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DISCUSSION DRAFT
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● 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

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STANDARDS FOR PRINCIPLE-BASED RESERVES FOR LIFE PRODUCTS

A proposal for an actuarial standard of practice associated with current regulatory work on principle-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 and Health 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 not used Discussion Drafts in the past. It 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.

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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 Task Force.

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Task Force on Principle-Based Reserves

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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 a reserve valuation that uses one or more methods or one or more assumptions determined by the insurer pursuant to requirements of the *Standard Valuation Law* and the *Valuation Manual*.

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. This standard does not require an actuary to use, nor preclude the actuary from using, a principle-based approach where the use of such an approach is not required by law or regulation.

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 4.5.

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 on or after 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 the conform to the extent possible to the standard 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.

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 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.

2.5 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.

2.6 Model Segment—A group of policies and associated assets that are modeled together to determine the path of net asset earned rates.

2.7 Modeling Cell—Two or more policies that are treated in a cash flow model as being completely alike with regard to mortality rates, policyholder behavior assumptions, and policy provisions.

2.8 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.

2.9 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.

2.10 Scenario—A projected sequence of events used in the cash flow model, such as future

interest rates, equity performance, or mortality.

2.11 Sensitivity Test—A calculation of the effect of varying an assumption, for the purpose of determining the significance of the assumption.

2.12 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.

2.13 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*.

3.2 Appointed Actuary—The appointed actuary (the qualified actuary appointed by the board and responsible for the Actuarial Opinion and Memorandum in accordance with the *Standard Valuation Law)* is required to sign a "PBR Actuarial Report," which must be prepared by the company in accordance with the *Valuation Manual.*

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—Under the principle-based approach, the minimum reserve is determined as the aggregate net premium reserve for all policies plus the excess, if any, of A over B, where the following occurs:

A = the greater of the aggregate deterministic reserve for all policies, and the stochastic reserve for all policies; and

B = the aggregate net premium reserve less any net deferred premium asset held on

account of those policies.

The company may elect to exclude certain groups of policies from the deterministic or stochastic reserve calculations, if exclusion tests determined in accordance with the *Valuation Manual* are passed.

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.

3.4.1 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. Hence the actuary should do the following in making the assignment:

a. Consider whether the assets backing the liabilities associated with the policies are managed under a common investment strategy or common investment guidelines, whether formal or informal; and

b. Assure the assignment is consistent with the *Valuation Manual*.

The actuary should assure that the assignment of policies to model segments leads to a reasonable model of future cash flows and investment actions. This does not preclude the actuary from assigning policies with offsetting risks to the same segment, if the assignment is otherwise appropriate and may reasonably be assumed to remain appropriate despite plausible changes in future conditions. The actuary should document the reasoning that was used in assigning policies to model segments.

3.4.2 Model Validation—The actuary should validate the model. The actuary should conduct a static validation of the model, which confirms that the initial values for reserves, face amount, policy count, and other basic statistics materially balance to the company records as of the model date. The actuary should spot check the calculations for accuracy and verify the results of the model for cash flow patterns that 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 over the first few periods to the actual historical data to verify that the model produces results reasonably similar to those actually experienced;

b. back testing the model against historical data to verify that modeled results are reasonably close to actual results over a given time period; and

c. 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.

The actuary's validation findings should be quantified and communicated to management.

3.4.3 Asset Modeling Considerations—The actuary should develop an asset model for each model segment that adequately reflects 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 do not produce reserves materially less than those produced by a more robust cash flow model. If there are material changes in the asset modeling procedures from one year to the next, the actuary should document the rationale for these changes in the actuary's report.

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, and the level of uncertainty that exists with respect to the performance of the hedging program over time.

3.4.4 Liability Modeling Considerations—The actuary should reflect in the reserve calculation 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 into representative cells. Since models with a high degree of granularity may provide a more accurate projection, but will be more costly to produce, the actuary will have to choose the level of granularity carefully. The actuary may decide to test the sensitivity of reserves to various levels of granularity. Such tests may be done as of a date other than the valuation date and need not be updated every year. The actuary should be particularly careful about the level of granularity in the premium assumptions (see section 3.6.4(b) below).

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, credited interest rates could appropriately reflect the projected change in asset yields. The actuary should consider current management policy and past company actions, as well as contractual provisions, when projecting future scale changes. For example, the actuary should consider incorporating in the model a lag between a change in experience and a change in scales if this reflects past company responses to changes in 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.

3.4.5 Use of Prior Period Data—The actuary may elect to base the cash flow projections used to determine reserves on asset and policy inforce data and assumptions that have an "as of" date prior to the valuation date, provided that the projections can be adjusted so that the reserve that is based on such data and assumptions is, in the actuary's judgment, appropriate. For example, the actuary may use stochastic projections based on data and assumptions as of a date prior to December 31st to

support a December 31st valuation, provided that adjustments, such as a deterministic estimate of the increase in reserves between such "as of" date and the valuation date, result in a reserve level that is, in the actuary's judgment, 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. The actuary should disclose and discuss in the supporting memorandum any use of prior period data and the reasoning leading to the conclusion that the reserve based on such data is appropriate.

3.5 Reinsurance—This section applies to reserves for policies ceded or assumed under the terms of a reinsurance agreement. In applying the guidance 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 to the extent 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 should be 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, the decisions made by the actuary in selecting assumptions and designing models should be made with an eye toward projection of cash flows that are net of reinsurance ceded. It would not normally be appropriate for the actuary to calculate the reserve by deducting a reinsurance credit from the gross reserve (the reserve excluding the effect of reinsurance ceded), unless, in the actuary's judgment, 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, in calculating such a reserve, should use assumptions about asset mix and experience that are consistent with the assumptions used in calculating the net reserve. The actuary should assume that current laws and regulations regarding credit for reinsurance will remain in effect for the duration of the projection.

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 by the ceding company in calculating the reserve for the reinsured policies and should reflect the terms of the reinsurance agreement.

5. Margin Affected by Reinsurance—In setting mortality margins, the actuary 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 by the actuary in setting a margin include any limits placed upon the reinsurer's ability to change the terms of 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. The actuary should consider modifying the assumptions used to project cash flows for ceded reinsurance to include a margin that has the effect of increasing the reserve if, in the actuary's 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*. In forming this judgment and setting 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 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. Items that should be considered by the actuary in setting a margin include any limits placed upon the reinsurer's ability to change the terms of 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.

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 must 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 actuary 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 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 should 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 by the actuary 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, the actuary should consider treating them in the same manner as a non-guaranteed element. In setting assumptions, the actuary should consider any actions that have been or are, in the actuary's judgment, likely to be taken by the ceding company and 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 actuary should consider modifying the assumptions used to project cash flows for assumed reinsurance to include a margin that has the effect of increasing the reserve if, in the actuary's judgment, such margin is necessary to reflect uncertainty regarding the receipt of cash flows from or payment of cash flows to the ceding company. In forming this judgment and setting 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 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 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 actuary should document the testing and logic leading to that conclusion.

3.6 Assumptions—The actuary should make assumptions about future experience 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, the actuary should use professional judgment in modifying other sources of information.

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.

When establishing anticipated experience assumptions, the actuary should review any prior

assumptions along with recent experience to determine whether continuing the existing assumptions is appropriate. The actuary should monitor emerging experience in such a way as to develop data for use in establishing assumptions in the future.

3.6.1 Determining Assumption Margins—After having specified the anticipated experience assumptions, the actuary should modify the assumptions for risks that are not modeled stochastically, using judgment to determine how much modification should be made for each assumption, to include a margin for estimation error and moderately adverse deviation. The resulting reserves for a group of policies should bear a reasonable relationship in the aggregate to the reserves based on anticipated experience. The actuary should ensure that 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) do 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 actuary should make a modification whose magnitude reflects 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, the actuary should consider 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 3.6.1(c), "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 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 in the judgment of the actuary, adjustments should be made in the reserves to be reported. The actuary may accomplish this 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.

3.6.2 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 use 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, the actuary should derive anticipated mortality 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, the actuary should use professional judgment 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.

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. 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.

3.6.3 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. The actuary may rely upon generators or scenario sets specified for this purpose by regulatory authorities and by actuarial professional organizations, but must exercise due caution to assure that the prescribed generator or scenario set is appropriately applied. The actuary should derive anticipated experience related to other aspects of the projection of asset cash flows and net investment earnings for starting assets and reinvestment assets that is consistent with each selected scenario.

b. Anticipated default costs for the various fixed income asset classes should be consistent with the type and quality rating of the asset class. The anticipated default cost for a particular asset class should take into consideration

available insurance industry and broad financial market experience, and the company's own experience if, in the actuary's professional judgment, the experience is credible and relevant. The anticipated default costs for starting assets and reinvestment assets should be consistent for each asset class.

c. In establishing the anticipated spreads over Treasuries for the purchase of reinvested assets, the actuary should consider the company's current investment strategy for the block of business and whether the reinvestment assets will be consistent with the types, quality and maturities of assets in the company's current investment strategy. For example, the current investment strategy may also relate to matching the duration of assets and liabilities over time. In that case, the maturities of future reinvestment assets may be different from the current strategy regarding maturities.

d. 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).

3.6.4 Policyholder Behavior—The actuary should develop anticipated policyholder behavior assumptions for the cash flow models generally including 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 establishing 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 develop 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 not 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 particularly if the inclusion of such items would not have a material effect on the results.

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 test the sensitivity of results to understand the materiality of making alternate assumptions.

b. Premium Assumptions

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 inforce, 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. The actuary should also consider varying premium payment assumptions 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 the actuary decides to use 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 inforce policies will be in accordance with the policy provisions. In other situations, the actuary, in formulating 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 lead to low premium payments include:

1. Marketing emphasis on coverage (as opposed to savings accumulation);

2. Marketing emphasis on premium flexibility; and

3. Illustrations featuring quick-pay premiums.

Marketing factors that may lead to high premium payments include:

1. Marketing emphasis on savings accumulation or tax advantages;

2. Pre-authorized transfers; and

3. 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, and/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.

3.6.5 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 deflator, such as the rate selected by the Social Security Administration for its long-term intermediate projection. The actuary may also wish to assume 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.

b. 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 use 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.

   Acquisition expenses and significant non-recurring expenses expected to be incurred after the valuation date should be included in the expense assumptions. The actuary should be careful to make provision 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 projecting 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).

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.

3.6.6 Taxes—The actuary 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.

3.7 Reliance on Data or Other Information Supplied by Others—When relying on data or other information supplied by others, the actuary should refer to ASOP No. 23, *Data Quality*, for guidance.

3.8 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. Such documentation should cover all aspects of the actuarial valuation in sufficient clarity such that another actuary qualified in the same practice area could evaluate the reasonableness of the actuary's work. The documentation supporting the actuary's report should be made available to the company, and if required, regulators.

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 addition, the actuary should provide reports, certifications, and memoranda as required by applicable law.

4.2 Certification and Actuarial Report—The actuary should prepare an actuarial report in

support of the certification. Applicable law may specify the content of the certification and its supporting actuarial report. If the actuary departs materially from the recommended language or gives an adverse opinion, such departure or adverse opinion should be disclosed in the certification and the supporting memorandum.

The actuarial report should include the following information:

a. a description of the blocks of policies subject to the *Valuation Manual*;

b. a description of the assets supporting the block of policies subject to the *Valuation Manual*;

c. a comparison of the deterministic reserve to the stochastic reserve, including the distribution of the scenario reserves and the result of applying the CTE risk level;

d. a summary of the projection results and the reserve levels determined for each model segment;

e. the rationale for the starting liabilities used as a basis for projections, and the amount by which these varied from the final reported reserves;

f. a description of, and the rationale for, the valuation assumptions, methods, models, risk management strategies (for example, hedging), derivative instruments, structured investments or any other risk transfer arrangements (such as reinsurance);

g. the basis for and the amount of margins in the projection assumptions;

h. the reasonableness of any prior period data, studies, analyses, or methods, that key assumptions are still appropriate, and that no material events have occurred prior to the valuation date that would invalidate the analysis on which the actuary's opinion is based;

i. relevant experience studies and the methods used to develop anticipated experience assumptions from them;

j. a description of the interest assumptions, interest rate scenarios, investment strategy and the methods used for allocating interest credits to the policies;

k. a description of the methods and rationale used for determining the non-guaranteed elements within the model;

l. a description of any cash flows excluded from the projections because of immateriality;

m. a description of any cash flows included in the projections that are not attributable to specific asset, policy, or other liability cash flows, and any off balance sheet items that were included in the projections;

n. results of all applicable sensitivity tests;

o. disclosure of all items as described and required by the *Valuation Manual*, including but not limited to:

    1. the aggregate impact of the margin on the reported reserve in total and for each model segment;

    2. the impact of the margin for each material risk factor (i.e., mortality, expense, policyholder behavior, and asset return) for each model segment. The actuary may choose to report the investment risk margin (including default risk margin) net of the amount disclosed under item c above, provided that the approach used is properly identified;

    3. an estimate of the margin ratio for each model segment;

    4. the embedded spreads, market values and statutory values for fixed income investments for each model segment;

    5. the impact to the reported reserve (at least once every three years) from the aggregation of blocks of policies with different risk characteristics; and

    6. a demonstration of the stochastic modeling exclusion.

p. description of internal procedures that are used to review the actuary's assumptions, processes and controls;

q. description of the key risk measurement tracking tools that the company uses as an early warning of changes in experience between valuation dates; and

r. the reasoning that was used in assigning policies to model segments.

4.3 Reliance on Others for Data, Projections, and Supporting Analysis—The actuary may rely on data, projections, and supporting analysis supplied by others. In doing so, the actuary should disclose in the supporting memorandum both the fact and the extent of such reliance. Such disclosure may be prescribed in applicable law. The accuracy and comprehensiveness of data, projections, and supporting analysis supplied by others are the responsibility of those who supply the data, projections, and supporting analysis. When practicable, the actuary should review the data, projections, and supporting analysis for reasonableness and consistency, and disclose such a review. For further guidance, the actuary is directed to ASOP No. 23.

4.4 Retention—The actuary, to the extent practicable, should take reasonable steps to ensure that the supporting memorandum 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).

4.5 Deviation from the Guidance of an ASOP—If, in the actuary's professional judgment, the actuary has deviated materially from the guidance set forth in an applicable ASOP, other than as covered under sections 4.2 or 4.3 of ASOP No. 41, the actuary can still comply with that ASOP by providing an appropriate statement in the actuarial communication with respect to the nature, rationale, and effect of such deviation.

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 "principle-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 principle-based reserving. The need was also recognized for an actuarial standard of practice that would accompany the regulatory effort and would provide additional guidance to the actuary who was preparing principle-based reserves. It should be noted that although the phrase "principle-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 principle-based regulatory requirements in United States jurisdictions. The terminology and provisions of this standard are intended to be consistent with those requirements.

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 principle-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.