

June 2012 Version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

● DISCUSSION DRAFT ●

Standards for Principle-Based Reserves for Life Products

**Developed by the
Task Force on Principle-Based Reserves of the
Life Committee of the
Actuarial Standards Board**

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

STANDARDS FOR PRINCIPLE-BASED RESERVES FOR LIFE PRODUCTS

A proposal for an actuarial standard of practice associated with current regulatory work on principles based reserves for life products is currently in development by the Task Force on Standards for Principle-Based Reserves of the Life Committee of the Actuarial Standards Board. This discussion draft is a result of that work and is intended to be consistent with draft regulations and actuarial guidelines on this topic that were recently exposed by the Life Actuarial Task Force of the NAIC. Please note that it is a work in progress and many changes are likely.

The Actuarial Standards Board (ASB) has authorized the Task Force on Standards for Principle-Based Reserves to distribute this discussion draft to illustrate how an actuarial standard of practice (ASOP) might work in conjunction with a model regulation on Principle-Based Reserving. The ASB has neither reviewed nor approved this Discussion Draft. This is not an Exposure Draft.

The Task Force expects to create an Exposure Draft after discussions with interested parties and adoption of a Model Regulation by the NAIC. That Exposure Draft (which will draw on the ideas in this discussion draft modified by discussions with interested parties and unfolding events) will go through the normal ASOP process:

1. The Task Force (TF) will submit the Exposure Draft (ED) to the Life Operating Committee (LOC).
2. The LOC will revise the ED and submit it to the ASB.
3. The ASB will revise the ED and release it to all actuaries and other interested parties for comment. The ASB has the final authority with respect to actuarial standards of practice.
4. Following the end of the exposure period, the TF will revise the ED based on comments received and produce a proposed ASOP or a second ED (depending on the amount of change). This document will follow the same process as the original ED (and even if submitted as a proposed ASOP may be changed to a second ED by the LOC or the ASB).
5. The ASOP will become effective only after final approval by the ASB.

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

At this time, comments on the discussion draft received by the TF will not be shared with the ASB but may be used by the TF as input. Also, note that the discussion draft may undergo substantial change as it is being developed, at the sole discretion of the TF.

June 2012 version

DISCUSSION DRAFT
Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board

STANDARDS FOR PRINCIPLE-BASED RESERVES FOR LIFE PRODUCTS

Section 1. Purpose, Scope, Cross References, and Effective Date

- 1.1 Purpose—This actuarial standard of practice (ASOP) provides guidance to actuaries when performing professional services in connection with establishing principle-based reserves for life insurance in compliance with the NAIC *Standard Valuation Law* (referred to herein as the Standard Valuation Law), and the *Valuation Manual*. A principle-based valuation is one based on deterministic reserves or stochastic reserves using methods and assumptions as defined in the *Valuation Manual*. For some risk factor assumptions, the insurer’s own experience, if relevant and credible, is used.
- 1.2 Scope—This standard applies to actuaries when performing professional services on behalf of life insurers, including fraternal benefit societies, in connection with the calculation or review of reserves for individual life insurance policies, including individual certificates issued under a group policy, where such reserves are represented as being in compliance with the provisions of the *Standard Valuation Law* and the *Valuation Manual* governing principle-based reserves.
- If the actuary departs from the guidance set forth in this standard in order to comply with applicable law (statutes, regulations, and other legally binding authority), or for any other reason the actuary deems appropriate, the actuary should refer to section 4.
- 1.3 Cross References—When this standard refers to the provisions of other documents, the reference includes the referenced documents as they may be amended or restated in the future, and any successor to them, by whatever name called. If any amended or restated document differs materially from the original referenced document, the actuary should consider the guidance in this standard to the extent it is accurate and appropriate.
- 1.4 Effective Date—This standard will be effective for work performed **starting** four months after adoption by the Actuarial Standards Board.

Section 2. Definitions

The terms below are defined for use in this actuarial standard of practice. **[Drafting Note: Definitions in this section are intended to conform to the extent possible to the *Standard***

June 2012 version

**DISCUSSION DRAFT
Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

Valuation Law and the Valuation Manual.]

- 2.1 Anticipated Experience—An expectation of future experience for a risk factor given available, relevant information pertaining to the assumption being estimated.
- 2.2 Cash Flow Model—A model that projects asset and liability cash flows. The *Valuation Manual* requires the company to design and use a cash flow model that does the following:
 - a. complies with applicable Actuarial Standards of Practice;
 - b. uses model segments consistent with the company’s asset segmentation plan, investment strategies, or approach used to allocate investment income for statutory purposes;
 - c. assigns each policy to only one model segment; and
 - d. projects cash flows for a period that extends far enough into the future so that no obligations remain.
- 2.3 Credibility—A measure of the predictive value that the actuary attaches to a particular body of data (*predictive* is used here in the statistical sense and not in the sense of predicting the future).
- 2.4 Deterministic Reserve—A principle-based reserve calculated under a defined scenario and a single set of assumptions, in accordance with procedures set forth in the *Valuation Manual*.
- 2.5 Granularity—The degree to which an asset and liability cash flow model contains separate components such as cells, or assumptions that vary by cell. Models with a higher degree of granularity (more cells or assumption variations) may provide more accurate projections, but may require greater effort and greater expense to run.
- 2.6 Margin—An amount included in a prudent estimate assumption that is intended to provide for estimation error and adverse deviation related to a corresponding anticipated experience assumption.
- 2.7 Minimum Reserve—The reserve for all life policies determined in accordance with the *Valuation Manual*.
- 2.8 Model Segment—A group of policies and associated assets that are modeled together to

June 2012 version

**DISCUSSION DRAFT
Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

determine the path of net asset earned rates.

- 2.9 Modeling Cell—Policies that are treated in a cash flow model as being completely alike with regard to mortality rates, policyholder behavior assumptions, and policy provisions.
- 2.10 Net Premium Reserve—The formula reserve calculated in accordance with the procedures set forth in the *Valuation Manual*.
- 2.11 PBR Actuarial Report—The principle based reserve actuarial report required annually from the company, if any policy or contract is subject to a principle-based reserve valuation under the *Standard Valuation Law*. This report must be prepared under the direction of, and signed by, one or more Qualified Actuaries. The *Valuation Manual* prescribes the content of this report and other requirements.
- 2.12 Prudent Estimate Assumption—A risk factor assumption developed by applying margins to the anticipated experience assumption for that risk factor.
- 2.13 Qualified Actuary—An actuary who meets the standards set forth in the *Valuation Manual* to sign the PBR Actuarial Report.
- 2.14 Relevant Experience—Experience which has occurred on a historical basis in situations that are sufficiently similar to the liabilities, assets and environments being projected to make the experience appropriate as a basis for determining the assumptions for anticipated experience. Changing circumstances can be a matter of concern when evaluating relevance.
- 2.15 Risk Factor—An aspect of future experience that is uncertain as of the valuation date and that can affect the future financial results arising from the provisions of a policy. Examples include mortality, expense, policyholder behavior, and asset return.
- 2.16 Scenario—A projected sequence of events used in the cash flow model, such as future interest rates, equity performance, or mortality.
- 2.17 Sensitivity Test—A calculation of the effect of varying an assumption, for the purpose of determining the significance of the assumption.
- 2.18 Starting Assets—An initial estimate of the value of the assets that will be used to fund projected policy cash flows arising from the policies funded by those assets.
- 2.19 Stochastic Reserve—A reserve amount calculated with stochastically generated scenarios in

June 2012 version

**DISCUSSION DRAFT
Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

accordance with the *Valuation Manual*.

- 2.20 Valuation Date—The date when the reported reserve is to be valued as required by the *Standard Valuation Law*.

Section 3. Analysis of Issues and Recommended Practices

- 3.1 Regulatory Requirements—An actuary performing professional services within the scope of this standard should be familiar with relevant law and regulation including the *Standard Valuation Law* and the *Valuation Manual*, and should make a reasonable effort to be aware of generally distributed interpretations thereof.
- 3.2 The Role of the Actuary—The statutory financial statements of life insurance companies are the responsibility of management. The methodologies used in determining principle-based reserves are generally prescribed by the *Standard Valuation Law* and the *Valuation Manual*. Actuaries frequently participate in the processes of developing specific techniques and assumptions for the application of principle-based methods to the preparation of insurance company reserves. To the extent the actuary participates in these activities, the actuary should be guided by this standard.

One or more Qualified Actuaries are also responsible for preparing, or overseeing the preparation, of the PBR Actuarial report in accordance with section VM-31 of the *Valuation Manual*, which must state that the PBR reserve valuation was calculated in accordance with VM-5 and VM-20, and that the assumptions are prudent estimates. If any actuary responsible for the PBR Actuarial Report has recommended to the company a method or assumption to be used in the calculation of principal-based reserves that is different from methods and assumptions used by the company in determining the reserves, the actuary should be guided by Section 4 of this standard.

- 3.3 Developing Practice—Principle-based reserving for life insurance policies is a new field of endeavor for actuaries, and it is to be expected that accepted methods of practice will emerge as experience in the field develops. New developments will arise and be published in practice notes or other types of actuarial literature. Although such guidance is not binding, actuaries should make an effort to be familiar with major developments of this kind, and consider adopting such procedures for their own work.
- 3.4 Reserve Calculations—Except as provided below, the minimum reserve is determined as the

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

aggregate net premium reserve for all policies plus the excess, if any, of the greater of the aggregate deterministic reserve for all policies and the stochastic reserve for all policies over the difference between the aggregate net premium reserve and any deferred premium asset held on account of those policies.

As an alternative, the company may elect to exclude certain groups of policies from the deterministic or stochastic reserve calculations, if exclusion conditions determined in accordance with the *Valuation Manual* are met. If the company elects this alternative, the minimum reserve is the sum of the following

- a. For the groups of policies that pass both the stochastic exclusion and deterministic exclusion test the aggregate net premium reserve for those policies;
- b. For the groups of policies that pass the stochastic exclusion test but fail the deterministic exclusion test, the aggregate net premium reserve for those groups plus the excess, if any, of the deterministic reserve for those groups over the difference between the aggregate net premium reserve for those policies and any deferred premium asset held on account of those policies. ; and
- c. For the groups of policies that fail the stochastic exclusion test or are not subject to exclusion tests, the aggregate net premium reserve plus, the excess, if any, of the greater of the deterministic reserve and the stochastic reserve over the difference between the aggregate net premium reserve for those policies and any deferred premium asset held on account of those policies.

Whereas the calculation of the deterministic and stochastic reserves are principle-based valuations, the calculation of the aggregate net premium reserve is based on assumptions prescribed by the *Valuation Manual*; the balance of the guidance in this section 3 focuses on the principle-based approach, and in general does not apply to the net premium reserve calculation.

- 3.5 Exclusion Tests—The company may choose to subject one or more groups of policies to the stochastic or deterministic exclusion tests. A group of policies may pass the stochastic exclusion test either by satisfying the stochastic exclusion ratio test or, for groups of policies other than variable life or universal life with a secondary guarantee, by providing the Commissioner with a certification by a Qualified Actuary that “the group of policies is not subject to material interest rate risk or asset return volatility risk.” In providing a certification that the group is not subject to material interest rate risk or asset return volatility risk, the Qualified Actuary should consider the group as a whole and take into account the

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

possibility that future changes in the economic, regulatory or market environment may cause a material risk to arise. A possible basis for certification might be a risk analysis completed as part of an internal capital measurement process, or the results of cash flow testing.

The *Valuation Manual* does not contain significant restrictions on how the groups of policies are constructed, except that the company may not group together “contract types with significantly different risk profiles” for the purposes of doing the stochastic exclusion ratio or the deterministic exclusion test.

3.6 Modeling—The actuary should ensure that the modeling methods selected are appropriate for the business being valued.

3.6.1 Model Segments—The actuary should assign each of the policies to be modeled to a model segment. The purpose of the assignment is to facilitate the calculation of earned rates and discount rates, and normally this will be achieved by combining policies that will be managed under a common investment policy, particularly as regards reinvestment and borrowing practices. The PBR Actuarial Report should confirm that the model segments are consistent with the company’s asset segmentation plan, investment strategies, or approach used to allocate investment income for statutory purposes, as required by the *Valuation Manual*, and the assignment of policies to model segments leads to a reasonable model of future cash flows and investment actions. This does not preclude the assignment of policies with offsetting risks to the same model segment, if the assignment is otherwise appropriate and may reasonably be assumed to remain appropriate despite plausible changes in future conditions. In the PBR Actuarial Report the Qualified Actuary should document the reasoning that was used in assigning policies to model segments.

In applying the exclusion tests, the groups of policies tested need not coincide with model segments. If the group tested is a subgroup of the policies assigned to a model segment, the basis on which the asset cash flows are allocated to the subgroup and whether this allocation may be expected to have a material effect on the results of the test should be disclosed. If the group tested is a combination of policies from several model segments, the disclosure should note whether this combination may be expected to have a material effect on the results of the test.

3.6.2 Model Validation—The PBR Actuarial report requires documentation of the validation procedures performed. A static validation confirms that the initial values for reserves, face amount, policy count, and other basic statistics materially balance

June 2012 version

DISCUSSION DRAFT

Not an Exposure Draft - For Illustrative Purposes Only Distribution Authorized, but Content NOT Reviewed or Approved by the Actuarial Standards Board

to the company records as of the model date. The actuary should spot check the calculations to determine that the results of the model for assets, reserves and cash flow patterns in several scenarios are either predictable or explainable. The actuary should consider conducting additional validation procedures such as the following:

- a. performing a dynamic validation of the model, which populates the model with historical data, and compares the cash flows produced by the model to the actual historical data to verify that the model produces results reasonably similar to those actually experienced;
- b. comparing calculations from the model to any other existing company systems that have the same calculations for consistency. Any material differences between the model and the existing company systems should be explained.

3.6.3 Asset Modeling Considerations—An asset model for each model segment should adequately reflect all of the material characteristics and investment strategies of the asset portfolio of the model segment. The starting asset amounts and asset cash flows should be determined in accordance with the *Valuation Manual*. If the actuary chooses to group assets or use simplified modeling procedures, the actuary should demonstrate that these procedures can reasonably be expected to produce reserves that are not materially less than those produced by a more robust cash flow model.

The actuary should model the appropriate costs and benefits of a clearly defined hedging strategy as defined by the *Valuation Manual*. If it is not practical to model the impact of the hedging program within the model, the actuary should develop a reasonable estimate of the hedging program impact. The actuary should exercise care to assure that the impact of the hedging program appropriately reflects any experience the company has had with hedging programs, anticipated economic conditions, the cash flows expected on the basis of the model, the transaction costs, and the level of uncertainty that exists with respect to the performance of the hedging program over time. The actuary might also consider the liquidity ramifications of collateral requirements. The PBR Actuarial Report requires an actuarial certification regarding the modeling of clearly defined hedging strategies.

If there are material changes in the procedures for modeling assets or hedging from one year to the next, the rationale for these changes should be documented in the PBR Actuarial Report.

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

- 3.6.4 Liability Modeling Considerations—The reserve calculation should reflect all policy provisions and risks specific to the insurance contracts, including those arising from guarantees, whether or not specifically mentioned in this standard or in law or regulation, that have a reasonable probability of materially affecting future policy cash flows or other contract-related cash flows. Costs that are not specific to the insurance contract, for example, federal income taxes, shareholder dividends, and costs related to operational failures, mismanagement, fraud and regulatory risks should not be recognized in the reserve calculation.
- a. The actuary may group policies with similar risk characteristics in representative modeling cells in order to simplify the calculation of the deterministic or stochastic reserve. A cash flow model with fewer policies assigned to each model cell has a higher “level of granularity.” The PBR Actuarial Report should disclose the results of any tests used to demonstrate that the use of a model with a higher level of granularity is unlikely to result in a materially higher reserve. Acceptable demonstrations for this purpose include, but are not limited to, the following:
 1. comparison for a set of sample cells of the reserve based on the modeling cells to the reserve based on seriatim calculation; and
 2. a demonstration that extremes of adverse experience for a sample set of scenarios have closely similar effects on the reserve for all policies assigned to the same sample cells. Such demonstrations may be done as of a date other than the valuation date and need not be updated every year, unless the actuary determines that conditions likely to affect the result have changed. The actuary should be particularly careful about the level of granularity in the premium assumptions (see section on Policyholder Behavior – premium assumptions).
 - b. In projecting policy or other liability cash flows, the actuary should consider the impact of projected changes in experience on cash flows arising from policyholder dividends or other non-guaranteed elements. For example, if the company bases credited rates on current asset yields, then projected credited rates should be consistent with projected asset yield rates. The actuary should consider current management policy and past company actions as well as contractual provisions, when projecting future scale changes. For example, the model should incorporate a lag between a change in experience and a change in scales if this reflects past company responses to changes in

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

experience. If the model incorporates dynamic policyholder behavior assumptions, those assumptions and the scale projections should be consistent. For example, consistency may require increased lapse rates if credited interest rates tend to lag projected new money rates in a rising interest rate scenario.

- 3.6.5 Use of Prior Period Data—The actuary may elect to base the cash flow projections used to determine reserves on asset and policy in force data and assumptions that have an “as of” date prior to the valuation date subject to the requirements of the *Valuation Manual*. For example, the actuary may use stochastic projections based on data and assumptions as of September 30 to support a December 31st valuation, as long as the PBR Actuarial Report explains why the use of such data will not produce a material change compared to using data as of the valuation date. Such explanation shall address the nature of any up-dating adjustment made to the data and the rationale for why the adjustments are appropriate. Under some circumstances, such adjustments may not result in an appropriate reserve level for some or all policies. For example, if changes in equity market values or interest rates cause some guarantees to be “in the money” that were not so at the earlier date, projections based on the data and assumptions of the earlier date may not produce an appropriate level of reserves for policies having such guarantees
- 3.7 Reinsurance—This section applies to reserves for policies ceded or assumed under the terms of a reinsurance agreement. In applying the requirements of the section, the actuary should assume that the counterparty to the reinsurance agreement is knowledgeable about the contingencies involved in the agreement and thus likely to exercise the terms of the agreement to its advantage.

The terms “reinsurance” and “reinsurer” in this section include retrocession and retrocessionaire, respectively.

a. **Reinsurance Ceded**

1. Cash Flows for Reinsurance Ceded—In determining the cash flows used in calculating the reserve for a reinsured policy, the actuary should reflect cash flows expected to be received from and paid to reinsurers under the terms of the reinsurance agreement. Reinsurance credit may be taken only if such agreement meets the requirements of applicable laws and regulations. Cash flows expected to be received from or paid to reinsurers under the terms of any reinsurance agreement that does not meet such requirements shall be

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

taken into account only if doing so results in an increase in the reserve held for such policies.

2. Net Cash Flows—In calculating the deterministic and stochastic reserves, assumptions and models should be designed with an eye toward projection of cash flows that are net of reinsurance ceded. It would not normally be appropriate to calculate the reserve by deducting a reinsurance credit from the gross reserve (the reserve excluding the effect of reinsurance ceded), unless it is reasonable to assume that such a procedure would produce a result that does not materially differ from a directly calculated net reserve. If a gross reserve (i.e., a reserve before reinsurance ceded) is also needed for regulatory reporting or other purposes, the actuary should be careful to disclose whether the assumptions about asset mix and experience used in such a calculation are consistent with the assumptions used in calculating the net reserve
3. Cash Surrender Value Floor—If the reserve is subject to a statutory provision requiring a cash surrender value floor, the actuary should set the floor for a reinsured policy to be that portion of the cash surrender value of the policy that the company is obligated to pay after taking into account the terms of the reinsurance agreement.
4. Assumptions for Reinsurance Ceded—The assumptions used by the actuary to project expected cash flows to or from reinsurers should be consistent with other assumptions used in calculating the reserve for the reinsured policies and should reflect the terms of the reinsurance agreement.
5. Margin Affected by Reinsurance—Mortality margins, should take into account the impact of ceded reinsurance, particularly nonproportional reinsurance, on the degree of uncertainty. Stochastic analysis may be needed to achieve the appropriate result. Other items relevant to ceded reinsurance that should be considered in setting a margin include any limits placed upon the reinsurer's ability to change the terms of the treaty, including the presence or absence of guarantees of reinsurance premiums and allowances; past practices of reinsurers in general and the assuming reinsurer in particular regarding the changing of such terms; and the ability of the ceding company to modify the terms of the reinsured policies in response to changes in terms of the reinsurance agreement. Consideration should be given to modifying the assumptions used to project cash flows for ceded reinsurance so as to

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

include a margin that has the effect of increasing the reserve if, based on actuarial judgment, such margin is necessary to reflect uncertainty regarding the receipt of assumed cash flows from the reinsurer. Such a margin may be required by the *Valuation Manual*. The actuary should take account of the ratings, risk-based capital ratio or other available information bearing on the probability of default by the reinsurer, together with the likely impact on cash flows expected to be received from or paid to the reinsurer. The actuary should consider the extent to which the probability of default is dependent on future economic conditions and thus on specific scenarios used in calculating the reserve. In determining the likely impact on cash flows, the actuary should take account of any security posted by the reinsurer or other factor limiting such impact, to the extent such security or other factor is expected to be available to mitigate such impact.

6. Assets Held by the Reinsurer or Another Party—If under the terms of the reinsurance agreement, some of the assets supporting the reserve are held by the reinsurer or by another party, the actuary should determine whether such assets in that portfolio must be modeled in order to determine either discount rates or projected cash flows. In some situations, modeling of the assets held by the reinsurer or other party may not be necessary. An example would be a reinsurance agreement containing provisions, such as experience refund provisions, under which the cash flows and effective investment return to the ceding company are the same under all scenarios. If a conclusion is reached that modeling is unnecessary, the PBR Actuarial Report should document the testing and logic leading to that conclusion.
7. Relationships to Assumptions Used by Assuming Company—The actuary should choose assumptions to be used to determine the reserve and the reserve excluding the effect of reinsurance for policies ceded under a reinsurance agreement that are appropriate for the ceding company. Unless laws or regulations provide otherwise, such assumptions need not be the same as the assumptions used by the assuming company to determine the reserve it will hold for these policies.

b. Reinsurance Assumed

1. Cash Flows for Reinsurance Assumed—In determining the cash flows used in calculating the reserve for an assumed policy, the actuary should reflect cash flows expected to be received from and paid to the ceding company

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

under the terms of the reinsurance agreement to the extent such agreement meets the requirements of applicable laws and regulations. Cash flows expected to be received from or paid to ceding companies under the terms of any reinsurance agreement that does not meet such requirements shall be taken into account only if doing so results in an increase in the reserve held for such policies.

2. Cash Surrender Value Floor—If the reserve is subject to a statutory provision requiring a cash surrender value floor, the actuary should set the floor for an assumed policy to be that portion of the cash surrender value of the policy that the company is obligated to pay after taking into account the terms of the reinsurance agreement.
3. Assumptions for Reinsurance Assumed—The assumptions used to project expected cash flows to or from the ceding company should be consistent with the assumptions used by the reinsurer for the model segment to which the reinsured policies belong and should reflect the terms of the reinsurance agreement. If reinsurance premiums or allowances are not guaranteed, consideration should be given to treating them in the same manner as a non-guaranteed element. Also, consideration should be given to any actions that have been taken or appear likely to be taken by the ceding company that could affect the expected mortality or other experience of the assumed policies. Examples of actions that could be taken by the ceding company that could affect the expected mortality of the assuming company include internal replacement programs or table-shave programs.
4. Margin for Uncertainty in Reinsurance Cash Flows—The actuary should include a margin in the assumptions and should test the aggregate margin so produced as provided in the margin section of this standard. In addition, the cash flows for assumed reinsurance should include a further margin that has the effect of increasing the reserve if, based on actuarial judgment, such margin is necessary to reflect uncertainty regarding the receipt of cash flows from or paid to the ceding company. Where the ceding company is known to be impaired, such a margin is required by the *Valuation Manual*. In determining such margins, the actuary should take account of the ratings, risk-based capital ratio or other available information bearing on the probability of default by the ceding company, together with the likely impact on cash flows expected to be received from or paid to the ceding company. The actuary should consider the extent to which the probability of default is

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

dependent on future economic conditions and thus on specific scenarios used in calculating the reserve. In determining the likely impact on cash flows, the company should take account of any security posted by the ceding company or other factor limiting such impact, to the extent such security or other factor is expected to be available to mitigate such impact.

5. Assets Held by the Ceding Company or Another Party—If under the terms of the reinsurance agreement, some of the assets supporting the reserve are held by the ceding company or by another party, the actuary must determine whether such assets must be modeled in order to determine either discount rates or projected cash flows. In some situations, modeling of the assets held by the ceding company or other party may not be necessary. An example would be a reinsurance agreement containing provisions, such as experience refund provisions, under which the cash flows and effective investment return to the reinsurer are the same under all scenarios. If a conclusion is reached that modeling is unnecessary, the PBR Actuarial Report should document the testing and logic leading to that conclusion.

- 3.8 Assumptions—Where permitted by the *Valuation Manual* the assumptions about future experience should be based on the insurer's actual recent experience, if relevant and credible. To the extent the insurer's actual experience is not sufficiently relevant or credible, the actuary should consider using other relevant and credible experience, such as industry experience, appropriately modified to reflect the insurer's circumstances. The appropriate modifications should take into consideration any expected material differences in experience that could result from the company's circumstances being different from those that existed when the other experience took place. Some examples of circumstances that may be different include the company's underwriting practices, the market demographics, the design of the product, the economic environment, the regulatory environment, and the time period of the study. If no relevant and credible experience is available, actuarial judgment should be used in modifying other sources of information.

The actuary should be aware of the requirements of the *Valuation Manual* that direct the use of specified procedures in selecting assumptions.

The actuary should consider sensitivity testing the assumptions to determine those that have the most significant impact on resulting reserves. In general, more analysis is warranted for assumptions that have a significant impact on valuation results than for assumptions that are less significant.

June 2012 version

**DISCUSSION DRAFT
Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

The Qualified Actuary shall annually review relevant emerging experience for the purpose of assessing the appropriateness of the anticipated experience assumptions

- 3.8.1 Determining Assumption Margins—After the anticipated experience assumptions are established each assumption should be modified to include a margin for estimation error and moderately adverse deviation, except as indicated below. Assumptions that are modeled dynamically (i.e., assumed to vary as a function of a stochastic assumption, such as lapse rates or NGE rates that vary in response to interest rates) should carry an adequate margin throughout all their variations.
- a. Modifying Assumptions—The modification for a particular assumption should be such that the reserve is increased thereby. If the direction of impact of changing an assumption is not clear, the actuary should attempt to determine the nature of the change that is appropriate. If it is not practical to determine the directional impact, then the actuary need not modify that assumption. Assumptions for risks that are to be modeled stochastically need not be modified so long as a moderately adverse proportion of the stochastically generated results is used for establishing the reserve. For each assumption that is modified, the magnitude of the modification should reflect the degree of risk and uncertainty in that assumption. When determining the degree of risk and uncertainty, the actuary should take into account the magnitude and frequency of fluctuations in relevant historical experience, if available. In doing so, consideration should be given to using statistical methods to assess the potential volatility of the assumption in setting an appropriate margin. The additive impact of margins for all assumptions should be established at a level that provides for an appropriate amount of adverse deviation in the aggregate, even though it may seem that the margin for an individual assumption may not appear adequate on a stand-alone basis (see also section on “Overall Margins.”).
 - b. Sensitivity Testing—The actuary may use sensitivity testing to evaluate the significance of an assumption in determining the valuation results. For assumptions that are relatively insignificant, the actuary may decide to add little or no margin to the anticipated experience assumption.
 - c. Overall Margins—The actuary should compare the reserves based on modified assumptions (reserves with margins) with the reserves based on anticipated experience (reserves without margins), for a group of policies. For this purpose, “group of policies” may mean a line of business, or the

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

actuary may make the comparison on several groups of policies within a line of business. The reserves with margins should be greater than the reserves without margins by an amount that could be justified as consistent with the risk on the group of policies and the regulatory requirements for reserves. For example, the actuary might relate the difference in reserves to a percentage of the present value of risk capital requirements on the group of policies.

- d. Adjusting Reserves—If the difference between reserves with margins and reserves without margins is inadequate based on actuarial judgment, adjustments should be made in the reserves to be reported. This may be accomplished by changing the assumption margins, or by adjusting the total reserves in the group of policies, using any reasonable method to allocate the difference to individual policies.

3.8.2 Mortality—Principle-based reserving should be based on company underwriting standards and mortality experience to the extent it is reasonable to do so.

- a. The actuary should use the most recent relevant company experience that is practicably available. Consideration should be given to the length of the observation period, recognizing the tradeoff between having insufficient data if the period is too short and having data no longer relevant if the period is too long.
- b. If relevant company experience for a particular risk class is available and has full credibility, the actuary should consider the use of that experience as the basis for deriving anticipated mortality. In situations where relevant company experience for a particular risk class is not available or does not have full credibility, anticipated mortality should be derived in a reasonable and appropriate manner, using credibility methods to blend any partially credible data relevant for the risk class with other data from actual experience and past trends in experience of other similar types of business, either in the same company, in other companies (including reinsurance companies), or from other sources, generally in that order of preference. If the relevant company experience for a particular risk class and other relevant experience are insufficient to form an assumption, actuarial judgment should be used in assessing anticipated mortality, taking into account where, in the spectrum of mortality experience, such business would be expected to fall relative to the mortality experience for other risk classes.

June 2012 version

DISCUSSION DRAFT

Not an Exposure Draft - For Illustrative Purposes Only

**Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

- c. The actuary should consider the effect that lapsation or nonrenewal activity or other anticipated policyholder behaviors has had or would be expected to have on mortality. The actuary should specifically take into account the effect of any anticipated or actual increase in gross premiums or cost of insurance charges on lapsation, and the resultant effect on mortality due to antiselection.
- d. In determining anticipated mortality, the actuary should consider trends in mortality, whether improvements or deterioration, which have been observed in company, industry or population experience, to the extent such trends are expected to continue. If the actuary determines that recognition of mortality trends beyond the valuation date will have the effect of increasing reserves, such trends should be incorporated into the assumptions for the cash flow projections. Otherwise, mortality trends should not be projected beyond the valuation date unless permitted by applicable law. But mortality improvement beyond the valuation date may be included in the aggregate margin amount that the actuary is required to report. Trends in experience should not be used in determining anticipated mortality to the extent that such trends result from temporary conditions, such as changes in underwriting rules or procedures.

3.8.3 Investment Experience—The actuary should make reasonable assumptions about future investment experience that take into consideration the company's asset/liability management strategy for the product portfolio.

- a. Sets of scenarios of future U.S. Treasury rates and future equity values are specified in the *Valuation Manual*. In applying them, the actuary may use scenario reduction techniques, but should consider using techniques that follow published methods (such as the American Academy's practice note on the subject) and in addition the actuary should be satisfied that the techniques used are appropriate to the situation and can reasonably be expected not to result in a material reduction in reserves.
- b. Factors and methods for determining default assumptions and spread assumptions are set forth in the *Valuation Manual*. Such requirements apply to reinvested assets as well as starting assets, but in the case of reinvested assets the company needs to specify an investment strategy that can be used to determine the maturity and quality of reinvested assets in various circumstances. In the case of a strategy that provides for the matching of

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

assets and liabilities, the modeling of the maturities of reinvested assets may be very sensitive to the scenario being used.

- c. The actuary should consider any variability in the timing of the asset cash flows related to movements in interest rates, such as prepayment risk, and incorporate such variability into the various scenarios within the model. For example, prepayment, extension, call and put features should be specifically modeled in a manner consistent with current asset adequacy analysis practice (ASOP Nos. 7 and 22).

3.8.4 Policyholder Behavior—Anticipated policyholder behavior assumptions for the cash flow models should usually include premium payment patterns, premium persistency, surrenders, withdrawals, transfers between fixed and separate accounts on variable products, benefit utilization, and other option elections.

- a. General Considerations

1. When determining these assumptions, the actuary should consider that anticipated policyholder behavior may be expected to vary according to such characteristics as gender, attained age, issue age, policy duration, time to maturity, tax status, level of account and cash value, surrender charges, transaction fees or other policy charges; distribution channel, product features and whether the policyholder and insured are the same person or not.

The actuary should determine anticipated policyholder behavior assumptions that are appropriate for the block of business being valued. The actuary should give due consideration to other assumptions of the valuation model when deriving anticipated policyholder behavior.

The actuary should consider whether it is reasonable to constrain anticipated policyholder behavior to the outcomes and events exhibited by historic experience, especially when modeling policyholder behavior of a new product benefit or feature.

The actuary may ignore certain items that might otherwise be explicitly modeled if the inclusion of such items would not reasonably be expected to have a material effect on the results.

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

2. Options embedded in the product, for example, term conversion privileges or policy loans, may impact policyholder behavior. The actuary should consider that as the value of a product option increases, there is an increased likelihood that policyholders will behave in a manner that maximizes their financial interest in the contract (for example, lower lapses, higher benefit utilization, etc.) The actuary may ignore options that are not material drivers of policyholder behavior.
 3. Unless there is clear evidence to the contrary, anticipated policyholder behavior assumptions should be consistent with relevant past experience and reasonable future expectations. At any duration for which relevant data do not exist, the actuary should consider taking into account what action will maximize the value of the policy from the point of view of an impartial investor who owns the policy (i.e., lapse the policy, persist, take out a loan, etc.) The actuary should also recognize that policyholders may place value on factors other than maximizing the policy's financial value (for example, convenience of level premiums, personal budget choices, etc.), and that the policy's full economic value to the policyholder depends not only on its currently realizable value but also on factors not available for analysis, such as the health of the insured and the financial circumstances of the beneficiaries and policyholder.
 4. The actuary should exercise care in using static assumptions when it would be more natural and reasonable to use a dynamic model or other scenario-dependent formulation for anticipated policyholder behavior. Risk factors that are modeled dynamically should encompass the reasonable range of future expected behavior consistent with the economic scenarios and other variables in the model. In the absence of evidence to the contrary, it may not be necessary to model extreme or "catastrophic" forms of behavior. However, the actuary should consider testing the sensitivity of results to understand the materiality of making alternate assumptions.
- b. Premium Assumptions

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

An important element of the cash flow model is the set of assumptions about the amount of premium to be paid in each future period on policies remaining in force, and assumptions about premium persistency, the probability that a premium will be paid in a particular period. While historical experience, when available, is often a good basis for such assumptions, the actuary should exercise care about assuming that past behavior will be indefinitely maintained. For example, market or environmental changes can make historical experience less relevant. Premium payment assumptions may also vary by interest rate scenario.

The actuary should consider the desirability of making multiple premium payment assumptions, by subdividing the cell of business into several projection cells, each with a separate payment pattern assumption. If this is not done, and there is one average pattern for the cell, the actuary should consider making use of sensitivity testing, which may help to determine whether the estimates of reserves or risks are materially impacted by the use of such an approach.

For policies with fixed future premiums, the actuary should of course assume that future premium payments on in force policies will be in accordance with the policy provisions. In other situations, the actuary, in designing assumptions about future premium payments, should consider taking into account such factors as the limitations inherent in the policy design, the amount of past funding of the policy, and the marketing of the policy.

Marketing factors that may have an impact on the level and continuation of premium payments include:

1. marketing emphasis on coverage (as opposed to savings accumulation);
2. marketing emphasis on savings accumulation or tax advantages;
3. marketing emphasis on premium flexibility;
4. policy illustrations showing premiums for limited period;
5. automatic electronic payment of premiums; and

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

6. bonuses for higher premiums or assets.

In selecting multiple premium patterns for modeling purposes, the actuary may consider using one or more of the following patterns: target premium, illustrated premium, billed premium, minimum premium, or continuation of past premium levels.

- c. Withdrawal and Surrender Assumptions

The actuary should exercise care in using static assumptions when it would be more appropriate to use a dynamic model reflecting projected interest rate environment, funding level, premium increases, and benefit triggers. In setting partial withdrawal and surrender assumptions, the actuary should consider the insured's age and gender, and the policy duration and the existence of policy loans. In addition, the actuary should consider taking into account such factors as the policy's competitiveness, surrender charges, interest or persistency bonuses, taxation status, premium frequency and method of payment, and any guaranteed benefit amounts. The actuary should consider the fact that rates of surrender can decline dramatically prior to a scheduled sharp increase in surrender benefit (sometimes known as a "cliff") caused by a decrease in surrender charge, a bonus or a maturity benefit, and rates of surrender can rise materially after such an event.

- 3.8.5 Expenses—The actuary should review the expenses that have been allocated, for financial reporting purposes, in recent years to the block of policies being evaluated. Those expenses that are classified as "direct sales expenses" or as "taxes, licenses, and fees," should be directly allocated to the activity creating the expense. All other expenses should be allocated to the appropriate activity count (per policy, per claim, etc.) and by duration where appropriate, using reasonable principles of expense allocation and unit costs. This analysis should normally serve as the basis for projecting expenses in doing the reserve valuation, but if, in the judgment of the actuary, the expense experience is not a suitable basis for projection, other sources of data may be used (as set forth in section (b) below).

- a. Expense Inflation—The actuary should consider whether unit costs (particularly those other than direct sales expenses and taxes, licenses, and fees) ought to be treated in the projection as subject to inflation. Applicable law may require such an assumption. Possible sources of information about inflation assumptions are published projections of the CPI or the price

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

deflator, such as the rate selected by the Social Security Administration for its long-term intermediate projection. Another relevant source is the difference between the rates on treasury securities and treasury inflation protected securities of a similar maturity. The actuary may also consider the assumption that future inflation rates will vary if prevailing new-money rates change. The resulting projection of implied “real return” should be reviewed by the actuary for reasonability.

- c. Applying Recent Expense Experience—In reviewing recent experience, the actuary should be satisfied that the expenses being allocated to the block of policies being evaluated represent all expenses associated with the block, including overhead, according to statutory accounting principles. If the recent experience on the block is not, in the judgment of the actuary, a suitable basis for projection, the actuary may consider the use of experience on a closely similar type of policy within the company, or intercompany studies, provided that any regulatory approval required for such a step is obtained.

The provision for overhead should consider holding company expenses that are associated with the life company (e.g., rent, executive compensation, and other costs of running the insurance business) that have not been recognized in other charges to or reimbursements from the life company.

Acquisition expenses and significant non-recurring expenses expected to be incurred after the valuation date, to the extent allocable to the business in force at the valuation date, should be included in the expense assumptions.

Provision should be made for unusual future expenses, such as severance costs or litigation costs, which may be anticipated.

If system development costs or other capital expenditures are amortized in the annual statement the actuary should reflect such amortization in the assumptions. If such expenditures occurred in the exposure period and were not amortized the actuary may exclude them from the experience, but should consider the possibility that similar expenditures will occur in the future.

In projections of direct sales expenses, the actuary may take into account recent changes in company practice, such as changes in commission rates that may not have been fully reflected in the experience. Projection of taxes, licenses, and fees should be based on a reasonable activity base (such as premium).

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

Recent changes in company practice, such as changes in staffing levels, that could affect “all other” expenses, may be reflected in the projection, but the actuary should, in the case of changes that are planned but not fully implemented, consider the probability that the changes will actually affect expenses.

- 3.8.6 Taxes—The company should determine reserves using models in which federal income taxes are excluded from consideration. Any taxes other than federal income taxes, which are not included in the “taxes licenses, and fees” item, should be separately recognized in the projection models.
- 3.9 Reliance on Data or Other Information Supplied by Others—When relying on data or other information supplied by others, an actuary should refer to ASOP No. 23, *Data Quality*, for guidance. In addition, where the Qualified Actuary relies on others for data, assumptions, projections or analysis in determining the principle based reserves, the specific requirements of the *Valuation Manual* must be met.
- 3.10 Documentation—The actuary should create records and other appropriate documentation supporting the valuation and, to the extent practicable, should take reasonable steps to ensure that this documentation will be retained for a reasonable period of time (and no less than the length of time necessary to comply with any statutory, regulatory, or other requirements). The actuary need not retain the documentation personally; for example, the actuary's company may retain it. The PBR Actuarial Report must contain documentation and disclosure sufficient for another actuary qualified in the same practice area to evaluate the work. The PBR Actuarial Report must include descriptions of all material decisions made and information used by the company in complying with the minimum reserve requirements and must comply with the minimum documentation and reporting requirements set forth in the *Valuation Manual*. The company shall retain on file for at least seven (7) years from the date of filing, sufficient documentation so that it will be possible to determine the procedures followed, the analyses performed, the bases for assumptions and the results obtained in a Principal-Based Valuation. The company shall submit a PBR Actuarial report to a commissioner upon request.

Section 4. Communications and Disclosures

- 4.1 Actuarial Communications—When issuing actuarial communications under this standard, the actuary should refer to ASOP No. 23 and ASOP No. 41, *Actuarial Communications*. In

June 2012 version

**DISCUSSION DRAFT
Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

addition, the actuary should refer to ASOP No. 21 *Responding to or Assisting Auditors or Examiners in Connection with Financial Statements for All Practice Areas*, where applicable.

- 4.2. Disclosures—The actuary should include the following, as applicable, in an actuarial communication:
- a. the disclosure in ASOP No. 41, section 4.2, if any material assumption or method was prescribed by applicable law (statutes, regulations, and other legally binding authority);
 - b. the disclosure in ASOP No. 41, section 4.3, if the actuary states reliance on other sources and thereby disclaims responsibility for any material assumption or method selected by a party other than the actuary; and
 - c. the disclosure in ASOP No. 41, section 4.4, if in the actuary’s professional judgment, the actuary has otherwise deviated materially from the guidance of this ASOP.

June 2012 version

**DISCUSSION DRAFT
Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

Appendix

Background and Current Practices

Note: This appendix is provided for informational purposes, but is not part of the standard of practice.

Background

Prior to 1980, the regulation of life insurance reserves for statement purposes was on a very stable basis, with occasional changes in the statutory interest rates and mortality tables, but with no significant changes in the basic approach for many years. But after 1980, an interest rate volatility of unprecedented magnitude, and the increasing popularity of new policy types that did not fit easily into the existing structure, began to cast some doubt on the approach that was being used.

In response to the problem, changes were introduced, including the adoption of dynamic statutory interest rates, the use of cash flow testing of reserves, and a number of adaptations of the reserve structure to provide formulas appropriate for different policy types. But it became increasingly difficult to modify the existing structure to keep up with changing conditions.

In addition, the statutory factors for interest and mortality were designed to produce reserves that were high enough to cover a wide variety of situations, and thus were viewed as unnecessarily conservative for many companies. It was also evident that some risk factors were not explicitly addressed in the statutory approach, such as the variety of choices open to policyholders (i.e., the items generally grouped under the heading of “policyholder behavior”) and also the level and pattern of insurance company expenses. These risk factors could have a significant impact on reserve adequacy.

Thus there were many reasons for considering the need for radical changes in the statutory reserving system. In many other countries, programs for change had already been under way for some time. In the United States, the proposed new approach has been given the name of “principles based reserves,” and it would require that reserve calculations make use of the company’s own experience, when credible, that they recognize the impact of all material risk factors, and that reserve margins be appropriate to the risk in the products being reserved for.

Committees of the actuarial profession have been at work recommending the detailed regulatory provisions needed to implement principles based reserving. The need was also recognized for an actuarial standard of practice that would accompany the regulatory effort and would provide

June 2012 version

DISCUSSION DRAFT

**Not an Exposure Draft - For Illustrative Purposes Only
Distribution Authorized, but Content NOT Reviewed or Approved by the
Actuarial Standards Board**

additional guidance to the actuary who was preparing principles based reserves. It should be noted that although the phrase “principles based reserves” is quite broad and could apply to many different types of reserves, this standard is limited to the situation of the actuary concerned about certifying reserves in compliance with principles based regulatory requirements in United States jurisdictions. The terminology and provisions of this standard are intended to be consistent with those requirements.

The proposed regulatory structure for principles based reserves will retain the principle that statutory reserves should be adequate to withstand moderately adverse circumstances, and that the company should hold additional assets, known as “risk based capital” to cover more extreme circumstances. It is hoped that there will eventually be a greater consistency in the methodologies of reserves and risk based capital. Efforts have been under way for some time to make changes in the approach to risk based capital. But this standard is not intended to apply to risk based capital. An extension of the scope of this standard to risk based capital, or the initiation of new standards to support capital calculations, is still in the future.

Current Practice

Since its introduction in the 1980s, cash flow testing has become a well-established technique in most life insurance companies. ASOP No. 7, *Analysis of Life, Health, or Property/Casualty Insurer Cash Flows*, gives guidance on this technique. The current proposals for principles based reserve regulations make use of cash flow testing as a central part of the recommended approach.

The adoption of the Actuarial Opinion and Memorandum Regulation in 1991, together with ASOP No. 22, *Statement of Opinion Based on Asset Adequacy Analysis by Actuaries for Life or Health Insurers*, made it mandatory for larger companies to use one or more of a set of techniques (collected under the general heading of “asset adequacy analysis”) in testing reserves. Foremost among these techniques was cash flow testing. But statutory formulas remained the minimum standard for reserves. Asset adequacy analysis was designed only to determine if there was a need for reserves higher than the minimum.

The need for modification of the formula minimums in the light of new conditions continued in subsequent years. One of the most ambitious efforts was known as “Regulation XXX,” which became effective in 2000. Among the many changes introduced by it was a provision that allowed the actuary, in certain very limited circumstances, to use lower than statutory minimums if justified by company experience. ASOP No. 40, *Compliance with the NAIC Valuation of Life Insurance Policies Model Regulation with Respect to Deficiency Reserve Mortality*, was adopted to assist the actuary in this process.