ACTUARIAL STANDARDS BOARD

● **EXPOSURE DRAFT** ●

Proposed
Actuarial Standard
of Practice

Principle-Based Reserves for Life Products

Comment Deadline:
December 16, 2013

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

Approved for Exposure by the
Actuarial Standards Board
June 2013

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APPENDIX

EXPOSURE DRAFT—June 2013

June 2013

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Principle-Based Reserves for Life Products

FROM: Actuarial Standards Board (ASB)

SUBJ: Proposed Actuarial Standard of Practice (ASOP)

This document contains the exposure draft of a proposed actuarial standard of practice, *Principle-Based Reserves for Life Products*. Please review this exposure draft and give the ASB the benefit of your comments and suggestions. Each written response and each response sent by e-mail to the address below will be acknowledged, and all responses will receive appropriate consideration by the drafting committee in preparing the final document for approval by the ASB.

The ASB accepts comments by either electronic or conventional mail. The preferred form is e-mail, as it eases the task of grouping comments by section. However, please feel free to use either form. If you wish to use e-mail, please send a message to **comments@actuary.org**. You may include your comments either in the body of the message or as an attachment prepared in any commonly used word processing format. **Please do not password protect any attachments.** Include the phrase "ASB COMMENTS" in the subject line of your message. Please note: Any message not containing this exact phrase in the subject line will be deleted by our system's spam filter.

If you wish to use conventional mail, please send comments to the following address:

Principle-Based Reserves
Actuarial Standards Board
1850 M Street, NW, Suite 300
Washington, DC 20036

The ASB posts all signed comments received to its website to encourage transparency and dialogue. Unsigned or anonymous comments will not be considered by the ASB nor posted to the website. The comments will not be edited, amended, or truncated in any way. Comments will be posted in the order that they are received. Comments will be removed when final action on a proposed standard is taken. The ASB website is a public website and all comments will be available to the general public. The ASB disclaims any responsibility for the content of the comments, which are solely the responsibility of those who submit them.

Deadline for receipt of responses in the ASB office: **December 16, 2013**

Background

The forces that led to consideration of principle-based approaches to reserving for individual life insurance are discussed in the appendices of this document. When a serious effort to develop operating rules started several years ago, the Actuarial Standards Board decided to explore the need for a standard of practice, and a task force was formed to produce a discussion draft of the standard. Over the years, that task force has tried to create a draft containing actuarial guidance that is useful in calculating principle-based reserves and is consistent with VM-20 (the relevant chapter of the *Valuation Manual*). That discussion draft went through many permutations, as useful suggestions came from many sources, and as the draft of VM-20 itself changed significantly from year to year. That discussion draft has now become an exposure draft for consideration by the profession.

This guidance is provided in the context of the requirements of the *Valuation Manual* adopted by the National Association of Insurance Commissioners (NAIC); if it were developed for purposes of principle-based reserves more broadly, this standard might be different.

Request for Comments

The ASB would appreciate comments on all areas of this proposed standard and would like to draw the readers' attention to the following questions in particular:

1. The text sometimes repeats or summarizes material in VM-20 to the extent needed to clarify the guidance. Is this overdone or, conversely, should there be more of it?

2. Is the guidance provided, particularly in the areas listed below, clear and appropriate? If not, what specific changes do you suggest?

    - making updating adjustments when data prior to the valuation date is used;
    - doing stochastic analysis of nonproportional reinsurance;
    - grouping policies into modeling cells; or
    - deciding on model granularity.

3. Is this standard of practice appropriately prescriptive?

4. If adopted, do you feel that this standard of practice provides adequate guidance for actuaries responsible for determining principle-based reserves? If not, what changes would you suggest?

The ASB reviewed the draft and approved its exposure in June 2013.

EXPOSURE DRAFT—June 2013

Task Force on Principle-Based Reserves

Frank S. Irish, Chairperson

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The ASB establishes and improves standards of actuarial practice. These ASOPs identify what the actuary should consider, document, and disclose when performing an actuarial assignment. The ASB's goal is to set standards for appropriate practice for the U.S.

EXPOSURE DRAFT—June 2013

PROPOSED ACTUARIAL STANDARD OF PRACTICE

PRINCIPLE-BASED RESERVES FOR LIFE PRODUCTS

STANDARD OF PRACTICE

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 National Association of Insurance Commissioners (NAIC) *Standard Valuation Law* (referred to herein as the *Standard Valuation Law*) and the NAIC *Valuation Manual* as adopted in December 2012.

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, 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.

2.1 Anticipated Experience Assumption—An expectation of future experience for a risk factor, given available, relevant information pertaining to the assumption being estimated.

2.2 Asset Segmentation Plan—The plan by which an insurer allocates assets among lines of business for reporting investment income for statutory purposes.

2.3 Cash Flow Model—A model designed to simulate asset and liability cash flows.

2.4 Credibility—A measure of the predictive value in a given application 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).

2.5 Deterministic Reserve—A reserve calculated under a defined scenario and a single set of assumptions.

2.6 Granularity—The extent to which a model contains separate components such as cells, or assumptions that vary by cell or time intervals. Models with a higher degree of granularity (more cells or assumption variations) may provide more model precision or flexibility, but may also require greater effort and expense to design, maintain, assemble and run.

2.7 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.

2.8 Minimum Reserve—The minimum reserve standard for all life policies subject to the requirements of the *Valuation Manual*.

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

2.10 Modeling Cell—Policies that are treated in a cash flow model as being completely alike with regard to demographic characteristics, policyholder behavior assumptions, and policy provisions.

2.11 Net Premium Reserve—The formula reserve calculated in accordance with the procedures set forth in the *Valuation Manual*.

2.12 Principle-Based Reserve (PBR)—The reserve resulting from a principle-based valuation prepared in accordance with the *Valuation Manual*.

2.13 Principle-Based Reserve Actuarial Report—The principle-based reserve actuarial report required annually from the insurer, if any policy or contract is subject to a principle-based reserve valuation under the *Standard Valuation Law*.

2.14 Principle-Based Valuation—A valuation that uses a cash flow model to project liability and asset cash flows to estimate the values and analyze the risks of policy benefits and

guarantees, and of the assets backing the policies. It uses assumptions for some risk factors that are based on the insurer's own experience to the extent relevant and credible.

2.15 Prudent Estimate Assumption—A risk factor assumption developed by applying margins to the anticipated experience assumption for that risk factor.

2.16 Qualified Actuary—An actuary who meets the standards set forth in the *Valuation Manual* to sign the principle-based reserves actuarial report.

2.17 Relevant Experience—Experience in situations that are sufficiently similar to the liabilities, assets, and environments being projected to make the experience appropriate, in the actuary's professional judgment, as a basis for determining the assumptions for anticipated experience.

2.18 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.

2.19 Scenario—A projected sequence of events used in the cash flow model, such as future interest rates, equity performance, or mortality.

2.20 Sensitivity Test—A calculation of the effect of varying an assumption.

2.21 Starting Assets—An estimate as of the valuation date of the value of the assets that will be used to fund projected policy cash flows arising from the policies funded by those assets.

2.22 Stochastic Reserve—A reserve amount calculated with stochastically generated scenarios in accordance with the *Valuation Manual*.

2.23 Valuation Date—The date as of which the minimum reserve is to be determined.

Section 3. Analysis of Issues and Recommended Practices

3.1 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 process 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*. If any actuary responsible for the PBR actuarial report is recommending to the insurer a method or assumption to be used in the calculation of principle-based reserves that is different from methods and assumptions used by the insurer in determining the principle-based reserves, the actuary should be guided by section 4 of this standard.

3.2 Regulatory Requirements—An actuary performing professional services within the scope of this standard should be familiar with applicable law and regulation including the *Standard Valuation Law* and the *Valuation Manual*.

3.3 Reserve Calculations—Except as provided below, the minimum reserve is defined in the *Valuation Manual* as the 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 insurer 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 insurer elects this alternative, the minimum reserve, according to the *Valuation Manual*, is the sum of the following:

a. the aggregate net premium reserve for those groups of policies that pass both the stochastic exclusion and deterministic exclusion tests;

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.

Although the calculation of the deterministic and stochastic reserves are principle-based valuations, the calculation of the aggregate net premium reserve is not a principle-based reserve since it is based on assumptions prescribed by the *Valuation Manual* and does not use a cash flow model. The balance of the guidance in this section 3 focuses on the principle-based approach and does not apply to the net premium reserve calculation.

3.4 Exclusion Tests—The insurer may choose to subject one or more groups of policies to the stochastic or deterministic exclusion tests. According to the *Valuation Manual*, a group of policies may pass the stochastic exclusion test by either 1) satisfying the stochastic exclusion ratio test; 2) providing demonstration that if the stochastic reserve were to be calculated on a standalone basis for the group of policies, the minimum reserve would not increase; or 3) 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."

Under the second exclusion test above, the insurer is required to perform the demonstration at least once every three years, and include the demonstration in the PBR actuarial report. The demonstration can be based on a date that precedes the initial or subsequent exclusion period. In the *Valuation Manual's* subsection on "Stochastic Exclusion Demonstration Test," several methods are provided that are acceptable in satisfying this demonstration requirement.

In providing a certification that the group is not subject to material interest rate risk or asset return volatility risk under the third exclusion test above, the qualified actuary should evaluate the group as a whole and take into account the possibility that future changes in the economic environment or competitive landscape 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 insurer 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. In constructing the grouping of policies, the actuary should consider the following:

a. contractual provisions of the policies and the impact of varying economic scenarios on the value of those provisions; and

b. results of other analysis performed that may provide an indication of the risk profile of different groups of policies (for example, economic capital analysis or cash flow testing analysis).

3.5 Modeling—The actuary should use modeling methods that are appropriate for the business being valued.

3.5.1 Cash Flow Model—Typically, principle-based valuation involves the use of a cash flow model that does the following:

a. uses model segments consistent with the insurer's asset segmentation plan,

investment strategies, or approach used to allocate investment income for statutory purposes;

b. assigns each policy to only one model segment; and

c. projects cash flows for a period that extends far enough into the future so that no obligations remain.

3.5.2 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 *Valuation Manual* requires that model segments be consistent with the company's asset segmentation plan, investment strategies, or approach used to allocate investment income for statutory purposes and that the assignment of policies to model segments leads to a reasonable projection 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. The *Valuation Manual* requires that the qualified actuary document the reasoning used in assigning policies to model segments in the PBR actuarial report.

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 actuary should disclose 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. If the group tested is a combination of policies from several model segments, the actuary should disclose whether this combination may be expected to have a material effect on the results of the test.

3.5.3 Model Validation—The *Valuation Manual* requires that the PBR actuarial report include 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 to the insurer's records as of the model date. The actuary should determine the appropriate degree of checking of the results of the model for assets, minimum reserves and cash flow patterns, given the intended purpose, context and nature of the model, including its operating environment and controls, and whether there have been any changes to the model and its environment.

The actuary should consider conducting additional validation procedures such as

the following:

a. performing a dynamic validation of the model that involves comparing 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; and

b. comparing results from the model to any other existing internal systems that have similar calculations for consistency. The actuary should disclose and explain any significant differences in results between the model and the existing internal systems.

3.5.4 Asset Modeling Considerations—The actuary should adequately reflect all of the material characteristics and investment strategies of the asset portfolio of each model segment in the asset model. The actuary should determine starting asset amounts and asset cash flows in accordance with the *Valuation Manual*. If the actuary chooses to group assets or use simplified modeling procedures, the *Valuation Manual* requires that the actuary demonstrate that these procedures can reasonably be expected to produce minimum 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 modeling the impact of the hedging strategy is not practical, the actuary should develop a reasonable estimate of the impact. The actuary's estimate should appropriately reflect any experience the insurer has had with relevant hedging strategies, 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 strategy over time. The actuary should consider the liquidity ramifications of collateral requirements. The *Valuation Manual* requires that the PBR actuarial report include an actuarial certification regarding the modeling of clearly defined hedging strategies.

If the procedures for modeling assets or hedging change significantly from the prior valuation, the actuary should disclose the rationale for these changes in the PBR actuarial report.

3.5.5 Liability Modeling Considerations—In determining the minimum reserve, the actuary should reflect all relevant 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. According to the *Valuation Manual*, 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) are not 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. The actuary should disclose the results of any tests used to demonstrate that the use of a model with a higher level of granularity would be unlikely to result in a materially higher minimum reserve. Acceptable demonstrations for this purpose include, but are not limited to, the following:

   1. comparison for a set of sample cells of the minimum reserve based on the modeling cells to the minimum 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 minimum 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.

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 nonguaranteed elements (including policyholder dividends). For example, if the insurer bases credited rates on current asset yields, the actuary should model projected credited rates that are consistent with projected asset yield rates. The actuary should consider contractual provisions, current management policy, and past company actions, such as any lag between a change in experience and a change in nonguaranteed elements, when projecting future nonguaranteed element changes. If the model incorporates dynamic policyholder behavior assumptions, the actuary should determine policyholder behavior assumptions that are consistent with the nonguaranteed element projections. 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.

3.5.6 Use of Prior Period Data—The actuary may elect to base the cash flow projections used to determine minimum reserves on asset and policy in force data and assumptions that have an "as of" date up to three months 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 30th to support a December 31st valuation. When using a different "as of" date, the actuary should disclose why the use of such data will not produce a

material change compared to using data as of the valuation date, the nature of any updating 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 minimum 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 minimum reserves for policies having such guarantees.

3.6 Reinsurance—This section applies to reserves for policies ceded or assumed under the terms of a reinsurance agreement. The terms "reinsurance" and "reinsurer" include retrocession and retrocessionaire, respectively.

a. Minimum Reserve and Reinsurance—The actuary should use cash flows reflecting the effects of reinsurance assumed and ceded when calculating deterministic and stochastic reserves. The actuary should use assumptions and models that project cash flows that are net of reinsurance ceded. It would not be appropriate to calculate the reserve by deducting a reinsurance credit from the pre-reinsurance-ceded minimum reserve, unless it is reasonable to assume that such a procedure would produce a minimum reserve that does not materially differ from a directly calculated net reserve.

b. Determination of a Pre-Reinsurance-Ceded Minimum Reserve—If a pre-reinsurance-ceded minimum reserve is needed for financial reporting or other purposes, the actuary should determine such a reserve by recalculating the minimum reserve assuming there is no reinsurance ceded in effect and assuming that the business would be managed in a manner consistent with the manner that retained business is managed. For the deterministic and stochastic reserve calculations, this could mean using different assumptions than for the minimum reserve calculation.

c. Reinsurance Assumptions for Projecting Cash Flows—The actuary should choose assumptions for projecting cash flows for assumed reinsurance and for ceded reinsurance that consider all aspects of the reinsurance agreement, including nonguaranteed elements.

1. In modeling nonguaranteed elements, the actuary may consider 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; known actions of the ceding company, such as changes in dividend scales; known 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 the reinsurance agreement. Assuming

and ceding parties shall assume that both are knowledgeable of the terms of the reinsurance agreement and will exercise options to their advantage, taking into account the context of the agreement in the entire economic relationship between the parties.

2. The actuary should incorporate assumptions and margins that are appropriate for the ceded or assumed business segment. The *Valuation Manual* does not require that the assuming and ceding companies use the same assumptions and margins.

3. In situations where a single deterministic valuation assumption for risk factors in a reinsurance agreement does not adequately capture the risk (for example, stop-loss reinsurance), the actuary should use an alternative approach that adequately captures the risk, such as modeling the risk stochastically. Alternative approaches may be used either directly in the cash flow model or in a separate analysis outside the model.

4. The actuary should consider any actions that have been taken or appear likely to be taken by the ceding company, or direct writer, if different, that could affect the expected mortality or other experience of assumed policies. Examples of such actions include internal replacement programs and table-shave programs.

d. Margin for Risk of Default—The actuary should establish a margin for the risk of default if the actuary has knowledge that the insurer's counterparty is financially impaired. The *Valuation Manual* does not require that a margin be established unless the insurer has knowledge that its counterparty is financially impaired.

e. Credit for Reinsurance—The *Valuation Manual* requires that the insurer reflect a reinsurance agreement or amendment in calculating the minimum reserve if, under the terms of the NAIC *Accounting Practices and Procedures Manual*, the agreement or amendment qualifies for credit for reinsurance. In making this determination, laws and regulations in effect on a valuation date are assumed to remain in effect for the projection period. If a reinsurance agreement or amendment does not qualify for credit for reinsurance, but treating the reinsurance agreement or amendment as if it did so qualify would result in a reduction to the insurer's surplus, then the actuary should increase the minimum reserve by the absolute value of such reduction in surplus.

f. Assets Held by the Counterparty or Another Party—If, under the terms of the reinsurance agreement, some of the assets supporting the reserve are held by the counterparty or another party, the actuary should determine whether such assets should be modeled in order to properly determine discount rates or projected cash flows. If the actuary concludes that modeling is unnecessary, the actuary should

disclose the testing and logic leading to that conclusion.

3.7 Assumptions—In setting assumptions, the actuary should consider ASOP No. 23, *Data Quality*, and ASOP No. 25, *Credibility Procedures*, as applicable, and also consider the following:

a. Where permitted by the *Valuation Manual*, the actuary should use assumptions about future experience that are based on the insurer's actual recent experience, if relevant and credible.

b. 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. In making such modifications, the actuary should take into consideration any expected material differences in experience that could result from the insurer's circumstances being different from those that existed when the other experience took place. Some examples of circumstances that may be different include the insurer's underwriting practices, the market demographics, the design of the product, the economic environment, the regulatory environment, and the time period of the study.

c. If no relevant and credible experience is available, the actuary should use professional judgment in modifying other sources of information.

d. 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.

The *Valuation Manual* requires the qualified actuary to annually review relevant emerging experience for the purpose of assessing the appropriateness of the anticipated experience assumptions.

3.7.1 Mortality—The actuary should base mortality assumptions for principle-based reserves on the insurer's underwriting standards and mortality experience to the extent doing so is reasonable.

a. The actuary should use the most recent relevant company experience that is practicably available. The actuary should take into consideration 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. VM-20 requires the observation period to be at least three years but no more than ten.

b. VM-20 requires that the actuary determine the level of credibility of the underlying experience data, using a credibility method that follows common actuarial practice published in actuarial literature. Examples include, but are not limited to, the Limited Fluctuation Method and the Panjer Method. The actuary should refer to ASOP No. 25 for guidance on credibility. The actuary should determine credibility over the entire exposure period (not for each duration). The actuary may determine credibility at either the mortality segment level or at a more aggregate level if the mortality for the mortality segments was determined using an aggregate level for mortality experience. VM-20 gives the actuary discretion to decide the level of granularity when determining the level of credibility.

c. If relevant company experience for a particular risk class is available and has a high degree of 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 a high degree of credibility, the actuary should derive anticipated mortality in a reasonable and appropriate manner. The actuary should use professional judgment 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 with similar underwriting, either in the same insurer, in other insurers (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.

d. The actuary should consider reflecting 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.

e. In determining anticipated mortality, the actuary should consider known 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, the actuary should incorporate such trends into the assumptions for the cash flow projections. Otherwise, the actuary should not project mortality trends beyond the valuation date unless permitted by applicable law. However, mortality improvement beyond the valuation date may be included in the aggregate margin amount that the actuary is required to report. The actuary should not incorporate trends in experience in determining anticipated mortality to the extent that such trends result from temporary conditions, such as changes in underwriting rules or procedures.

3.7.2 Investment Experience—The actuary should make reasonable assumptions about future investment experience that take into consideration the insurer'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. 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 minimum reserves.

b. Factors and methods for determining prescribed default assumptions and spread assumptions are set forth in the *Valuation Manual*. The prescribed default assumptions apply to reinvested assets as well as starting assets. In the case of reinvested assets, the *Valuation Manual* requires that the insurer 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 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 (for related guidance, see ASOP No. 7, *Analysis of Life, Health, or Property/Casualty Insurer Cash Flows* and ASOP No. 22,

Statement of Opinion Based on Asset Adequacy Analysis by Actuaries for Life or Health Insurers).

3.7.3 Policyholder Behavior—Anticipated policyholder behavior assumptions for the cash flow models 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—General considerations include the following:

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, account and cash values, surrender charges, transaction fees, or other policy charges; distribution channel, product features and whether the policyholder and insured are the same person.

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 historical experience, especially when modeling policyholder behavior of a new product benefit or feature.

2. Options embedded in the product, such as term conversion privileges or policy loans, may affect policyholder behavior. The actuary should consider that, as the value of a product option increases, the likelihood that policyholders will behave in a manner that maximizes their financial interest in the contract will increase (for example, lower lapses, higher benefit utilization, etc.).

3. Unless there is clear evidence to the contrary, the actuary should use anticipated policyholder behavior assumptions that are 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. For risk factors that are modeled dynamically the actuary should incorporate a 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, modeling extreme behavior may not be necessary. However, the actuary should consider testing 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 in force, including assumptions about premium persistency. 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 making multiple premium payment pattern assumptions, for example, by subdividing the cell of business into several projection cells, each with a separate payment pattern assumption. If this is not done and consequently the cell has one average pattern, the actuary should consider using sensitivity testing 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 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 affect the level and continuation of premium payments include the following:

1. marketing emphasis on death benefits;

2. marketing emphasis on savings accumulation or tax advantages;

3. marketing emphasis on premium flexibility;

4. policy illustrations showing premiums for a limited period;

5. automatic electronic payment of premiums; and

6. bonuses for higher premiums or assets.

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

The actuary should consider the level of granularity in setting the premium assumption. It should be granular enough to adequately reflect expected experience on a cost-effective basis.

c. Withdrawal and Surrender Assumptions—The actuary should consider using dynamic assumptions for withdrawal and surrender that are responsive to the projected interest rate environment, the 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.

3.7.4 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 non-direct 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. The actuary should use this analysis as the basis for projecting expenses in doing the reserve valuation, unless, in the actuary's professional judgment, the expense experience is not a suitable basis for projection, in which case 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 consider the assumption that future inflation rates will vary if prevailing new-money rates change. The actuary should review the resulting projection of implied "real return" for reasonability.

b. Applying Recent Expense Experience—In reviewing recent experience, the actuary should assure 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 actuary's professional judgment, 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 actuary should include a provision for overhead that considers holding company expenses that are associated with running the life insurance business of the insurer (for example, rent and executive compensation) that have not been recognized in other charges to or reimbursements from the life company.

   In developing expense assumptions, the actuary should include acquisition expenses and significant non-recurring expenses expected to be incurred after the valuation date, to the extent allocable to the business inforce at the valuation date. The actuary should include provision for unusual future expenses, such as severance costs or litigation costs that 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 should consider recent changes in company practice, such as changes in commission rates that may not have been fully reflected in the experience. The actuary's 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 non-direct 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.

3.7.5 Taxes—The *Valuation Manual* requires that the insurer determine reserves using models in which federal income taxes are excluded from consideration. The actuary should separately recognize any taxes, other than federal income taxes, which are not included in the "taxes, licenses, and fees" item, in the projection models.

3.7.6 Determining Assumption Margins—After the anticipated experience assumptions are established, the actuary should modify each assumption to include a margin for estimation error and moderately adverse deviation, except as indicated below. The actuary should incorporate an adequate margin in assumptions that are modeled dynamically (i.e., assumed to vary as a function of a stochastic assumption, such as lapse rates or nonguaranteed elements rates that vary in response to interest rates) throughout all their variations.

a. Mortality Margins—VM-20 prescribes the margins that are to be added to the anticipated experience mortality assumptions. The guidance in the remainder of this section on determining assumption margins does not apply to the mortality assumptions. However, VM-20 requires the actuary to establish an additional margin beyond the prescribed margin if in the actuary's professional judgment the prescribed margin is not adequate.

b. Modifying Assumptions—The actuary should only modify a particular assumption if doing so increases the minimum reserve. 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 minimum reserve.

For each assumption that is modified, the actuary should reflect the degree of risk and uncertainty in that assumption in determining the magnitude of such modification. 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 actuary should establish margins such that the additive impact for all assumptions is at a level that, in the actuary's professional judgment, provides for an appropriate amount of adverse deviation in the aggregate, even if the margin for an individual assumption does not appear adequate on a stand-alone basis (see also section on "Overall Margins").

c. Sensitivity Testing—The actuary should consider using 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.

d. Overall Margins—The actuary should compare the minimum reserves based on modified assumptions (i.e., prudent estimates) with the minimum reserves based on anticipated experience (minimum 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 actuary should set overall margins such that the minimum reserves with margins are greater than the minimum reserves without margins by an amount that is consistent with the risk on the group of policies and the regulatory requirements for reserves. In evaluating consistency, the actuary may, for example, relate overall margins to a percentage of the present value of risk capital requirements on the group of policies.

e. Adjusting Reserves—The actuary should make adjustments in the minimum reserve if, in the actuary's professional judgment, the difference between minimum reserves with and without margins is inadequate. This may be accomplished by changing the assumption margins, or by adjusting the total minimum reserves in the group of policies and using a

reasonable method to allocate the difference to individual policies.

3.8 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 and ASOP No. 41, *Actuarial Communications*, for guidance. In addition, where the actuary relies on others for data, assumptions, projections or analysis in determining the principle-based reserves, the actuary should comply with specific requirements of the *Valuation Manual*.

3.9 Documentation—The actuary should create records and other appropriate documentation supporting the valuation. To the extent practicable, the actuary should take reasonable steps to support the retention of this documentation 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 employer may retain it.

The *Valuation Manual* requires that the PBR actuarial report contain documentation and disclosure sufficient for another actuary qualified in the same practice area to evaluate the work. The actuary should include descriptions of all material decisions made and information used by the insurer in complying with the minimum reserve requirements and in compliance with the minimum documentation and reporting requirements set forth in the *Valuation Manual* in the PBR actuarial report.

The *Valuation Manual* requires that the insurer retain on file for at least seven 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 principle-based valuation. It also requires that the insurer 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. In 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.

The actuary should be aware of the requirements of VM-31.

4.2 Actuarial Report—The actuarial report is prepared under the direction of, and signed by, one or more qualified actuaries, as required by the *Valuation Manual*. The *Valuation Manual* prescribes the content of this report and other requirements.

The actuary should disclose the following items as discussed in further detail in section 3:

a. demonstration supporting the exclusion test (see section 3.4);

b. exclusion test grouping (see section 3.5.2);

c. differences in model results from existing internal system results (see section 3.5.3);

d. changes in procedures for modeling assets or hedging (see section 3.5.4);

e. results of tests of model granularity (see section 3.5.5(a));

f. use of an as-of date for assumptions or data that is prior to the valuation date (see section 3.5.6);

g. the rationale for not modeling assets held by a counterparty or another party (see section 3.6(f)); and

h. details such that another qualified actuary working in the same practice area could evaluate the work (see section 3.9).

The actuary should also disclose any items required by the *Valuation Manual* that are not listed above.

4.3 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.

Appendix

Background and Current Practices

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

Background

Principle-based reserving for life insurance policies is a new field of endeavor for actuaries, and accepted methods of practice are expected to emerge as experience in the field develops. New developments will arise and be published in practice notes or other types of actuarial literature.

Prior to 1980, the regulation of life insurance statutory reserves was very stable, with only occasional changes in the statutory interest rates and mortality tables, but with no significant changes in the basic approach for many years. After 1980, interest rate volatility of unprecedented magnitude, as well as 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 valuation interest rates, the use of cash flow testing of reserves, and a number of adaptations of minimum reserve requirements to provide formulas appropriate for different policy types. 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 have a significant impact on reserve adequacy.

The formulaic nature and prescriptive assumption set of statutory valuation techniques worked well for many years. However, as insurance products increased in their complexity, and as new and innovative product designs were developed that changed the insurer’s risk profile, it became apparent that revised regulations and numerous actuarial guidelines were not the best solution for the industry as a whole. On the insurance regulatory side, the NAIC, state commissioners, and insurance departments faced the challenge of maintaining the solvency objective of statutory reporting while creating a valuation platform that could be maintained efficiently, enhance uniformity among the states, persist into the future, and remain appropriate for all types of insurance products under various economic conditions.

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 requires that reserve calculations make use of a 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 product.

Committees within 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 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 who is opining on a principle-based reserve valuation performed in compliance with the *Standard Valuation Law* applicable to United States jurisdictions. The terminology and provisions of this standard are intended to be consistent with those requirements.

The proposed regulatory structure for principle-based reserves is intended to be consistent with the objectives of statutory financial reporting which emphasize solvency for the protection of policyholders. In addition to statutory reserves the insurer is also required to hold additional assets, known as "risk-based capital." These reserves and risk-based capital are intended to create an adequate margin of safety to provide that policyholder obligations and other legal obligations will be met when they come due.

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 component 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 for adequacy of reserves in light of the assets supporting them. Foremost among these techniques was cash flow testing. Asset adequacy analysis was designed as an aggregate test to determine whether the insurer should establish reserves in excess of the statutory minimums and includes methods of quantifying this amount. To a degree, these same techniques are paralleled in the determination of certain components of a principle-based valuation.