



AMERICAN ACADEMY *of* ACTUARIES

Report of the American Academy of Actuaries' Life Reserves Work Group

Presented to the National Association of Insurance Commissioners' Life and Health Actuarial Task Force

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PRINCIPLES-BASED RESERVES FOR LIFE PRODUCTS MODEL REGULATION

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Section 1. Purpose

- A. The method for calculating reserves defined in this regulation will constitute the Commissioner's Reserve Valuation Method (CRVM) for policies to which this regulation is applicable.
- B. The purpose of this regulation is to define the minimum valuation standard under a principles-based approach for Individual Life products. **[Add language from the Illustration Model Regulation to include in the scope for this regulation, individual policies issued under a group contract.]**
- C. A principles-based approach is one that:
 1. Captures all of the material risks, benefits and guarantees in the policy using basic risk analysis and risk management techniques.
 2. Provides an appropriate level of conservatism that is consistent with the objectives of statutory reporting.
 3. Requires a modeling and/or stochastic approach be used when necessary to properly capture the risks of the business being valued.
 - a. For some products, using only a deterministic, single scenario approach may be adequate to capture the risks of the policy.
 - b. For products with Material Tail Risk arising from sensitivities to changing economic conditions, a stochastic approach may be necessary.
 - c. A stochastic approach does not require that all assumptions be stochastically modeled.

Section 2. Authority

This regulation is issued under the authority of Section [insert applicable section] of the Insurance Laws of [insert state]

[Drafting Note: This regulation presumes that changes to the SVL have been adopted that permit the use of the principles-based valuation standard defined by this regulation.]

Section 3. Scope

1. The method defined by this regulation applies to all Individual Life policies whether directly written or assumed through reinsurance, including:
 - a. Universal Life Policies;
 - b. Variable Life and Variable Universal Life Policies;
 - c. Term Insurance Policies; and
 - d. Traditional Whole Life Policies.
2. **[Add language from Illustration Model Regulation to include in scope individual policies issued under a group contract]**
3. Reserves for policies, supplemental benefits, and riders on these policies that are not directly identified in this regulation are to be determined on a basis that is consistent with the principles and methodologies defined in this regulation.

[Drafting Note: emerging products such as Equity Indexed Life are included in scope, but additional considerations may need to be incorporated in this regulation to address issues related to these new emerging products.]

Section 4. Guiding Principles

The method defined by this regulation is based on the following set of principles. These principles should be followed when applying the methodology defined by this regulation and analyzing the resulting reserves.¹

Principle 1: The reserve is based on a prospective valuation method that appropriately captures all material risks underlying the product being valued including the magnitude of the tail risk, and the revenue to fund the risks.

Principle 2: The method provides a framework that can be applied to all individual life insurance products, including individual policies issued under a group contract.

Principle 3: A deterministic reserve approach may be sufficient for certain products, depending on the nature of the risks, and a stochastic approach may be necessary for other products.

Principle 4: For risks that the company has some degree of control over (e.g., mortality), assumptions should reflect a blend of company experience and prescribed assumptions (or methods for setting the assumptions), with the relative weightings of each dependent on the credibility of company experience. For risks that the company has no control over (e.g., market interest rate movements), prescribed assumptions or methods for setting the assumption should be used.

Principle 5: Assumptions that are not stochastically modeled should be based on Prudent Best Estimates that incorporate appropriate Margins for uncertainty. This means that assumptions are to be based on the conservative end of the actuary's confidence interval. Margins should be set for each assumption to produce an acceptable Margin in the aggregate, since setting conservative assumptions for each assumption may result in a distorted measure of the total risk.

¹ Note the following when considering these principles:

- a. The principles should be considered in their entirety.
- b. The method defined by this regulation requires companies to meet these principles with respect to only those policies that fall within the scope of this regulation and are in force as of the valuation date to which the requirements are applied.

Principle 6: Assumptions are not locked in at issue, but are updated as expectations of future experience and economic conditions change.

Principle 7: While a stochastic cash flow model attempts to include all real world risks relevant to the objective of the stochastic cash flow model and relationships among the risks, it will still contain limitations because it is only a model. Neither a cash flow scenario model, nor a method based on factors calibrated to the results of a cash flow scenario model, can completely quantify a company's exposure to risk. A model attempts to represent reality, but will always remain an approximation thereto and hence uncertainty in future experience is an important consideration when determining the Stochastic Reserve Amount. As such:

1. The actuary must take the model's limitations into consideration when setting assumptions, applying the methodology and determining the appropriateness of the resulting reserve levels.
2. The use of assumptions and risk management strategies should be appropriate to the business and not merely constructed to exploit 'foreknowledge' of the components of the required methodology. Therefore, the use of assumptions, methods, models, risk management strategies (e.g., hedging), derivative instruments, structured investments or any other risk transfer arrangements (such as reinsurance) that serve to materially reduce the calculated statutory reserve without also reducing risk on scenarios similar to those used in the actual cash flow modeling are inconsistent with these principles.

Section 5. Definitions

For purposes of this regulation:

- A. Asset Segment: a grouping of policies in a manner that generally follows the company's asset segmentation plan, investment strategies, or approach used to allocate investment income for statutory purposes. A separate set of Net Asset Earned Rates will be determined for each Asset Segment.
- B. Best Estimate: the actuary's most reasonable estimate of future experience for a risk factor given all available, relevant information pertaining to the contingencies being valued.
- C. Cash Flow Model: a model that projects asset and liability cash flows used to determine a path of Net Asset Earned Rates and the net cash flows for the Deterministic Reserve and Stochastic Reserve.
- D. Cash Surrender Value: the amount available to the policyholder upon surrender of the policy, prior to any outstanding policy indebtedness.
- E. Clearly Defined Hedging Strategy. A strategy undertaken by a company to manage risks through the future purchase or sale of hedging instruments and the opening and closing of hedging positions meeting the principles outlined in Section 4 of this regulation (particularly Principle 7) and the requirements of a Clearly Defined Hedging Strategy as described in Subsection E (5) of Section 7.
- F. Conditional Tail Expectation (CTE): a statistical risk measure that provides enhanced information about the tail of a distribution above that provided by the traditional use of percentiles. Instead of only identifying a value at a particular percentile and thus ignoring the possibility of extremely large values in the tail, CTE provides the average over all values in the tail beyond the CTE percentile.
- G. Deterministic Reserve: a reserve determined on a seriatim basis using a single Scenario and a set of Prudent Best Estimate assumptions. It equals the sum of the greater of the Seriatim Reserve and the Cash Surrender Value for each policy.
- H. Discount Rates: the path of pre-tax interest rates used to discount cash flows for the Deterministic Reserve and Stochastic Reserve calculations.
- I. Gross Wealth Ratio. The Gross Wealth Ratio is the cumulative equity index return for the indicated time period and percentile (e.g., 1.0 indicates that the index is at its original level).
- J. Margin: an amount added to, or deducted from, the Best Estimate assumption to account for estimation error and adverse deviation. The Margin should be directly related to the level of uncertainty in the underlying risk factor whereby the greater the uncertainty, the larger the Margin. Each Margin should serve to increase the Reported Reserve that would otherwise be held in its absence (i.e., using only the Best Estimate assumption).

- K. Material Tail Risk: Material Tail Risk arises when the Scenario Reserves for one or more Scenarios are materially unfavorable compared to the Scenario Reserves for the rest of the Scenarios.
- L. Net Asset Earned Rates: the path of earned rates reflecting the net portfolio rate in each Projection Interval (net of appropriate default costs and investment expenses). These rates are used to determine the amount of benefits, expenses, and revenue that depend on the level of interest credited.
- M. Net Investment Earnings: the amount used to determine the Net Asset Earned rate for each Projection Interval as defined in Section F (2) of Section 7.
- N. Non-Guaranteed Elements (NGE): debits or credits to a policyholder's account value, benefit, or consideration that may be adjusted at the discretion of an insurance company. For purpose of this regulation, Non-Guaranteed Elements includes policyholder dividends for participating policies.
- O. Projection Interval: the time interval selected in the cash flow model to project the cash flows amounts (e.g. monthly, quarterly, annually).
- P. Prudent Best Estimate: the deterministic valuation assumptions used for projections that are developed by applying a Margin for estimation error and adverse deviation to the Best Estimate assumption. This means that valuation assumptions not stochastically modeled are to be set at the conservative end of the actuary's confidence interval.

[Drafting Note: This definition deviates slightly from the current definition used in VACARVM.]

- Q. Qualified Actuary: an actuary who meets the qualifications as defined in Section 6 (Certifications) to certify that the reserves for the policies subject to this regulation have been calculated following all applicable laws, regulations, actuarial guidelines and Actuarial Standards of Practice. The Qualified actuary will be referred to throughout this regulation as "the actuary".
- R. Reported Reserve: the minimum reserve for the policies falling within the scope of this regulation using a principles-based approach and equals the greater of the Deterministic Reserve and the Stochastic Reserve, as defined by this regulation.
- S. Revenue Sharing: any arrangement or understanding by which an entity responsible for providing investment or other types of services makes payments to the company (or to one of its affiliates). Such payments are typically in exchange for administrative services provided by the company (or its affiliate), such as marketing, distribution and record keeping. Only payments that are attributable to charges or fees taken from the underlying variable funds or mutual funds supporting the policies that fall under the scope of this regulation shall be included in the definition of Revenue Sharing.
- T. Scenario: a single path of outcomes used in a Cash Flow Model, such as a path of future interest rates, equity performance, and separate account fund performance. It could also include outcomes related to policyholder behavior (e.g., lapses) and company experience (e.g., mortality).
- U. Scenario Reserve: equals the present value of future benefits and expenses (ignoring federal income tax) for all policies on an aggregated basis projected under a given Scenario less the present value of future gross premium payments and/or other applicable revenue for all policies on an aggregated basis projected under a given Scenario, where the present values are discounted using the path of Discount Rates defined by this regulation.
- V. Seriatim Reserve: equals the present value of future benefits and expenses (ignoring federal income tax) projected under a given policy less the present value of future gross premium payments and/or other applicable revenue projected under a given policy, where the present values are discounted using the path of Discount Rates defined by this regulation.
- W. Stochastic Reserve: provides for all material risks of a group of policies, including Material Tail Risk arising from sensitivities to changing economic conditions. It equals the amount determined by applying a prescribed CTE level to the distribution of Scenario Reserves over a broad range of stochastically generated Scenarios and using Prudent Best Estimate assumptions for all assumptions not stochastically modeled. The prescribed CTE level is established by the NAIC.

[Drafting Note: The prescribed CTE level is expected to be set by Actuarial Guideline.]

[Drafting Note: This regulation presumes that requirements have been adopted to define the regulatory and governance process.]

- A. A Qualified Actuary shall certify that the work has been done in a way that meets the requirements of this regulation and all applicable Actuarial Standards of Practice.
- B. A Qualified Actuary shall prepare a Memorandum that documents all material decisions made including assumptions, margins and methodologies used to calculate the Reported Reserve.
- C. This regulation requires a Qualified Actuary to make various determinations, verifications and certifications. The company is expected to provide the Qualified Actuary with the necessary information sufficient to permit the actuary to fulfill the responsibilities set forth in this regulation and responsibilities arising from applicable Actuarial Standards of Practice.
- D. Except in cases of fraud or willful misconduct, the qualified actuary shall not be liable for damages to any person (other than the insurance company and the commissioner) for any act, error, omission, decision or conduct with respect to the actuary's opinion.
- E. The qualifications of a Qualified Actuary are:
 - 1. Be a member of the American Academy of Actuaries;
 - 2. Be familiar with all appropriate standards of practice that apply to principles-based reserves;
 - 3. Not have been found by the commissioner, following appropriate notice and hearing to have:
 - a. Violated any provision of, or any obligation imposed by, the insurance law or other law in the course of his or her dealings as a Qualified Actuary or an Appointed Actuary;
 - b. Been found guilty of fraudulent or dishonest practices;
 - c. Demonstrated his or her incompetence, lack of cooperation, or un trustworthiness to act as an Qualified Actuary; or
 - d. Resigned or been removed as a Qualified Actuary within the past five (5) years as a result of acts or omissions indicated in any adverse report on examination or as a result of a failure to adhere to generally acceptable actuarial standards;
 - 4. Not fail to notify the commissioner of any action taken by a commissioner of another state similar to that under Paragraph (3) above;

[Drafting Note: it needs to be determined whether the Qualified Actuary must be appointed by, or be delegated authority by, the Board of Directors of the company. This will depend on the requirements of the regulatory and governance process being established in other regulations and guidelines]

Section 7. Definition of General Reserve Methodology

A. Summary

This regulation applies the principles of risk management, asset adequacy analysis and stochastic modeling to establish the minimum reserve for the products within its scope. It requires that the Reported Reserve for policies falling within its scope be based on the greater of an amount calculated using a seriatim, deterministic method (Deterministic Reserve) and an amount calculated using a stochastic method when appropriate (Stochastic Reserve), where the comparison is done on an aggregate basis. Both the Deterministic Reserve and the Stochastic Reserve will be determined by taking the present value of net cash flows as described below.

The Deterministic Reserve is calculated as the sum over all policies using a seriatim approach that uses Prudent Best Estimate assumptions over a single Scenario. For policies without Material Tail Risk, as defined in section 5, a company may only need to calculate the Deterministic Reserve.

The Stochastic Reserve is calculated in the aggregate using a projection of net cash flows over a broad range of stochastically generated Scenarios, using Prudent Best Estimate assumptions for all assumptions

not stochastically modeled, and then applying a prescribed Conditional Tail Expectation (CTE) level. The stochastic interest rates, equity performance, and separate account fund performance underlying these Scenarios must meet mandated calibration standards established by the National Association of Insurance Commissioners (NAIC).

B. Prudent Best Estimate Assumptions

The actuary shall determine the valuation assumptions for all material risks for each policy that are not stochastically modeled using Prudent Best Estimate assumptions as defined in Section 5. A Prudent Best Estimate assumption is developed by applying a Margin for estimation error and adverse deviation to the Best Estimate assumption. This means that valuation assumptions not stochastically modeled are to be set at the conservative end of the actuary's confidence interval as to the true underlying probabilities for the parameter(s) in question, based on the availability of relevant experience and its degree of credibility. Prudent Best Estimate valuation assumptions not stochastically modeled will be the same for both the Deterministic Reserve and the Stochastic Reserve.

Recognizing that assumptions are simply assertions of future unknown experience, the Margin for estimation error and adverse deviation should be directly related to uncertainty in the underlying risk factor. The greater the uncertainty, the larger the Margin. Each Margin should serve to increase the Reported Reserve that would otherwise be held in its absence (i.e., using only the Best Estimate assumption).

For example, assumptions for circumstances that have never been observed require larger Margins for error than those for which abundant and relevant experience data are available. Furthermore, larger Margins are typically required for contingencies related to policyholder behavior when a given policyholder action results in the surrender or exercise of a valuable option.

However, the choice of an appropriate Margin to establish each Prudent Best Estimate assumption may result in a distorted measure of the total risk in the aggregate. Conceptually, the choice of a Margin for each assumption should be made so that the final result approximates what would be obtained for the Stochastic Reserve at the required risk level (i.e. the prescribed CTE level) if it were possible to calculate results over the joint distribution of all future outcomes. In applying this concept to the actual calculation of the Stochastic Reserve and Deterministic Reserve, the actuary should be guided by the evolving practice and expanding knowledge base in the measurement and management of risk.

[Drafting note: This regulation presumes that requirements have been adopted that provide more specific guidance to determine the Prudent Best Estimate in order to comply with this requirement].

C. Cash Flow Models

1. Purpose. Both the Stochastic Reserve and Deterministic Reserve calculations require the use of Cash Flow Models for each Asset Segment. The Cash Flow Models will:
 - a. Project the premiums, benefits, expenses, and other applicable revenue items to be used in the reserve calculations; and
 - b. Project the total asset and liability cash flows, Net Investment Earnings, and invested asset balances for the purpose of determining the path of Net Asset Earned Rates.

It will be permissible for the Deterministic Reserve to use a grouped liability model to calculate the path of Net Asset Earned Rates and then perform the Seriatim Reserve calculation on each policy based on those Net Asset Earned Rates.

2. General Description of Cash Flow Projections. For the Deterministic Reserve and for each Scenario for the Stochastic Reserve, a cash flow projection shall be made ignoring Federal Income Tax and shall reflect the dynamics of the expected cash flows for the entire Asset Segment. The projection will include the impact of all material product features, including the guarantees provided under the policies.

- a. Actual gross premiums received from the policyholder will be included as revenue in the cash flow projection. Amounts charged to account values on General Accounts business (such as COI and expense charges) will not be included in the cash flow projection as revenue, but will impact the level of cash surrender benefits.
 - b. Insurance company expenses (including overhead expenses), commissions, fund expenses, contractual fees and charges, Revenue Sharing income received by the company (net of applicable expenses) and cash flows associated with any reinsurance are to be reflected on a basis consistent with the requirements herein.
 - c. Asset cash flows shall include investment income, capital gains and losses, appropriate asset default costs, investment expenses, income from hedge instruments, and asset prepayments, maturities and sales.
 - d. Throughout the projection, where estimates of asset or liability items are made that are neither stochastically generated nor prescribed, such estimates shall be on a Prudent Best Estimate basis.
 - e. Since the projection of cash flows reflect premium mode directly, deferred premiums are zero under this approach.
3. Reinvestment Assets. Net cash flows in each Projection Interval will be reinvested in a manner consistent with the company's investment policy for each Asset Segment. Handling of disinvestment will also be consistent with the company's investment policy and reflect economic reality such as the reasonable short-term borrowing capacity of the company.
 4. Future IMR Amounts. Capital gains and losses arising from changes in interest rates can be reflected in the Projection Interval when they occur, or can be spread out over future Projection Intervals by establishing a new IMR amount.
 5. Length of Projections. Projections shall be performed for at least as many future years as needed so that no materially greater reserve value would result from longer projection periods.
 6. Simplified approaches. For the Deterministic Reserve and Stochastic Reserve, simplified approaches may be acceptable if they can be shown to produce reserves that are not materially different than those produced by a more robust cash flow model.
 7. Asset adequacy analysis principles and techniques as defined by applicable regulations, actuarial guidelines and Actuarial Standards of Practices may be relied on for many of the detailed aspects encountered in projecting cash flows.

D. Description of Scenarios

1. For the Deterministic Reserve, the cash flow projections will be made in a manner that reflect a single path of U.S. Treasury yield curves, a single path of equity performance, and a single set of paths of future fund performances (for variable products). For Treasuries, this path will start with the current U.S. Treasury rate yield curve in effect at the valuation date and grade linearly over time to an ultimate static U.S. Treasury rate yield curve. The length of the grading period and the values of the ultimate yield curve will be established by the NAIC. The method applicable to future fund performance will also be established by the NAIC.

[Drafting Note: It is anticipated that specific parameters associated with the deterministic paths of these underlying indices will be published in an actuarial guideline and updated from time to time.]

2. For the Stochastic Reserve, the cash flow projections will be made in a manner that reflect stochastically generated paths of U.S. Treasury yield curves, equity performance, and future fund performance (for variable products). The paths of U.S. Treasury yield curves shall be determined by an interest rate generator prescribed by the NAIC, or determined by the company if mandated calibration standards established by the NAIC are met. Returns for equity performance and groupings

of variable funds shall be determined on a stochastic basis such that the resulting distribution of the Gross Wealth Ratios of the Scenarios meets the scenario alibration criteria established by the NAIC.

[Drafting Note: It is anticipated that mandated calibration standards for the interest rate generator and the distribution of Gross Wealth Ratios for equity and separate account fund performance will be published in an actuarial guideline and updated from time to time. It is also anticipated that this guideline will permit the use of a prescribed interest rate generator like the C3P1 generator and a prescribed set of equity performance scenarios similar to those used for C3P2 RBC requirements for variable annuities. Ideally, a fully integrated model of equity returns, separate account fund performance and interest rates, with rate volatility and expectations and frequency and duration of yield curve inversions consistent with the C3P1 requirements, would be run to develop an estimate of the (combined) market risks. The US Treasury Fund scenarios within the 10,000 prepackaged scenarios for the C3P2 requirements qualify as meeting this standard. Although an integrated modeling approach is desirable, we believe a number of simpler approaches are acceptable.]

3. The number of scenarios for which Scenario Reserves are computed shall be the responsibility of the actuary and considered to be sufficient if any resulting understatement in total reserves, as compared with that resulting from running additional scenarios, is not material.

E. Starting and Projected Assets

1. Starting Asset Amount. For the projections supporting the reserve methodology, the value of assets at the start of the projection shall be set equal to the estimated value of the Reported Reserve at the start of the projection. Assets shall be valued consistently with their annual statement values. The amount of such asset values shall equal the sum of the following items, all as of the start of the projection:
 - a. all of the Separate Account assets supporting the policies;
 - b. an amount of assets held in the General Account equal to the estimated value of the Reported Reserve as of the start of the projections less the amount in a.) above.

For products in which a substantial portion of policyholder funds are allocated to Separate Accounts, in many instances the initial General Account assets may be negative, resulting in a projected interest expense. General Account assets chosen for use as described above shall be selected on a consistent basis from one reserve valuation hereunder to the next.

Any positive Interest Maintenance Reserve (IMR) balance allocable to the business being valued may be included as a negative asset in the determination of the General Account Assets under item 2) above, thus allowing additional positive General Account assets to be allocated to support the reserve calculation. Any negative IMR balance allocable to the business being valued, to the extent it offsets positive IMR balances elsewhere in the entity, must be included as a positive asset with the opposite effect as described above.

Any hedge assets allocable to the business being valued and meeting the requirements described in subsection 5 below shall be reflected in the projections and included with other General Account assets under item b.) above. To the extent the sum of the value of such hedge assets and the value of assets in item a.) above is greater than the estimated value of the Reported Reserve as of the start of the projection, then item b.) above may include enough negative General Account assets or cash such that the sum of items a.) and b.) above equals the estimated value of the Reported Reserve as of the start of the projection.

2. Valuation of Projected Assets. The projected values of Starting Assets shall be determined in a manner consistent with their values at the start of the projection. For reinvestment assets, the value shall be determined in a manner consistent with the value of assets at the start of the projection that have similar investment characteristics.
3. Grouping of Variable Funds and Subaccounts. The portion of the Starting Asset Amount held in the Separate Account represented by the variable funds and the corresponding account values may be grouped for modeling using an approach that recognizes the investment guidelines and objectives of the funds. In assigning each variable fund and the variable subaccounts to a grouping for projection purposes, the fundamental characteristics of the fund shall be reflected and the parameters shall have the appropriate relationship to the required calibration points of the S&P 500. The grouping shall

reflect characteristics of the efficient frontier (i.e., returns generally cannot be increased without assuming additional risk).

An appropriate proxy for each variable subaccount shall be designed in order to develop the investment return paths. The development of the scenarios for the proxy funds is a fundamental step in the modeling and can have a significant impact on results. As such, the actuary must map each variable account to an appropriately crafted proxy fund normally expressed as a linear combination of recognized market indices (or sub-indices).

4. Modeling of Hedges. The appropriate costs and benefits of hedging instruments that are currently held by the company in support of the policies falling under the scope of the regulation shall be included in the projections. If the company is following a Clearly Defined Hedging Strategy and the hedging strategy meets the requirements as defined in subsection 5 below, the projections shall take into account the appropriate costs and benefits of hedge positions expected to be held in the future through the execution of that strategy.

To the degree either the currently held hedge positions or the hedge positions expected to be held in the future introduce basis, gap, price, or assumption risk, a suitable reduction for effectiveness of hedges shall be made. The actuary is responsible for verifying compliance with the requirements of a Clearly Defined Hedging Strategy for all hedge instruments included in the projections.

While hedging strategies may change over time, any change in hedging strategy shall be documented and include an effective date of the change in strategy.

These requirements do not supersede any statutes, laws, or regulations of any state or jurisdiction related to the use of derivative instruments for hedging purposes and should not be used in determining whether a company is permitted to use such instruments in any state or jurisdiction.

5. Requirements of a Clearly Defined Hedging Strategy. In order to qualify as a Clearly Defined Hedging Strategy, the strategy must meet the principles outlined in section 4 of this regulation (particularly Principle 7) and shall, at a minimum, identify:
 - a. The specific risks being hedged (e.g., delta, rho, vega, etc.),
 - b. the hedge objectives,
 - c. the risks not being hedged (e.g., variation from expected mortality, withdrawal, and other utilization or decrement rates assumed in the hedging strategy, etc.),
 - d. the financial instruments that will be used to hedge the risks,
 - e. the hedge trading rules including the permitted tolerances from hedging objectives,
 - f. the metric(s) for measuring hedging effectiveness,
 - g. the criteria that will be used to measure effectiveness,
 - h. the frequency of measuring hedging effectiveness,
 - i. the conditions under which hedging will not take place, and
 - j. the person or persons responsible for implementing the hedging strategy.

The hedge strategy may be dynamic, static, or a combination thereof.

Strategies involving the offsetting of the risks associated with other products outside of the scope of this regulation do not currently qualify as a Clearly Defined Hedging Strategy.

[Drafting Note: the calibration standards to determine to whether a hedging strategy qualifies as a Clearly Defined Hedging Strategy will be established by Actuarial Guideline or Actuarial Standard of Practice]

F. Net Asset Earned Rates and Discount Rates

1. For both the Deterministic Reserve and the Stochastic Reserve calculations, a Cash Flow Model will be used to determine a path of Net Asset Earned Rates that reflects the net portfolio rate in each Projection Interval (i.e., monthly, quarterly, annually). This path will vary by Asset Segment and for each Scenario. It will be dependent on, among other things,
 - a. the projected Net Investment Earnings from the portfolio of starting assets,
 - b. the pattern of projected asset cash flows from the starting assets and subsequent reinvestment assets,
 - c. the pattern of net liability cash flows, and
 - d. the projected Net Investment Earnings from reinvestment assets.
2. The Net Asset Earned rate for each Projection Interval shall be computed in a manner that is consistent with the timing of cash flows and length of the Projection Interval of the related cash flow model. It shall be calculated as the ratio of Net Investment Earnings divided by invested assets. The following considerations pertain to the calculation of this ratio:
 - a. Net Investment Earnings shall include investment income plus capital gains and losses (excluding capital gains and losses that are included in the IMR), minus appropriate default costs and investment expenses
 - b. Net Investment Earnings shall also include income from hedge instruments and amortization of the Interest Maintenance Reserve on all applicable assets.
 - c. Policy loan interest (net of investment expenses) and policy loan balances shall be included in the calculation if they are modeled.
 - d. Invested assets shall be determined in a manner that is consistent with the timing of cash flows and length of the Projection Interval of the related cash flow model.
 - e. The outstanding Interest Maintenance Reserve shall be reflected as an adjustment to invested assets. Any negative IMR balance can only be reflected to the extent that a positive IMR balance exists on policies outside the scope of this regulation.
 - f. The statutory value of hedge instruments shall be included in invested assets. Reasonable approximations are acceptable.
 - g. All items reflected in the ratio shall be consistent with statutory asset valuation, including reflection of accrued and unearned investment income where appropriate.
3. The path of Discount Rates for each Asset Segment will be equal to the path of Net Asset Earned Rates.

G. The Deterministic Reserve

1. Purpose. The purpose of the Deterministic Reserve is to produce a reserve that is adequate to cover the product benefits and expense, reflecting future revenue, under a single Scenario. However, it is not meant to explicitly capture Material Tail Risk as defined in Subsection 5.
2. Reserve Calculation Description. The Deterministic Reserve is determined using the following steps:
 - a. Determine Prudent Best Estimate assumptions as defined in Subsection B.
 - b. Project cash flows for each policy as described in Subsections C, D, and E.
 - c. Calculate the path of Net Asset Earned Rates for each Asset Segment as described in Subsection F.

- d. Calculate the Seriatim Reserve for each policy using the methodology described in Subsection G (3).
 - e. Calculate the Deterministic Reserve as described Subsection G (4).
3. Calculation of the Seriatim Reserve for Each Policy.
- e. Project the items in (i) through (iv) below for each policy. Use the path of Net Asset Earned Rates as appropriate to determine benefits, expenses and revenue that depend on earned rates. For example, earned rates are needed to determine the level of cash surrender benefits.
 - i. The future benefits for each policy, including but not limited to death and cash surrender benefits.
 - ii. The future expenses for each policy, including but not limited to, commissions, general expenses, and premium taxes. Federal income taxes are excluded.
 - iii. The future gross premium payments for each policy.
 - iv. Other applicable revenue for each policy, such as fees and revenue on assets invested in sub-accounts, and any Revenue Sharing income.
 - b. The Seriatim Reserve for each policy is equal to:
 - i. The present value of future benefits determined by discounting the future benefits using the path of Discount Rates for the corresponding Asset Segment; plus
 - ii. The present value of future expenses determined by discounting the future expenses using the path of Discount Rates for the corresponding Asset Segment; minus
 - iii. The present value of future gross premium payments and/or other applicable revenue determined by discounting these future premiums and other revenue using the path of Discount Rates for the corresponding Asset Segment.
4. The Deterministic Reserve
- a. The deterministic reserve for each policy equals the greater of the Cash Surrender Value on the valuation date for each policy and the Seriatim Reserve for each policy determined in Subsection G (3).
 - b. The Deterministic Reserve equals the sum of the deterministic reserve for each policy for all policies falling under the scope of this regulation.

H. The Stochastic Reserve

1. Purpose. The purpose of the Stochastic Reserve is to produce a reserve that is adequate to cover the product benefits, revenue and expenses over a broad range of stochastically generated Scenarios for all policies falling under the scope of this regulation. It is meant to capture all material risks, including Material Tail Risk. The Stochastic Reserve may be determined assuming that all, or only some, of the risks underlying the policies are modeled stochastically, but at a minimum, it must assume that interest rate movements, equity movements, and separate account fund performance be modeled stochastically.
2. Applicability: It may not be necessary to calculate the Stochastic Reserve for groups of policies that are not subject to Material Tail Risk. As a result, the actuary may elect to exclude certain groups of policies from the Stochastic Reserve requirement upon demonstration that the Deterministic Reserve will adequately provide for all material risks underlying such policies, taking into account the investment strategy supporting the policies and any risk mitigation techniques currently applied, including but not limited to hedge instruments or reinsurance.

An acceptable demonstration should:

- a. Provide a reasonable assurance that the Stochastic Reserve will not be greater than the Deterministic Reserve during the current calendar year plus two additional calendar years;
 - b. Provide sufficient supporting information that an experienced independent actuarial reviewer can assess the reasonableness of the conclusion to exclude the group of policies; and
 - c. Provide an effective evaluation of the residual risk exposure resulting from risk mitigation techniques such as hedge instruments and reinsurance.
3. Reserve Calculation Description: The Stochastic Reserve is determined using the following steps:
- a. Determine policy grouping as defined in Subsection H (4)
 - b. Determine Prudent Best Estimate assumptions as defined in Subsection B
 - c. Project cash flows for each Asset Segment for each Scenario as described in Subsections C, D, and E
 - d. Calculate the path of Net Asset Earned Rates and Discount Rates for each Asset Segment for each Scenario as described in Subsection F
 - e. Calculate the Scenario Reserve for each Scenario using the methodology described in Subsection H (5)
 - f. Calculate the Stochastic Reserve as described in subsection H (6).
4. Grouping of Policies for Modeling: Projections may be performed for each policy in force on the date of valuation or by grouping policies into representative cells of model plans using all characteristics and criteria having a material impact on the size of the reserve. Grouping shall be the responsibility of the actuary but may not be done in a manner that intentionally understates the resulting Reported Reserve.
5. Calculation of the Scenario Reserve for each Scenario
- a. Use the asset model to project the items in (i) through (iv) below for each Scenario. Use the path of Net Asset Earned rates as appropriate for each Asset Segment to determine benefits, expenses and revenue that depend on earned rates. For example, earned rates are needed to determine the level of cash surrender benefits.
 - i. The future benefits, including but not limited to death and cash surrender benefits.
 - ii. The future expenses, including but not limited to, commissions, general expenses, and premium taxes.
 - iii. The future gross premium payments.
 - iv. The future other applicable revenue such as fees and revenue on assets invested in sub-accounts, and any Revenue Sharing income.
 - b. The Scenario Reserve for each Scenario is determined by following steps (i) through (iii) below for each Asset Segment, and then summing the results for all Asset Segments:
 - i. The present value of future benefits determined by discounting these future benefits using the path of Discount Rates for each Asset Segment; plus
 - ii. The present value of future expenses determined by discounting these future expenses using the path of Discount Rates for each Asset Segment; minus
 - iii. The present value of future gross premium payments and/or other applicable revenue determined by discounting these future premiums and other revenue using the path of Discount Rates for each Asset Segment.

6. The Stochastic Reserve

The Stochastic Reserve is calculated in aggregate for all policies falling under the scope of this regulation and shall be determined as follows:

- a. Rank the Scenario Reserves for each Scenario from lowest to highest
- b. Take the average of highest (100-CTE risk level) % of the Scenario Reserves.

[Drafting Note: the CTE risk level will be determined by the NAIC]

7. Aggregation: Aggregation of policies to reflect offsetting risks is permitted when calculating the Stochastic Reserve. However, since the regulation requires the Stochastic Reserve be compared to a seriatim Deterministic Reserve that uses the Cash Surrender Value as a minimum floor on a policy by policy basis, this comparison imposes a limitation on the magnitude of any risk offsets that may be reflected in the Reported Reserve.

The Stochastic Reserve may be calculated separately for subsets of the policies. If this approach is followed, the comparison of the Deterministic Reserve to the Stochastic Reserve shall be made after summing the Stochastic Reserve for each subset of policies. In this case, the Stochastic Reserve for each subset of policies is determined by following the methodology in Subsection (H) 3 separately for each subset of policies.

[Drafting Note: LHATF may wish to add as requirement for the actuary to disclose the impact of aggregation on the Reported Reserve. The nature and frequency of this disclosure would need to be established by the NAIC.]

I. The Reported Reserve

1. The Reported Reserve shall equal the greater of:
 - a. The Deterministic Reserve, and
 - b. The Stochastic Reserve
2. If there is Separate Account business, the Reported Reserve shall be allocated between the General and Separate Accounts as follows:
 - a. The amount of reserve held in the General Account shall be the difference, whether positive or negative, between the Reported Reserve and the reserve held in the Separate Account as of the valuation date.
 - b. The amount of reserve held in the Separate Account shall be an amount not less than the sum of the Separate Account values of the policies being valued as of the valuation date.

[Drafting Note: More guidance is needed to establish the Separate Account values as of the valuation date.]

J. Treatment of Non-Guaranteed Elements

1. Non-Guaranteed Elements are to be included in the models used to project future cash flows for both the Deterministic Reserve and the Stochastic Reserve. Where Non-Guaranteed Elements are based on some aspect of experience, future changes in the level of Non-Guaranteed Elements can be determined by the model based on the experience assumed in each Scenario. The intent is to project the Non-Guaranteed Elements as the company would actually set them if experience unfolded in a manner consistent with the Scenario under consideration.
2. Any liability for dividends declared but not yet paid that has been established according to statutory accounting procedures as of the valuation date shall be reported separately from the Reported Reserve.

Accordingly, where such a separate liability is reported on the statutory balance sheet as of the valuation date, any dividends that are included in the separate liability shall be excluded from the reserve cash flow projection.

[Drafting Note: An Actuarial Guideline or Actuarial Standard of Practice will provide details regarding the way future non-guaranteed elements may be adjusted in the projection done for valuation purposes.]

K. Treatment of Supplemental Benefits

Reserves for supplemental benefits may be calculated separately when calculating the Deterministic Reserve and the Stochastic Reserve.

L. Allocation of Reported Reserve to Individual Policies

1. When the Reported Reserve is equal to the Deterministic Reserve, the Reported Reserve allocated to each contract shall be the deterministic reserve for each policy as defined in Subsection G (4) (a).
2. When the Reported Reserve is equal to the Stochastic Reserve, the reserve allocated to each policy shall be the deterministic reserve for each policy as defined in Subsection G (4) (a), plus an allocation of the excess of the Reported Reserve over the Deterministic Reserve. Such allocation shall be made in proportion to the deterministic reserve for each policy as defined in Subsection G (4) (a).

[Drafting Note: It is the intent of this section to allocate the Reported Reserve back to the individual policy that gave rise to the reserve. To that extent, the Reported Reserve should be such that it groups policies with similar risk characteristics. The allocation to individual policies is needed, among other reasons, to allocate assets under the Life and Health Insurance Guaranty Association Model Act.]

Section 8. Requirements for Reinsurance

A. General Considerations

- (1) In applying the requirements of the Section, the actuary shall assume that the counterparty to a reinsurance agreement is knowledgeable about the contingencies involved in the agreement and thus likely to exercise the terms of the agreement to its advantage.
- (2) The terms “reinsurance” and “reinsurer” in this Section include retrocession and retrocessionaire respectively.

B. Reinsurance Ceded

1. Cash Flows for Reinsurance ceded. The cash flows used in calculating the Deterministic Reserve and Stochastic Reserves shall include the effect of cash flows received from or paid to reinsurers under the terms of such ceded reinsurance agreements that meet the requirements of NAIC Life and Health Reinsurance Agreements Model Regulation. Cash flows received from or paid to reinsurers under the terms of any reinsurance agreement that does not meet the requirements of the Model Regulation shall be taken into account only if doing so results in an increase in the Reported Reserve held for such policies.
2. Cash Surrender Value floor. In applying subsection G (4) (a) of section 7 (the Cash Surrender Value floor) the cash surrender value shall be taken 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 any reinsurance agreement(s) meeting the requirements of the NAIC Life and Health Reinsurance Agreements Model Regulation.
3. Assumptions for reinsurance ceded. The assumptions used to project cash flows to or from reinsurers should be consistent with other assumptions used by the ceding company in calculating the Reported

Reserve for the reinsured policies, and should reflect the terms of the reinsurance agreement. Current laws and regulations regarding credit for reinsurance should be assumed to remain in effect for the duration of the projection. The actuary may include a Margin that has the effect of increasing the Reported Reserve if such Margin is necessary, in the actuary's judgment, to reflect uncertainty regarding the reinsurance cashflows received from the reinsurer. Such uncertainty is likely to be present if the current terms of the reinsurance agreement are not guaranteed for the entire projection period used in calculating the Reported Reserve.

[Drafting Note: Items that should be considered by the actuary in deciding whether to use a margin for adverse deviation for non-guaranteed reinsurance, and how large the margin should be, include any limits placed upon the reinsurer's ability to change the terms of treaty, past practices concerning the changing of terms of reinsurers in general and the assuming reinsurer in particular, the ability of the direct company to modify the terms of its policies in response to changes in terms from its reinsurers, and actions that might be taken by the assuming company if the direct company has financial problems. Current laws and regulations regarding reserve credit restrict the terms of reinsurance agreements for which credit may be taken and prescribe conditions under which reinsurance credit may be taken with respect to unauthorized reinsurers. A review of these laws and regulations in light of principles-based reserving may be appropriate.]

[Drafting Note: If needed for regulatory reporting or other purposes, a Reported Reserve without reinsurance shall be calculated using methods and assumptions consistent with those used in calculating the Reported Reserve, but excluding the effect of cash flows to and from reinsurers. The credit for reinsurance ceded shall be calculated as the excess, if any, of the Reported Reserve without reinsurance over the Reported Reserve. The assumptions used to calculate the Reported Reserve without reinsurance are to some degree hypothetical, since this is not the situation that actually occurs. For example, assets backing ceded reserves are held by the reinsurer, not the ceding company. The ceding company should use assumptions that represent what company experience would be if the reinsurance were not entered into and the business was managed in a manner consistent with the manner the retained business is managed. The assumptions that are used by a direct-writing company to determine the Reported Reserve and the Reported Reserve without reinsurance for policies that are ceded to a reinsurer shall be appropriate for the direct-writing company and need not be the same as the assumptions used by the assuming company to determine the Reported Reserve for these policies. As a consequence, the credit for reinsurance ceded calculated by the ceding company may not necessarily be equal the Reported Reserve set up by the assuming company.]

[Drafting Note: Any increase or decrease in actual risk should be reflected in principles-based reserves. It is possible for reinsurance to decrease (or increase) the aggregate risk faced by the ceding and assuming company with respect to the reinsured policies, and if so, the sum of the reserves held by the two companies should decrease (or increase). In this regard, "mirror reserving" is in conflict with the principles of this Section 8. In any case, the sum of the reserves held by the ceding and assuming companies will not be less than the sum of the Deterministic Reserves held by the companies, and this sum will not, in turn, be less than the total cash surrender value for the reinsured policies.]

C. Reinsurance Assumed

1. Cash Flows for Reinsurance assumed. The cash flows used in calculating the Deterministic Reserve and Stochastic Reserves shall include the effect of cash flows received from or paid to ceding companies under the terms of assumed reinsurance agreements.
2. Cash surrender value floor. In applying Subsection G (4) (a) of Section 7 (the Cash Surrender Value floor), the Cash Surrender Value for each assumed policy shall be taken 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 any reinsurance agreement(s).
3. Assumptions for reinsurance assumed. The assumptions used to estimate cash flows to or from the ceding company should reflect the reinsurer's (i.e. the assuming company's) experience for the business segment to which the reinsured policies belong, and should reflect the terms of the

reinsurance agreement. In particular, if reinsurance premiums or allowances are not guaranteed, the actuary should consider treating them in the same manner as a Non-Guaranteed Element.

4. Consideration of ceding company actions. The assumptions that are used by a company that assumes policies under a reinsurance arrangement to determine the Reported Reserve for these policies shall take into account 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.

[Drafting Note: 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, both of which could have the effect of increasing expected mortality for the assuming company. These and similar actions could also affect policyholder behavior and possibly expense and investment assumptions.]

Section 9. Effective Date

- A. The method defined by this regulation affects all policies issued on or after <<insert date>>

[Drafting Note: LHATF needs to determine the effective date and transition rules regarding application to this approach. Possible transition rules include limiting the application of this methodology to all inforce policies or policies issued after a certain date and/or, establishing a grade in period from current reserve levels to those under this methodology.]

- B. Transitional rules for reinsurance.

[Drafting Note: We expect that principles-based reserves will be adopted by all US life companies for products within the scope on a uniform date. If there is uneven adoption of principles-based reserves, then some relaxation of this concept until adoption is complete should be considered by the NAIC, based on administrative considerations. This could be done by establishing special transitional rule for situations where the ceding and assuming companies are subject to different effective dates or different reserve requirements. When principles-based reserving methods are applied to all life products, then this section will no longer be needed.]