there's no clarity on that point. I would also go further to say that I feel like sometimes companies will use the floor of zero depending on what their modeling systems can do, more than it being a conscious decision. If the system doesn't have a little place that says "use floor at zero at the model cell level or not," you might be stuck with what the system does. You should pay attention to if it's flooring at zero at the model cell, or at whatever levels in your modeling system.