## VM-21: Requirements for Principle-Based Reserves for Variable Annuities

### Table of Contents

[Section 1: Background](#_Section_1._Background) 21-1

Section 2: Scope and Effective Date 21-8

[Section 3: Reserve Methodology 21-9](#_Section_2._Reserve_1)

Section 4: Determination of the Stochastic Reserve 21-11

[Section 5: Reinsurance Ceded 21-20](#_Section_4._Reinsurance)

### Section 1: Background

A. Purpose

These requirements establish the minimum reserve valuation standard for variable annuity contracts, and certain other policies and contracts (“contracts”) as defined in the Scope, issued on or after the operative date of the *Valuation Manual* as required by Model #820. These requirements constitute the Commissioners Annuity Reserve Valuation Method (CARVM) for all contracts encompassed by the Scope.

The contracts subject to these requirements may be aggregated with the contracts subject to *Actuarial Guideline XLIII—CARVM for Variable Annuities* (AG 43), published in Appendix C of the AP&P Manual, for purposes of performing and documenting the reserve calculations.

**Guidance Note:** It is intended that reserve calculation requirements in VM-21 also be used for those contracts issued prior to January 1, 2017 which are otherwise in the scope of VM-21. AG 43 references the calculation requirements of VM-21, and reserves for contracts subject to both VM-21 and AG 43 may be computed as a single group. If a company chooses to aggregate business subject to AG 43 with business subject to VM-21 in calculating the reserve, then the provisions in VM-G apply to this aggregate principle-based valuation.

B. Principles

The projection methodology used to calculate the stochastic reserve, as well as the approach used to develop the Alternative Methodology, is based on the following set of principles. These principles should be followed when interpreting and applying the methodology in these requirements and analyzing the resulting reserves.

**Guidance Note:** The principles should be considered in their entirety, and it is required that companies meet these principles with respect to only those contracts that fall within the scope of these requirements and are in force as of the valuation date to which these requirements are applied.

**Principle 1:** The objective of the approach used to determine the stochastic reserve is to quantify the amount of statutory reserves needed by the company to be able to meet contractual obligations in light of the risks to which the company is exposed.

**Principle 2:** The calculation of the stochastic reserve is based on the results derived from an analysis of asset and liability cash flows produced by the application of a stochastic cash-flow model to equity return and interest rate scenarios. For each scenario, the greatest present value of accumulated deficiency is calculated. The analysis reflects prudent estimate assumptions for deterministic variables and is performed in aggregate (subject to limitations related to contractual provisions) to allow the natural offset of risks within a given scenario. The methodology uses a projected total statutory balance sheet approach by including all projected income, benefit and expense items related to the business in the model and sets the stochastic reserve at a degree of confidence using the CTE measure applied to the set of scenario specific greatest present values of accumulated deficiencies that is deemed to be reasonably conservative over the span of economic cycles.

**Guidance Note:** Examples where full aggregation between contracts may not be possible include experience rated group contracts and the operation of reinsurance treaties.

**Principle 3:** The implementation of a model involves decisions about the experience assumptions and the modeling techniques to be used in measuring the risks to which the company is exposed. Generally, assumptions are to be based on the conservative end of the confidence interval. The choice of a conservative estimate for each assumption may result in a distorted measure of the total risk. Conceptually, the choice of assumptions and the modeling decisions should be made so that the final result approximates what would be obtained for the stochastic reserve at the required 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, the company should be guided by evolving practice and expanding knowledge base in the measurement and management of risk.

**Guidance Note:** The intent of Principle 3 is to describe the conceptual framework for setting assumptions. Section 11 provides the requirements and guidance for setting contract-holder behavior assumptions and includes alternatives to this framework if the company is unable to fully apply this principle.

**Principle 4:** 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. The calculation of the stochastic reserve is based on the results derived from the application of the stochastic cash-flow model to scenarios, while the actual statutory reserve needs of the company arise from the risks to which the company is (or will be) exposed in reality. Any disconnect between the model and reality should be reflected in setting prudent estimate assumptions to the extent not addressed by other means.

**Principle 5:** 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. 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 solely to reduce the calculated stochastic reserve without also reducing risk on scenarios similar to those used in the actual cash-flow modeling are inconsistent with these principles. 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.

C. Risks Reflected

1. The risks reflected in the calculation of reserves under these requirements arise from actual or potential events or activities that are both:

a. Directly related to the contracts falling under the scope of these requirements or their supporting assets, and

b. Capable of materially affecting the reserve.

2. Categories and examples of risks reflected in the reserve calculations include, but are not necessarily limited to:

a. Asset risks

i. Separate account fund performance.

ii. Credit risks (e.g., default or rating downgrades).

iii. Commercial mortgage loan roll-over rates (roll-over of bullet loans).

iv. Uncertainty in the timing or duration of asset cash flows (e.g., shortening (prepayment risk) and lengthening (extension risk)).

v. Performance of equities, real estate and Schedule BA assets.

vi. Call risk on callable assets.

vii. Risk associated with hedge instrument (includes basis, gap, price, parameter estimation risks and variation in assumptions).

viii. Currency risk.

b. Liability risks

i. Reinsurer default, impairment or rating downgrade known to have occurred before or on the valuation date.

ii. Mortality/longevity, persistency/lapse, partial withdrawal and premium payment risks.

iii. Utilization risk associated with guaranteed living benefits.

iv. Anticipated mortality trends based on observed patterns of mortality improvement or deterioration, where permitted.

v. Annuitization risks.

vi. Additional premium dump-ins (high interest rate guarantees in low interest rate environments).

c. Combination risks

i. Risks modeled in the company’s risk assessment processes that are related to the contracts, as described above.

ii. Disintermediation risk (including such risk related to payment of surrender or partial withdrawal benefits).

iii. Risks associated with revenue-sharing income.

3. The risks not necessarily reflected in the calculation of reserves under these requirements are:

a. Those not reflected in the determination of RBC.

b. Those reflected in the determination of RBC but arising from obligations of the company not directly related to the contracts falling under the scope of these requirements, or their supporting assets, as described above.

4. Categories and examples of risks not reflected in the reserve calculations include, but are not necessarily limited to:

a. Asset risks

i. Liquidity risks associated with a “run on the bank”

b. Liability risks

i. Reinsurer default, impairment or rating downgrade occurring after the valuation date.

ii. Catastrophic events (e.g., epidemics or terrorist events).

iii. Major breakthroughs in life extension technology that have not yet fundamentally altered recently observed mortality experience.

iv. Significant future reserve increases as an unfavorable scenario is realized.

c. General business risks

i. Deterioration of reputation.

ii. Future changes in anticipated experience (reparameterization in the case of stochastic processes), which would be triggered if and when adverse modeled outcomes were to actually occur.

iii. Poor management performance.

iv. The expense risks associated with fluctuating amounts of new business.

v. Risks associated with future economic viability of the company.

vi. Moral hazards.

vii. Fraud and theft.

### Section 2: Scope and Effective Date

A. Scope

1. The following categories of annuities or product features issued on or after the operative date of the *Valuation Manual*, directly written or assumed through reinsurance, are subject to the requirements of VM-21:

a. Variable deferred annuity contracts, whether or not such contracts contain GMDBs or VAGLBs.

b. Variable immediate annuity contracts, whether or not such contracts contain GMDBs or VAGLBs.

c. Any group annuity contract which contains guarantees similar in nature to GMDBs, VAGLBs or any combination thereof.

**Guidance Note:** The term “similar in nature” as used in Section 2.A.1.c and Section 2.A.1.d is intended to capture current products and benefits, as well as product and benefit designs that may emerge in the future. Examples of the currently known designs are listed in Section 2.A.1.d. Any product or benefit design that does not clearly fit the scope should be evaluated on a case-by-case basis taking into consideration factors that include, but are not limited to, the nature of the guarantees, the definitions of GMDB and VAGLB in VM-01, and whether the contractual amounts paid in the absence of the guarantee are based on the investment performance of a market-value fund or market-value index (whether or not part of the company’s separate account).

d. Any other policy or contract which contain guarantees similar in nature to GMDBs or VAGLBs, even if the insurer does not offer the mutual funds, variable funds, or other supporting investments to which these guarantees relate, where there is no other explicit reserve requirement. If such a benefit is offered as part of a contract that has an explicit reserve requirement and that benefit does not currently have an explicit reserve requirement:

i. These requirements shall be applied to the benefit on a stand-alone basis (i.e., for purposes of the reserve calculation, the benefit shall be treated as a separate contract).

ii. The reserve for the underlying contract, excluding any benefits valued under i. above, is determined according to the explicit reserve requirement.

iii. The reserve held for the contract shall be the sum of i and ii.

**Guidance Note:** For example, a group life contract that wraps a GMDB around a mutual fund generally would fall under the scope of these requirements since there is not an explicit reserve requirement for this type of group life contract. However, for an individual variable life contract with a GMDB and a benefit similar in nature to a VAGLB, the requirements generally would apply only to the VAGLB-type benefit, since there is an explicit reserve requirement that applies to the variable life contract and the GMDB.

2. These requirements do not apply to contracts falling under the scope of VM- A–255: *Modified Guaranteed Annuities*; however, they do apply to contracts listed above that include one or more subaccounts containing features similar in nature to those contained in modified guaranteed annuities (MGAs) (e.g., market value adjustments).

1. Separate account contracts that guarantee an index and do not offer GMDBs or VAGLBs are excluded from the scope of these requirements.

**Guidance Note:** Current VAGLBs include Guaranteed Minimum Accumulation Benefits, Guaranteed Minimum Income Benefits, Guaranteed Minimum Withdrawal Benefits, Guaranteed Lifetime Withdrawal Benefits and Guaranteed Payout Annuity Floors. These requirements will be applied to future variations on these designs and to new guarantee designs.

B. Effective Date and Phase in

These requirements apply for valuation dates on or after January 1, 2020. A company may elect to phase in these requirements over a 36-month period beginning January 1, 2020. A company may elect a longer phase-in period, as long as 7 years, with approval of the domiciliary commissioner. The election of whether to phase in and the period of phase-in must be made prior to the 12/31/20 valuation. A phase-in may be terminated prior to the end of the period of phase-in at the company’s election; the reserve would then be equal to the unadjusted reserve calculated according to the then-current requirements of VM-21. The method to be used for the phase-in calculation is as follows:

1. Compute R1 = the reserves as of the valuation date following the applicable VM-21 requirements for all business in-force on the valuation date,

2. Separately compute R2 = the reserves as of the valuation date following the calculation requirements from VM-21 in the 2019 NAIC Valuation Manual for the same in-force contracts, and

3. Compute the reported reserve as follows:

Reserve on a valuation date = (A\*R1 + (B-A)\*R2)/B, where

* A is the number of months that has elapsed since December 31, 2019. For example, for the March 31, 2020 valuation, A = 3.
* B = 36 unless the company has obtained approval for a longer phase-in, in which case B = number of months of approved phase-in

A company may elect to apply these requirements as the NAIC requirements for the valuation on December 31, 2019. Any company so electing may not elect the phase-in period defined above.

### Section 3: Reserve Methodology

1. General Description

The aggregate reserve for contracts falling within the scope of these requirements shall equal the stochastic reserve (following the requirements of Section 4) plus the additional standard projection amount (following the requirements of Section 6) less the PIMR included in the starting assets.

1. Impact of Reinsurance Ceded

Where reinsurance is ceded for all or a portion of the contracts, all components in the above general description (and thus the aggregate reserve) shall be determined net of any reinsurance treaties that meet the statutory requirements that would allow the treaty to be accounted for as reinsurance.

An aggregate reserve pre-reinsurance ceded shall also be calculated for regulatory reporting or other purposes, using methods described in Section 5.

1. The Additional Standard Projection Amount

The additional standard projection amount is an additive factor, determined by applying one of the two standard projection methods defined in Section 6. The same method must be used for all contracts within a group of contracts that are aggregated together to determine the reserve. The company shall elect which method they will use to determine the additional standard projection amount. The company may not change that election for a future valuation without the approval of the domiciliary commissioner.

1. The Stochastic Reserve

The stochastic reserve shall be determined based on projections of the contracts falling within the scope of these requirements, and the assets supporting these contracts, over a broad range of stochastically generated projection scenarios described in Section 8 and using prudent estimate assumptions as required by this VM-21.

The stochastic reserve may be determined in aggregate for all contracts falling within the scope of these requirements (i.e., a single grouping) or, at the option of the company, it may be determined by sub-groupings of contracts, in which case the stochastic reserve shall equal the sum of the amounts computed for each such subgrouping.

 The stochastic reserve for any group of contracts shall be determined as CTE70 following the requirements of

Section 4.

1. Alternative Methodology (subject to further review)

For a group of variable deferred annuity contracts that contain either no guaranteed benefits or only GMDBs (i.e., no VAGLBs), the stochastic reserve may be determined using the alternative methodology described in Section 7 rather than using the approach described in Section 3.D. However, in the event the approach described in Section 3.D has been used in prior valuations for that group of contracts, the Alternative Methodology may not be used without approval from the domiciliary commissioner.

The stochastic reserve for the group of contracts to which the Alternative Methodology is applied shall not be less than the aggregate cash surrender value of those contracts.

1. Allocation of Results to Contracts

The aggregate reserve shall be allocated to the contracts falling within the scope of these requirements using the method outlined in Section 9.

The portion of the aggregate reserve held in the general account shall not be less than the excess of the aggregate reserve over the aggregate cash surrender value held in the separate account and attributable to the variable portion of all such contracts. For contracts for which a cash surrender value is not defined, the company shall substitute for cash surrender value held in the separate account the implicit amount for which the contract-holder is entitled to receive income based on the performance of the separate account. For example, for a variable payout annuity for which a specific number of units is payable, the implicit amount could be the present value of that number of units, discounted at the Assumed Investment Return and defined mortality, times the unit value as of the valuation date.

**Guidance note:**  this approach is equivalent to assuming that the separate account performance is equal to the Assumed Investment Return.

1. Documentation

A qualified actuary shall document the development of the reserves and provide the required certifications following the requirements of VM-31.

### Section 4: Determination of Stochastic Reserve

A. Projection of Accumulated Deficiencies

1. General Description of Projection

The projection of accumulated deficiencies shall be made ignoring federal income tax in both cash flows and discount rates and reflect the dynamics of the expected cash flows for the entire group of contracts, reflecting all product features including any guarantees provided under the contracts. Insurance company expenses (including overhead and investment expense), fund expenses, contractual fees and charges, revenue-sharing income received by the company (net of applicable expenses), and cash flows associated with any reinsurance or hedging instruments are to be reflected on a basis consistent with the requirements herein. Cash flows from any fixed account options also shall be included. Any market value adjustment assessed on projected withdrawals or surrenders also shall be included (whether or not the cash surrender value reflects market value adjustments). Throughout the projection, all assumptions shall be determined based on the requirements of this VM-21 as guided by Principle 3. Accumulated deficiencies shall be determined at the end of each projection year as the sum of the accumulated deficiencies for all contracts within each contract grouping.

2. 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 stochastically generated projection scenarios described in Section 8. The grouping shall reflect characteristics of the efficient frontier (i.e., returns generally cannot be increased without assuming additional risk).

An appropriate proxy fund 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 company must map each variable account to an appropriately crafted proxy fund normally expressed as a linear combination of recognized market indices, sub-indices or funds.

3. Grouping of Contracts

Projections may be performed for each contract in force on the date of valuation or by assigning contracts into representative cells of model plans using all characteristics and criteria having a material impact on the size of the reserve. Assigning contracts to model cells may not be done in a manner that intentionally understates the resulting reserve.

4. Modeling of Hedges

The detailed requirements for the modeling of hedges are defined in Section 9. The following paragraphs are an overview summary and do not supersede the detailed requirements.

a. The appropriate costs and benefits of hedging instruments that are currently held by the company in support of the contracts falling under the scope of these requirements shall be included in the projections used in the determination of the stochastic reserve.

b. If the company is following a clearly defined hedging strategy and the hedging strategy meets the requirements of Section 10, 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. Because models do not always accurately portray the results of hedge programs, the company shall, through back-testing and other means, assess the accuracy of the hedge modeling. The company shall determine a stochastic reserve as the weighted average of two CTE values ; first, a CTE70 (“best efforts”) representing a company’s projection of all of the hedge cash flows including future hedge purchases, and a second CTE70 (“adjusted”) which shall use only hedge assets held by the company on the valuation date and no future hedge purchases. These are described more fully in Section [10]. The stochastic reserve shall be the weighted average of the two CTE70 values, where the weights reflect the error factor (E) determined following the guidance of Section [10.x.xx.]

stochastic reserve = CTE70 (“best efforts”) + E \* Max (0,(CTE70 (“adjusted”) – CTE70 (“best efforts”)))

When computing CTE70 (“adjusted”), (see Section 10.X.x.), the company should reflect one of the following in the starting general account assets:

i. Any hedge assets meeting the requirements described in Section 4.A.4.a.; or

Cash or other general account assets in an amount equal to the aggregate market value of the hedge assets meeting the requirements described in Section 4.A.4.a.

The company may switch from i. to ii. at its discretion, but may not switch from ii. to i. without approval from the domiciliary commissioner.

c. The company is responsible for verifying compliance with clearly defined hedging strategy requirements and any other requirements in Section 10 for all hedge instruments included in the projections.

d. The use of products not falling under the scope of these requirements (e.g., equity-indexed annuities) as a hedge shall not be recognized in the determination of accumulated deficiencies.

e. These requirements govern the determination of contract reserves and 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.

f. Upon request of the company’s domiciliary commissioner, the company shall disclose the results of performing an additional set of projections reflecting only the hedges currently held by the company in support of the contracts falling under the scope of these requirements. Because this additional set of projections excludes some or all of the derivative instruments, the investment strategy may be modified to reflect the absence of those future hedge instruments.

5. Revenue Sharing

1. Projections of accumulated deficiencies may include income from projected future revenue-sharing, net of applicable projected expenses (net revenue-sharing income) if each of the following requirements are met:
2. The net revenue-sharing income is received by the company.

**Guidance Note**: For purposes of this section, net revenue-sharing income is considered to be received by the company if it is paid directly to the company through a contractual agreement with either the entity providing the net revenue-sharing income or an affiliated company that receives the net revenue-sharing income. Net revenue-sharing income also would be considered to be received if it is paid to a subsidiary that is owned by the company and if 100% of the statutory income from that subsidiary is reported as statutory income of the company. In this case, the company needs to assess the likelihood that future net revenue-sharing income is reduced due to the reported statutory income of the subsidiary being less than future net revenue-sharing income received.

ii. Signed contractual agreement or agreements are in place as of the valuation date and support the current payment of the net revenue-sharing income.

iii. The net revenue-sharing income is not already accounted for directly or indirectly as a company asset.

1. The amount of net revenue-sharing income to be used shall reflect the company’s assessment of factors that include, but are not limited to, the following (not all of these factors will necessarily be present in all situations):
2. The terms and limitations of the agreement(s), including anticipated revenue, associated expenses and any contingent payments incurred or made by either the company or the entity providing the net revenue-sharing as part of the agreement(s).
3. The relationship between the company and the entity providing the net revenue-sharing income that might affect the likelihood of payment and the level of expenses.
4. The benefits and risks to both the company and the entity paying the net revenue-sharing income of continuing the arrangement.
5. The likelihood that the company will collect the net revenue-sharing income during the term(s) of the agreement(s) and the likelihood of continuing to receive future revenue after the agreement(s) has ended.
6. The ability of the company to replace the services provided to it by the entity providing the net revenue-sharing income or to provide the services itself, along with the likelihood that the replaced or provided services will cost more to provide.
7. The ability of the entity providing the net revenue-sharing income to replace the services provided to it by the company or to provide the services itself, along with the likelihood that the replaced or provided services will cost more to provide.

c. The amount of projected net revenue-sharing income also shall reflect a margin (which decreases the assumed net revenue-sharing income) directly related to the uncertainty of the revenue. The greater the uncertainty, the larger the margin. Such uncertainty is driven by many factors, including the potential for changes in the securities laws and regulations, mutual fund board responsibilities and actions, and industry trends. Since it is prudent to assume that uncertainty increases over time, a larger margin shall be applied as time that has elapsed in the projection increases.

1. All expenses required or assumed to be incurred by the company in conjunction with the arrangement providing the net revenue-sharing income, as well as any expenses assumed to be incurred by the company in conjunction with the assumed replacement of the services provided to it (as discussed in Section 4.A.5.b.v), shall be included in the projections as a company expense under the requirements of Section 4.A.1. In addition, expenses incurred by either the entity providing the net revenue-sharing income or an affiliate of the company shall be included in the applicable expenses discussed in Section 4.A.1 and Section 4.A.5.a that reduce the net revenue-sharing income.
2. The company is responsible for reviewing the revenue-sharing agreements and verifying compliance with these requirements.
3. The amount of net revenue-sharing income assumed in a given scenario shall not exceed the sum of (i) and (ii), where:

(i) Is the contractually guaranteed net revenue-sharing income projected under the scenario.

(ii) Is the company’s estimate of non-contractually guaranteed net revenue-sharing income before reflecting any margins for uncertainty multiplied by the following factors:

a) 1.00 in the first projection year.

b) 0.95 in the second projection year.

c) 0.90 in the third projection year.

d) 0.85 in the fourth projection year.

e) 0.80 in the fifth and all subsequent projection years.

6. Length of Projections

Projections of accumulated deficiencies shall be run for as many future years as needed so that no materially greater reserve value would result from longer projection periods.

7. Asset Valuation Reserve (AVR)/Interest Maintenance Reserve (IMR)

The AVR and the IMR shall be handled consistently with the treatment in the company’s cash-flow testing.

B. Determination of Scenario Reserve

1. General

For a given scenario, the scenario reserve is the sum of:

* 1. The greatest present value, as of the projection start date, of the projected accumulated deficiencies; and
	2. The starting asset amount.

When using the Direct Iteration Method described in Section 4.B.5, the scenario reserve will equal the final starting asset amount determined according to Section 4.B.5.

The scenario reserve for any given scenario shall not be less than the Cash Surrender Value in aggregate on the valuation date for the group of contracts modeled in the projection.

2. Discount Rates

In determining the scenario reserve, accumulated deficiencies shall be discounted at the net asset earned rate on additional assets, as defined in Section 4.B.4.

3. Additional Invested Assets

On the valuation date, the company shall determine the additional invested assets as the amount of assets needed, or an approximation of it, to fund the present value of the accumulated deficiency. These assets may include only (i) general account assets available to the company on the valuation date that do not constitute part of the starting asset amount, and (ii) cash, and shall exclude separate account assets and policy loans. If the company elects not to include certain general account assets, or if the amount of additional available general account assets is lower than the amount needed to fund the present value of the accumulated deficiency, the company shall model cash assets to fill any deficiencies in the amount of additional invested assets. Any cash assumed will then be subject to the company’s investment policy as described in Section 4.D.4.a.

At subsequent projection intervals, the “additional invested assets” shall equal the additional invested assets on the valuation date plus any reinvestment assets generated by cash flows from the initial additional assets.

Guidance Note: As company’s manage themselves differently, additional assets may include assets earmarked for the VA business, other assets including surplus assets, and cash. A company might start with additional assets equaling the total earmarked for the VA business and not in the starting assets, develop vectors of NAER’s by scenario, and model the scenario reserves. If those assets are not sufficient for all scenarios, the company could add assets backing surplus or cash, and update the NAER’s and scenario reserves until a sufficient amount of additional assets is determined for each scenario.

4. Net Asset Earned Rate on Additional Assets

The net asset earned rate on additional assets shall represent the ratio of net investment earnings on additional invested assets to the amount of additional invested assets, as defined below. All items reflected in the ratio are consistent with statutory asset valuation and accrual accounting, including reflection of due, accrued, or unearned investment income where appropriate. A vector of NAER’s will be produced for each scenario.

The net asset earned rate on additional assets for each projection interval shall be calculated in a manner that is consistent with the timing of cash flows and length of the projection interval of the related cash flow model. The net investment earnings included in the calculation shall be projected in a manner consistent with Section 4.D.4, reflecting expected credit losses as prescribed in VM-20 Section 9.F. and anticipated investment expenses but without a reduction for federal income taxes.

5. Direct Iteration

In lieu of the method described in Sections 4.B.2, Section 4.B.3, and Section 4.B.4 above, the company may solve for the amount of starting assets which, when projected along with all contract cash flows, result in the defeasement of all projected future benefits and expenses by the end of the projection horizon.

C. Projection Scenarios

1. Number of Scenarios

The number of scenarios for which the scenario reserve shall be computed shall be the responsibility of the company and shall be considered to be sufficient if any resulting understatement in the stochastic reserve, as compared with that resulting from running additional scenarios, is not material.

2. Economic Scenario Generation

U.S. Treasury interest rate curves, as well as total investment return paths for general account equity assets and separate account fund performance shall be determined on a stochastic basis using the methodology described in Section 8. If the company uses a proprietary generator to develop scenarios, the company shall demonstrate that the resulting scenarios meets the requirements described in Section 8.

D. Projection Assets

1. Starting Asset Amount

For the projections of accumulated deficiencies, the value of assets at the start of the projection shall be set equal to the approximate value of statutory reserves at the start of the projection plus the allocated amount of PIMR attributable to the assets selected. Assets shall be valued consistently with their annual statement values, and shall include any hedge assets held in support of the guarantees in the contracts being valued[[1]](#footnote-2). The amount of such asset values shall equal the sum of the following items, all as of the start of the projection:

1. All of the separate account assets supporting the contracts.

b. An amount of assets held in the general account equal to the approximate value of statutory reserves as of the start of the projections less the amount in (a).

If the amount of initial general account assets is negative, the model should reflect 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.

To the extent the sum of the value of such hedge assets , or cash or other general account assets in an amount equal to the aggregate market value of such hedge assets, and the value of separate account assets supporting the contracts is greater than the approximate value of statutory reserves as of the start of the projections, then the company shall include enough negative general account assets or cash such that the starting asset amount equals the approximate value of statutory reserves as of the start of the projections.

For an asset portfolio that supports policies and contracts that are: a) subject to, and b) not subject to these requirements, the company shall determine an equitable method to apportion the total amount of starting assets between a. and b.

2. Valuation of Projected Assets

For purposes of determining the projected accumulated deficiencies, the value of projected assets shall be determined in a manner consistent with their value at the start of the projection. However, for derivative instruments that are used in hedging and that are not assumed to be sold during a particular projection interval, the company may account for them at amortized cost in a manner deemed appropriate by the company.

For assets assumed to be purchased during a projection, 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. Separate Account Assets

For purposes of determining the starting asset amounts in Section 4.D.1 and the valuation of projected assets in Section 4.D.2, assets held in a separate account shall be summarized into asset categories determined by the company as discussed in Section 4.A.2.

4. General Account Assets

a. General account assets shall be projected, net of projected defaults, using assumed investment returns consistent with their book value and expected to be realized in future periods as of the date of valuation. Initial assets that mature during the projection and positive cash flows projected for future periods shall be invested in a manner that is representative of and consistent with the company’s investment policy, subject to the following requirements:

i. The final maturities and cash flow structures of assets purchased in the model, such as the patterns of gross investment income and principal repayments or a fixed or floating rate interest basis, shall be determined by the company as part of the model representation;

ii. The combination of price and structure for fixed income investments and derivative instruments associated with fixed income investments shall appropriately reflect the projected U.S. Treasury curve along the relevant scenario and the requirements for gross asset spread assumptions stated below;

iii. For purchases of public non-callable corporate bonds, follow the requirements defined in VM-20 Sections 7.E, 7.F., and 9.F. The prescribed spreads reflect current market conditions as of the model start date and grade to long-term conditions based on historical data at the start of projection year four;

For transactions of derivative instruments associated with fixed income investments, reflect the prescribed assumptions in VM-20 Section 9.F. for interest rate swap spreads;

v. For purchases of other fixed income investments, if included in the model investment strategy, set assumed gross asset spreads over U.S. Treasuries in a manner that is consistent with, and results in reasonable relationships to, the prescribed spreads for public non-callable corporate bonds and interest rate swaps;

b. Notwithstanding the above requirements, the model investment strategy and any non-prescribed asset spreads shall be adjusted as necessary so that the aggregate reserve is not less than that which would be obtained by substituting an alternative investment strategy in which all fixed income reinvestment assets are public non-callable corporate bonds with gross asset spreads, asset default costs, and investment expenses by projection year that are consistent with a credit quality blend of 50% PBR credit rating 6 (A2/A) and 50% PBR credit rating 3 (Aa2/AA).

Drafting Note: this limitation is being referred to LATF for review.

Policy loans, equities and derivative instruments associated with the execution of a clearly defined hedging strategy (in compliance with Section 7.L) are not affected by this requirement.

c. Any disinvestment shall be modeled in a manner that is consistent with the company’s investment policy and that reflects the company’s cost of borrowing where applicable. Gross asset spreads used in computing market values of assets sold in the model shall be consistent with, but not necessarily the same as, the gross asset spreads in Section 4.D.4.a.iii and Section 4.D.4.a.v, recognizing that initial assets that mature during the projection may have different characteristics than modeled reinvestment assets.

5. Cash Flows from Invested Assets

a. Cash flows from general account fixed income assets, including starting and reinvestment assets, shall be reflected in the projection as follows:

* 1. Model gross investment income and principal repayments in accordance with the contractual provisions of each asset and in a manner consistent with each scenario.
	2. Reflect asset default costs as prescribed in VM-20 Section 9.F. and anticipated investment expenses through deductions to the gross investment income.
	3. Model the proceeds arising from modeled asset sales and determine the portion representing any realized capital gains and losses.
	4. Reflect any uncertainty in the timing and amounts of asset cash flows related to the paths of interest rates, equity returns, or other economic values directly in the projection of asset cash flows. Asset defaults are not subject to this requirement, since asset default assumptions must be determined by the prescribed method in VM-20 Sections 7.E, 7.F, and 9.F.

b. Cash flows from general account equity assets (i.e., non-fixed income assets having substantial volatility of returns such as common stocks and real estate), including starting and reinvestment assets, shall be reflected in the projection as follows:

* + 1. Determine the grouping for asset categories and the allocation of specific assets to each category in a manner that is consistent with that used for Separate Account Assets, as discussed in Section 4.A.2.
		2. Project the gross investment return including realized and unrealized capital gains in a manner that is consistent with the stochastically generated scenarios.
		3. Model the timing of an asset sale in a manner that is consistent with the investment policy of the company for that type of asset. Reflect expenses through a deduction to the gross investment return using prudent estimate assumptions.

E. Projection of Annuitization Benefits (Including GMIBs and GMWBs)

1. Assumed Annuitization Purchase Rates at Election

For purposes of projecting annuitization benefits (including annuitizations stemming from the election of a GMIB) and withdrawal amounts from GMWBs, the projected annuitization purchase rates shall be determined assuming that market interest rates available at the time of election are the interest rates used to project general account assets, as determined in Section 4.D.4.

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2. Projected Election of Guaranteed Minimum Income Benefit and Other Annuitization Options

a. For contracts projected to elect annuitization options (including annuitizations stemming from the election of a GMIB) or for projections of GMWB benefits once the account value has been depleted, the projections may assume one of the following at the company’s option:

1. The contract is treated as if surrendered at an amount equal to the statutory reserve that would be required at such time for the payout annuity benefits equivalent to the GMWB benefit payments.
2. The contract is assumed to stay in force and the projected periodic payments are paid.
	1. If the projected payout annuity is a variable payout annuity containing a floor guarantee (such as a GPAF) under a specified contractual option, only option ii. under Section 4.E.2.a above shall be used.

c. Where mortality improvement is used to project future annuitization purchase rates, as discussed in Section 4.E.1 above, mortality improvement also shall be reflected on a consistent basis in either the determination of the reserve in Section 4.E.2.a.i above or the projection of the periodic payments in Section 4.E.2.a.ii.

3. Projected Statutory Reserve for Payout Annuity Benefits

If the statutory reserve for payout annuity benefits referenced above in Section 4.E.2.a. requires a parameter that is not determined in a formulaic fashion such that, in reflecting the projected statutory reserve of a payout annuity benefit in the future, the company must make an assumption regarding this parameter and provide documentation in the VA Report.

Relationship to RBC Requirements

These requirements anticipate that the projections described herein are used for the determination of RBC for all of the contracts falling within the scope of these requirements. These requirements and the RBC requirements for the topics covered within Section 4.A to 4.E are identical. However, while the projections described in these requirements are performed on a basis that ignores federal income tax, a company may elect to conduct the projections for calculating the RBC requirements by including projected federal income tax in the cash flows and reducing the discount interest rates used to reflect the effect of federal income tax as described in the RBC requirements .

F. Compliance with ASOPs

When determining the stochastic reserve using projections, the analysis shall conform to the ASOPs as promulgated from time to time by the ASB.

Under these requirements, an actuary will make various determinations, verifications and certifications. The company shall provide the actuary with the necessary information sufficient to permit the actuary to fulfill the responsibilities set forth in these requirements and responsibilities arising from applicable ASOPs.

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### Section 5: Reinsurance Ceded

1. Treatment of Reinsurance Ceded in the Aggregate Reserve
2. Aggregate Reserve Pre- and Post- Reinsurance Ceded

As noted in Section 3.B, the minimum aggregate reserve is determined post-reinsurance ceded. Therefore, it is necessary to determine the components needed to determine the aggregate reserve (i.e., the additional standard projection amount, the stochastic reserve determined using projections and/or the reserve determined using the Alternative Methodology) on a post-reinsurance ceded basis. In addition, as noted in Section 3.B, it is necessary to determine the aggregate reserve determined on a pre-reinsurance ceded basis. Where this is needed, each of these components shall be determined ignoring the effect of reinsurance ceded. Section 5.A.2 through Section 5.A.4 discuss adjustments to inputs necessary to determine these components on both a post-reinsurance ceded and a pre-reinsurance ceded basis. Note that due allowance for reasonable approximations may be used where appropriate.

2. Stochastic Reserve Determined Using Projections

In order to determine the aggregate reserve post-reinsurance ceded, accumulated deficiencies, scenario reserves and the resulting stochastic reserve shall be determined reflecting the effects of reinsurance treaties that meet the statutory requirements that would allow the treaty to be accounted for as reinsurance within statutory accounting. This involves including, where appropriate, all anticipated reinsurance premiums or other costs and all reinsurance recoveries, where both premiums and recoveries are determined by recognizing any limitations in the reinsurance treaties, such as caps on recoveries or floors on premiums.

In order to determine the stochastic reserve pre-reinsurance ceded, accumulated deficiencies, scenario reserves and the resulting stochastic reserve shall be determined ignoring the effects of reinsurance ceded within the projections. One acceptable approach involves a projection based on the same starting asset amount as for the aggregate reserve post-reinsurance ceded and by ignoring, where appropriate, all anticipated reinsurance premiums or other costs and all reinsurance recoveries in the projections.

3. Amount Determined using the Alternative Methodology (to be reviewed)

If a company chooses to use the Alternative Methodology, as allowed in Section 3.E, it is important to note that the methodology produces reserves on a pre-reinsurance ceded basis. Therefore, where reinsurance is ceded, the Alternative Methodology must be modified to reflect the reinsurance costs and reinsurance recoveries under the reinsurance treaties in the determination of the aggregate reserve post-reinsurance ceded. In addition, the Alternative Methodology, unadjusted for reinsurance, shall be applied to the contracts falling under the scope of these requirements to determine the aggregate reserve pre-reinsurance ceded.

4. Additional Standard Projection Amount

Where reinsurance is ceded, the additional standard projection amount shall be calculated as described in Section 6 to reflect the reinsurance costs and reinsurance recoveries under the reinsurance treaties. The additional standard projection amount shall be also calculated pre-reinsurance ceded using the methods described in Section 6, but ignoring the effects of the reinsurance ceded.

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1. Deferred hedge gains/losses developed under SSAP108 are not included in the value of the starting assets. [↑](#footnote-ref-2)