



AMERICAN ACADEMY *of* ACTUARIES

Objective. Independent. Effective.™

July 16, 2021
Bruce Sartain, Chair
Valuation Manual (VM)-22 (A) Subgroup
Life Actuarial (A) Task Force
National Association of Insurance Commissioners (NAIC)

Dear Mr. Sartain,

The American Academy of Actuaries¹ Annuity Reserves and Capital Work Group (ARCWG) presented a fixed annuity principle-based reserving (PBR) framework proposal to the VM-22 Subgroup during its October 21, 2020 meeting. This document provides ARCWG's initial draft of NAIC Valuation Manual Section II and VM-22 requirements associated with the ARCWG proposal. We ask for the VM-22 Subgroup's consideration of the language herein as a foundation for further drafting efforts, in your efforts to advance toward an NAIC fixed annuity PBR framework.

Please let us know if you have any follow-up inquiries in response to this document. Again, we appreciate the opportunity to propose the fixed annuity framework and all of the efforts made by the VM-22 Subgroup to focus on this topic.

Sincerely,
Ben Slutsker
Chairperson, Annuity Reserves and Capital Work Group
American Academy of Actuaries

¹ The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

VM-22 PBR:- Requirements for Principle-Based Reserves for Non-Variable Annuities

Drafting Overview: This document is the ARCWG-proposed draft Valuation Manual wording for VM-22 PBR for non-variable annuities. The edits reflected in this draft are made in association with the recommendations in the Annuity Reserves Work Group-proposed VM-22 presentation, exposed by the VM-22 Subgroup in October 2020. Each section shows editorial mark-ups compared to existing VM-20 or VM-21 wording, which is included as a draft note at the beginning of each section (with the only exceptions being Sections 1 and 2 that do not contain mark-ups to existing Valuation Manual wording).

Table of Contents

Section 1: Background	4
A. Purpose	4
B. Principles	4
C. Risks Reflected.....	6
D. Specific Definitions to VM-22	8
Section 2: Scope and Effective Date	13
A. Scope	13
B. Effective Date & Transition	13
Section 3: Reserve Methodology.....	15
A. Aggregate Reserve.....	15
B. Impact of Reinsurance Ceded	15
C. To Be Determined	15
D. The Stochastic Reserve.....	15
E. Exclusion Test.....	16
F. Allocation of the Aggregate Reserve to Contracts	17
G. Prudent Estimate Assumptions:.....	17
Section 4: Determination of Stochastic Reserve	18
A. Projection of Accumulated Deficiencies	18
B. Determination of Scenario Reserve	24
C. Projection Scenarios	26
D. Projection of Assets	26
E. Projection of Annuitization Benefits	30
F. Frequency of Projection and Time Horizon	31
G. Compliance with ASOPs.....	31
Section 5: Reinsurance Ceded and Assumed	32
A. Treatment of Reinsurance Ceded in the Aggregate Reserve	32
Section 6: To Be Determined	35
Section 7: Exclusion Testing	36
A. Stochastic Exclusion Test Requirement Overview.....	36

B. Types of Stochastic Exclusion Tests	36
C. Stochastic Exclusion Ratio Test	37
D. Stochastic Exclusion Demonstration Test	40
E. Deterministic Certification Option	41
Section 8: To Be Determined (Scenario Generation for VM-21).....	43
Section 9: Modeling Hedges under a Future Hedging Strategy	44
A. Initial Considerations	44
B. Modeling Approaches	45
C. Calculation of Stochastic Reserve (Reported).....	46
F. Specific Considerations and Requirements	48
Section 10: Guidance and Requirements for Setting Contract Holder Behavior Prudent Estimate Assumptions	50
A. General	50
B. Aggregate vs. Individual Margins	50
C. Sensitivity Testing	51
D. Specific Considerations and Requirements	52
E. Dynamic Assumptions.....	54
F. Consistency with the CTE Level.....	54
G. Additional Considerations and Requirements for Assumptions Applicable to Guaranteed Living Benefits.....	55
H. Policy Loans	55
I. Non-Guaranteed Elements.....	56
Section 11: Guidance and Requirements for Setting Prudent Estimate Mortality Assumptions.....	58
A. Overview	58
B. Determination of Expected Mortality Curves	59
C. Adjustment for Credibility to Determine Prudent Estimate Mortality	62
D. Future Mortality Improvement	63
Section 12: Allocation of Aggregate Reserves to the Contract Level	64
Section 13: Statutory Maximum Valuation Interest Rates for Income Annuity Formulaic Reserves	67
A. Purpose and Scope.....	67
B. Definitions	68
C. Determination of the Statutory Maximum Valuation Interest Rate	69
Valuation Manual Section II. Reserve Requirements	78
Subsection 2: Annuity Products	78
Subsection 6: Riders and Supplemental Benefits	79

Section 1: Background

Drafting Note: All revisions shown in this section are in comparison to Section 1 in VM-21.

A. Purpose

These requirements establish the minimum reserve valuation standard for non-variable annuity ~~VA and certain other policies and contracts (“contracts”)~~ as defined in ~~the~~ Section 2.A, ~~and~~ issued on or after 1/1/2024 ~~operative date of the Valuation Manual as required by Model #820.~~ ~~For all contracts encompassed by the Scope,~~ these requirements constitute the Commissioners Annuity Reserve Valuation Method (CARVM) and, for certain contracts ~~encompassed in Section 2.A,~~ the Commissioners Reserve Valuation Method (CRVM).

Guidance Note: CRVM requirements apply to some group pension contracts.

~~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:

~~Effectively, through reference in AG 43, the reserve requirements in VM 21 also apply to those contracts issued prior to Jan. 1, 2017, that would not otherwise be encompassed by the scope of VM 21. Reserves for contracts subject to VM 21 or 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.~~

Guidance Note:

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 Sections 4.A through 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. A company that has elected to calculate RBC requirements in this manner may not switch back to using a calculation that ignores the effect of federal income tax without approval from the domiciliary commissioner.~~

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 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 with an element of conservatism consistent with statutory reporting objectives.

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 cash flow analysis 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 10 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).
 - ~~iiiv.~~ Uncertainty in the timing or duration of asset cash flows (e.g., shortening (prepayment risk) and lengthening (extension risk)).
 - iv. Performance of equities, real estate, and Schedule BA assets.
 - v. Call risk on callable assets.
 - ~~vi.~~ ~~Separate account fund performance.~~
 - 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 or deposits (high interest rate guarantees in low interest rate environments).
 - vii. Applicable expense risks, including fluctuation maintenance expenses directly attributable to the business, future commission expenses, and expense inflation/growth.
 - 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.~~
 - a. Those not associated with the policies or contracts being valued, or their supporting assets.
 - b. Determined to not be capable of materially affecting the reserve.
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 sudden and significant levels of withdrawals and surrenders“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.

D. Specific Definitions for VM-22

Buffer Annuity

Interchangeable term for Registered Index-Linked Annuity (RILA). See definition for Registered Index-Linked Annuity below.

Deferred Income Annuity (DIA)

An annuity which guarantees a periodic payment for the life of the annuitant or a term certain and payments begin one year or later after (or from) the issue date if the contract holder survives to a predetermined future age.

Fixed Indexed Annuity (FIA)

An annuity with an account value where the contract holder has the option for a portion or all of the account value to grow at a rate linked to an external index, typically with guaranteed principal.

Flexible Premium Deferred Annuity (FPDA)

An annuity with an account value established with a premium amount but allows for additional deposits to be paid into the annuity over time, resulting in an increase to the account value. The contract also has a guaranteed interest rate during the accumulation phase and has guaranteed mortality and interest rates applicable at the time of conversion to the payout phase.

Funding Agreement

A contract issued to an institutional investor (domestic and international non-qualified fixed income investors) that provides fixed or floating interest rate guarantees.

Guaranteed Investment Contract (GIC)

Insurance contract typically issued to a retirement plan (defined contribution) under which the insurer accepts a deposit (or series of deposits) from the purchaser and guarantees to pay a specified interest rate on the funds deposited during a specified period of time.

Index Credit Hedge Margin

A margin capturing the risk of inefficiencies in the company's hedging program supporting index credits. This includes basis risk, persistency risk, and the risk associated with modeling decisions and simplifications. It also includes any uncertainty of costs associated with managing the hedging program and changes due to investment and management decisions.

Index Credit

Any interest credit, multiplier, factor, bonus, charge reduction, or other enhancement to policy values that is linked to an index or indices. Amounts credited to the policy resulting from a floor on an index account are included.

Index Crediting Strategy

The strategy defined in a contract to determine index credits for a contract. This refers to underlying index, index parameters, date, timing, and other elements of the crediting method.

Index Parameter

Cap, floor, participation rate, spreads, or other features describing how the contract utilizes the index.

Longevity Reinsurance

An agreement, typically a reinsurance arrangement covering one or more group or individual annuity contracts, under which an insurance company assumes the longevity risk associated with periodic payments made to specified annuitants under one or more immediate or deferred payout annuity contracts. A common example is participants in one or more underlying retirement plans.

Typically, the reinsurer pays a portion of the actual benefits due to the underlying annuitants (or, in some cases, a pre-agreed amount per annuitant), while the ceding insurance company retains the assets supporting the reinsured annuity payments and pays periodic, ongoing premiums to the reinsurer over the expected lifetime of benefits paid to the specified annuitants. Such agreements may contain net settlement provisions such that only one party makes ongoing cash payments in a particular period. Under these agreements, longevity risk may be transferred on either a

permanent basis or for a prespecified period of time, and these agreements may or may not permit early termination.

Agreements which are not treated as reinsurance under Statement of Statutory Accounting Principles (SSAP) No. 61R are not included in this definition. In particular, contracts under which payments are made based on the aggregate mortality experience of a population of lives which are not covered by an underlying group or individual annuity contract (e.g., mortality index-based longevity swaps) are not included in this definition.

Market Value Adjustment (MVA) Annuity

An annuity with an account value where withdrawals and full surrenders are subject to adjustments based on interest rates or index returns at the time of withdrawal/surrender. There could be ceilings and floors on the amount of the market-value adjustment.

Modified Guaranteed Annuity (MGA)

A type of market-value adjusted annuity contract where the underlying assets are held in an insurance company separate account and the value of which are guaranteed if held for specified periods of time. The contract contains nonforfeiture values that are based upon a market-value adjustment formula if held for shorter periods.

Multiple Year Guaranteed Annuity (MYGA)

A type of fixed annuity that provides a pre-determined and contractually guaranteed interest rate for specified periods of time, after which there is typically an annual reset or renewal of a multiple year guarantee period.

Pension Risk Transfer (PRT) Annuity

An annuity, typically a group contract or reinsurance agreement, issued by an insurance company providing periodic payments to annuitants receiving immediate or deferred benefits from one or more retirement plans. Typically, the insurance company holds the assets supporting the benefits, which may be held in the general or separate account, and retains not only longevity risk but also asset risks (e.g., credit risk and reinvestment risk).

Registered Index-Linked Annuity (RILA)

An annuity with an account value where the contract holder has the option for a portion or all of the account value to grow at a rate linked to an external index, similar to a Fixed Indexed Annuity, but with downside risk exposure that may not guarantee full principal repayment. These contracts may include a cap on upside returns, and may also include a floor on downside returns which may be below zero percent.

Single Premium Immediate Annuity (SPIA)

An annuity purchased with a single premium amount which guarantees a periodic payment for the life of the annuitant or a term certain and payments begin within one year after (or from) the issue date.

Single Premium Deferred Annuity (SPDA)

An annuity with an account value established with a single premium amount that grows with a guaranteed interest rate during the accumulation phase and has guaranteed mortality and interest

rates applicable at the time of conversion to the payout phase. May also include cases where the premium is accepted for a limited amount of time early in the contract life, such as only in the first duration.

Stable Value Contract

A contract that provides limited investment guarantees, typically preserving principal while crediting steady, positive returns and protecting against losses or declines in yield. Underlying asset portfolios typically consist of fixed income securities, which may sit in the insurer's general account, a separate account, or in a third-party trust. These contracts often support defined contribution or defined benefit retirement plan liabilities.

Structured Settlement Contract (SSC)

A contract that provides periodic benefits and is purchased with a single premium amount stemming from various types of claims pertaining to court settlements or out-of-court settlements from tort actions arising from accidents, medical malpractice, and other causes. Adverse mortality is typically expected for these contracts.

Synthetic GIC

Contract that simulates the performance of a traditional GIC through a wrapper, swap, or other financial instruments, with the main difference being that the assets are owned by the policyholder or plan trust.

Term Certain Payout Annuity

A contract issued, which offers guaranteed periodic payments for a specified period of time, not contingent upon mortality or morbidity of the annuitant.

Two-Tiered Annuity

A deferred annuity with two tiers of account values. One, with a higher accumulation interest rate, is only available for annuitization or death. The other typically contains a lower accumulation interest rate, and is only available upon surrender.

1. ~~The term "cash surrender value" means, for the purposes of these requirements, the amount available to the contract holder upon surrender of the contract. Generally, it is equal to the account value less any applicable surrender charges, where the surrender charge reflects the availability of any free partial surrender options. However, for contracts where all or a portion of the amount available to the contract holder upon surrender is subject to a market value adjustment, the cash surrender value shall reflect the market value adjustment consistent with the required treatment of the underlying assets. That is, the cash surrender value shall reflect any market value adjustments where the underlying assets are reported at market value, but it shall not reflect any market value adjustments where the underlying assets are reported at book value.~~
2. ~~The term "clearly defined hedging strategy" (CDHS) is defined in VM-01. In order to be designated as a CDHS, the strategy must meet the principles outlined in Section 1.B (particularly Principle 5) 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 hedging effectiveness.~~
 - h. ~~The frequency of measuring hedging effectiveness.~~
 - i. ~~The conditions under which hedging will not take place.~~
 - j. ~~The person or persons responsible for implementing the hedging strategy.~~

Guidance Note: It is important to note that strategies involving the offsetting of the risks associated with VA guarantees with other products outside of the scope of these requirements (e.g., equity-indexed annuities) do not currently qualify as a clearly defined hedging strategy under these requirements.

3. ~~The term “guaranteed minimum death benefit” (GMDB) means a provision (or provisions) for a guaranteed benefit payable on the death of a contract holder, annuitant, participant or insured where the amount payable is either (i) a minimum amount; or (ii) exceeds the minimum amount and is:~~
- ~~— is increased by an amount that may be either specified by or computed from other policy or contract values; and~~
 - ~~— has the potential to produce a contractual total amount payable on such death that exceeds the account value, or~~
 - ~~— in the case of an annuity providing income payments, guarantees payment upon such death of an amount payable on death in addition to the continuation of any guaranteed income payments.~~

Guidance Note: The definition of GMDB includes benefits that are based on a portion of the excess of the account value over the net of premiums paid less partial withdrawals made (e.g., an earnings enhanced death benefit).

4. ~~The term “total asset requirement” (TAR) means the sum of the reserve determined from the VM-21 requirements prior to any adjustment for the elective phase in pursuant to Section 2.B plus the C3 RBC amount from LR027 step (paragraph D) prior to any adjustment for phase in or smoothing.~~

Section 2: Scope and Effective Date

Drafting Note: There are no revisions shown in this section compared to VM-21 or other chapters Valuation Manual, since the write-up is largely new for VM-22.

A. Scope

Subject to the requirements of this VM-22 are annuity contracts, certificates and contract features, whether group or individual, including both life contingent and term-certain-only, directly written or assumed through reinsurance issued on or after 1/1/2024, with the exception of contracts or benefits listed below.

Products out of scope include:

- Contracts or benefits that are subject to VM-21 (such as variable annuities, RILAs, buffer annuities, and structured annuities)
- GICs
- Synthetic GICs
- Stable Value Contracts
- Funding Agreements

Products in scope of VM-22 include fixed annuities which consist of, but are not limited to, the following the list:

- **Account Value Based Annuities**
 - Deferred Annuities (SPDA & FPDA)
 - Multi-Year Guarantee Annuities (MYGA)
 - Fixed Indexed Annuities (FIA)
 - Market-Value Adjustments (MVA)
 - Two-tiered Annuities
 - Guarantees/Benefits/Riders on Fixed Annuity Contracts
- **Payout Annuities**
 - Single Premium Immediate Annuities (SPIA)
 - Deferred Income Annuities (DIA)
 - Term Certain Payout Annuity
 - Pension Risk Transfer Annuities (PRT)
 - Structured Settlement Contracts (SSC)
 - Longevity Reinsurance

The company may elect to exclude one or more groups of contracts from the stochastic reserve calculation in certain situations, pursuant to the exclusion test requirements defined in Section 3.E of VM-22.

B. Effective Date & Transition

Effective Date

These requirements apply for valuation dates on or after January 1, 2024.

Transition

A company may elect to establish minimum reserves pursuant to applicable requirements in VM-A and VM-C for business otherwise subject to VM-22 PBR requirements and issued during the first three years following the effective date of VM-22 PBR. If a company during the three years elects to apply VM-22 PBR to a block of such business, then a company must continue to apply the requirements of VM-22 PBR for future issues of this business. Irrespective of the transition date, a company shall apply VM-22 PBR requirements to applicable blocks of business on a prospective basis starting at least three years after the effective date.

Section 3: Reserve Methodology

Drafting Note: All revisions shown in this section are in comparison to Section 3 in VM-21.

A. Aggregate Reserve

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 any applicable PIMR for all contracts not valued under applicable requirements in VM-A and VM-C ~~the Alternative Methodology (Section 7)~~, plus the reserve for any contracts ~~determined using the Alternative Methodology~~ valued under applicable requirements in VM-A and VM-C ~~(following the requirements of Section 7)~~.

Guidance Note: Contracts valued under applicable requirements in VM-A and VM-C are ones that pass the exclusion test and elect to not model PBR stochastic reserves, per the requirements in Section 3.E.

B. Impact of Reinsurance Ceded

~~Where reinsurance is ceded for all or a portion of the contracts, a~~ All components in the aggregate reserve shall be determined post-reinsurance ceded, that is net of any reinsurance cash flows arising from treaties that meet the statutory requirements that ~~would~~ allow the treaty to be accounted for as reinsurance. ~~A, and~~ pre-reinsurance ceded reserve also needs to be determined by, ~~that is~~ ignoring all reinsurance cash flows (such costs and benefits) in the reserve calculation.

C. To Be Determined ~~The Additional Standard Projection Amount~~

~~The additional standard projection amount is 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, and the additional standard projection amount excluding any contracts whose reserve is determined using the Alternative Methodology. 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.~~

D. The Stochastic Reserve

1. The stochastic reserve shall be determined based on asset and liability projections for the contracts falling within the scope of these requirements, excluding those contracts valued using the methodology pursuant to applicable requirements in VM-A and VM-C ~~Alternative Methodology~~, over a broad range of stochastically generated projection scenarios described in Section 8 and using prudent estimate assumptions as required in Section 3.F herein. ~~The stochastic reserve may be determined in aggregate for all contracts falling within the scope of these requirements— i.e., a single model segment— or, at the option of the company, it may be determined by subgrouping contracts into model segments,~~
2. The stochastic reserve amount for any group of contracts shall be determined as CTE70 of the scenario reserves following the requirements of Section 4, with the exception of groups of contracts for which a company elects the Deterministic Certification Option in Section 7.E, which shall be determined as the scenario reserve following the requirements of Section 4.

3. The reserve may be determined in aggregate across various groups of contracts as a single model segment when determining the stochastic reserve if the business and risks are not managed separately or are part of the same integrated risk management program. Aggregation is permitted if a resulting group of contracts (or model segment) follows the listed principles:
 - a. Aggregate in a manner that is consistent with the company's risk management strategy and reflects the likelihood of any change in risk offsets that could arise from shifts between product types, and
 - b. Using prudent actuarial judgement, consider the following elements when aggregating groups of contracts: whether groups of contracts are part of the same portfolio (or different portfolios that interact), same integrated risk management system, administered/managed together
4. Do not aggregate groups of contracts for which the company elects to use the Deterministic Certification Option in Section 7.E with any groups of contracts that do not use such option.
5. To the extent that these limits on aggregation result in more than one model segment, the stochastic reserve shall equal the sum of the stochastic reserve amounts computed for each model segment and scenario reserve amounts computed for each model segment for which the company elects to use the Deterministic Certification Option in Section 7.E.

E. Exclusion Test Alternative Methodology

~~For a group of variable deferred annuity contracts that contain either no guaranteed benefits or only GMDBs—i.e., no VAGLBs—the reserve may be determined using the Alternative Methodology described in Section 7 rather than using the approach described in Section 3.C and Section 3.D. However, in the event that the approach described in Section 3.C and 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 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. To the extent that certain groups of contracts pass one of the defined stochastic exclusion tests in Section 7.B, these groups of contracts may be valued using the methodology pursuant to applicable requirements in VM-A and VM-C, with the statutory maximum valuation rate for immediate annuities specified in Section 13.
 - a. For dividend-paying contracts, a dividend liability shall be established upon following requirements in VM-A and VM-C, as described above, for the base contract.

Guidance Note: The intention of contracts that pass the stochastic exclusion test is to provide the option to value contracts under VM-A and VM-C. This may apply to pre-PBR CARVM requirements in accordance with Actuarial Guideline XXXIII (AG33) methodology with type A, B, C rates for SPIAs issued before 2018; AG33 methodology with pre-PBR VM-22 rates for SPIAs issued on/after 2018; Actuarial Guideline XXXV (AG35) pre-PBR methodology for Fixed Indexed Annuities; and AG33 methodology (with interest rate updates for modernization initiatives on new contracts) for non-SPIAs.

2. The approach for grouping contracts when performing the exclusion tests should follow the same principles that underlie the aggregation approach for model segments discussed for Stochastic Reserves in Section D above.

F. Allocation of the Aggregate Reserve to Contracts

The aggregate reserve shall be allocated to the contracts falling within the scope of these requirements using the method outlined in Section 12.

G. Prudent Estimate Assumptions:

1. With respect to the Stochastic Reserve in Section 3.C, the company shall establish the prudent estimate assumption for each risk factor in compliance with the requirements in Section 12 of Model #820 and must periodically review and update the assumptions as appropriate in accordance with these requirements.
2. The qualified actuary, to whom responsibility for this group of contracts is assigned, shall annually review relevant emerging experience for the purpose of assessing the appropriateness of the anticipated experience assumption. If the results of statistical testing or other testing indicate that previously anticipated experience for a given factor is inadequate, then the qualified actuary shall set a new, adequate, anticipated experience assumption for the factor.
3. To determine the prudent estimate assumptions, the stochastic reserve shall also follow the requirements in Sections 4 and 9 for asset assumptions, Section 10 for policyholder behavior assumptions, and Section 11 for mortality assumptions.

G. Reserve to Be Held in the General Account

~~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 separate account 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.~~

Section 4: Determination of Stochastic Reserve

Drafting Note: All revisions shown in this section are in comparison to Section 4 in VM-21.

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 it shall 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 using prudent estimate liability assumptions defined in Sections 10 and 11 and asset assumptions defined in Section 4.D. The company shall project cash flows including the following:

- a. Revenues received by the company including gross premiums received from the policyholder (including any due premiums as of the projected start date).
- b. All material benefits projected to be paid to policyholders—including, but not limited to, death claims, surrender benefits and withdrawal benefits—reflecting the impact of all guarantees and adjusted to take into account amounts projected to be charged to account values on general account business. Any guarantees, in addition to market value adjustments assessed on projected withdrawals or surrenders, shall be taken into account.

Guidance Note: Amounts charged to account values on general account business are not revenue; examples include rider charges and expense charges.

- c. Non-Guaranteed Elements (NGE) cash flows as described in Section 10.J.
- d. Insurance company expenses (including overhead and investment expense), ~~commissions~~ fund expenses, contractual fees and charges, and revenue-sharing income received by the company (net of applicable expenses). ~~and~~
- e. Net cash flows associated with any reinsurance. ~~or~~
- f. Cash flows from hedging instruments as described in Section 4.A.4. ~~are to be reflected on a basis consistent with the requirements herein.~~
- g. Cash receipts or disbursements associated with invested assets (other than policy loans) as described in Section 4.D.4, including investment income, realized capital gains and losses, principal repayments, asset default costs, investment expenses, asset prepayments, and asset sales.
- ~~a.~~h. If modeled explicitly, cash flows related to policy loans as described in Section 10.I.2, including interest income, new loan payments and principal repayments.

Guidance Note: Future net policy loan cash flows include: policy loan interest paid in cash plus repayments of policy loan principal, including repayments occurring at death or surrender (note that the future benefits in Section 4.A.1.b are before consideration of policy loans), less additional policy loan principal (but excluding policy loan interest that is added to the policy loan principal balance). 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 herein. Accumulated deficiencies shall be determined at the end of each projection year as the sum of the accumulated deficiencies for all contracts within each model segment.

Guidance Note: Section 4.A.1 requires market value adjustments (MVAs) on liability cash flows to be reflected because in a cash flow model, assets are assumed to be liquidated at market value to cover the cash outflow of the cash surrender; therefore, inclusion of the market value adjustment aligns the asset and liability cash flows. This may differ from the treatment of MVAs in the definition of cash surrender value (Section 1.D), which defines the statutory reserve floor for which the values must be aligned with the annual statement value of the assets.

2. Grouping of ~~Variable Funds and Subaccounts~~Index Crediting Strategies

~~The portion of the starting asset amount held in the separate account represented by the variable funds and the corresponding account values~~Index crediting strategies may be grouped for modeling using an approach that recognizes the investment guidelines and objectives of ~~the fund~~each index crediting strategy. In assigning each ~~variable fund and the variable subaccounts~~index crediting strategy to a grouping for projection purposes, the fundamental characteristics of the ~~fund~~index crediting strategy 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).

Index accounts sharing similar index crediting strategies may also be grouped for modeling to an appropriately crafted proxy strategy normally expressed as a linear combination of recognized market indices, sub-indices or funds, in order to develop the investment return paths and associated interest crediting. Each index crediting strategy's specific risk characteristics, associated index parameters, and relationship to the stochastically generated scenarios in Section 8 should be considered before grouping or assigning to a proxy strategy. Grouping and/or development of a proxy strategy may not be done in a manner that intentionally understates the resulting reserve.

~~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. Model Cells

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

- a. For a company that does not have a CDHS future hedging program tied directly to the contracts falling under the scope of VM-22 stochastic reserve requirements:
 - i. The company shall not consider the cash flows from any future hedge purchases or any rebalancing of existing hedge assets in its modeling.
 - ii. Existing 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 starting assets. The hedge assets may then be considered in one of two ways:
 - a) Include the asset cash flows from any contractual payments and maturity values in the projection model; or
 - b) No hedge positions—in which case the hedge positions held on the valuation date are replaced with cash and/or other general account assets in an amount equal to the aggregate market value of these hedge positions.

Guidance Note: If the hedge positions held on the valuation date are replaced with cash, then as with any other cash, such amounts may then be invested following the company's investment strategy.

A company may switch from method a) to method b) at any time, but it may only change from b) to a) with the approval of the domiciliary commissioner.

- b. For a company ~~with a CDHS~~ that has a future hedging program tied directly to the contracts falling under the scope of VM-22 stochastic reserve requirements:
 - i. For a hedging program with hedge payoffs that offset interest credits associated with indexed interest strategies (indexed interest credits):
 - a) In modeling cash flows, the company shall include the cash flows from future hedge purchases or any rebalancing of existing hedge assets that are intended solely to offset interest credits to policyholders
 - b) Existing hedging instruments that are currently held by the company for this purpose in support of the contracts falling under the scope of these requirements shall be included in the starting assets. -Existing hedging instruments that are currently held by the

company for any other purpose should be modeled consistently with the requirements of Section 4.A.4.a.ii.

c) An Index Credit Hedge Margin for these instruments shall be reflected by reducing index interest credit hedge payoffs by a margin multiple that shall be justified by sufficient and credible company experience and be no less than [X%] multiplicatively of the interest credited. In the absence of sufficient and credible company experience, a margin of [Y%] shall be assumed. There is no cap on the index credit hedge margin if company experience indicates actual error is greater than [Y%]. It is permissible to substitute stress-testing for sufficient and credible experience if such stress-testing comprehensively considers a robust range of future market conditions.

ii. For a company that hedges any contractual obligation or risks other than indexed interest credits, the detailed requirements for the modeling of hedges are defined in Section 9. The following requirements 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) 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 CDHS~~. 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 the 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~~only future hedge purchases associated with indexed interest credited. These are discussed in greater detail in Section 9. ~~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 9.C.4.~~

c) Consistent with Section 4.A.4.b.i., the index credit hedge margin for instruments associated with indexed interest credited shall be reflected by reducing hedge payoffs by a margin multiple as defined in Section 4.A.4.b.i.c).

- 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.

Guidance Note: Section 4.A.4.b.i is intended to address common situations for products with index crediting strategies where the company only hedges index credits or clearly separates index credit hedging from other hedging.- In this case the hedge positions are considered similarly to other fixed income assets supporting the contracts, and a margin is reflected rather than modeling using a CTE70 adjusted run with no future hedge purchases. If a company has a more comprehensive hedge strategy combining index credits, guaranteed benefit, and other risks (e.g., full fair value or economic hedging), an appropriate and documented bifurcation method should be used in the application of sections 4.A.4.b.i and 4.A.4.b.ii above for the hedge modeling and justification. Such bifurcation methods may quantify the specific risk exposure attributable to index credit liabilities versus other liabilities such as guaranteed living benefits, and apply such for the basis for allocation.

Guidance Note: The requirements of Section 4.A.4 govern the determination of reserves for annuity contracts 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.

5. Revenue Sharing

~~If applicable, P~~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 ~~set forth in VM 21 Section 4.A.5~~ are met.:

~~The net revenue sharing income is received by the company~~company receives the net revenue sharing income.

~~**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.~~

~~Signed contractual agreement(s) are in place as of the valuation date and support the current payment of the net revenue sharing income.~~

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

~~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):~~

~~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).~~

~~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.~~

~~The benefits and risks to both the company and the entity paying the net revenue sharing income of continuing the arrangement.~~

~~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.~~

~~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.~~

~~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.~~

~~The amount of projected net revenue sharing income 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.~~

~~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.~~

~~The company is responsible for reviewing the revenue sharing agreements and verifying compliance with these requirements.~~

~~The amount of net revenue sharing income assumed in a given scenario shall not exceed the sum of (i) and (ii), where:~~

~~Is the contractually guaranteed net revenue sharing income projected under the scenario;
and~~

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

~~1.00 in the first projection year.~~

~~0.95 in the second projection year.~~

~~0.90 in the third projection year.~~

~~0.85 in the fourth projection year.~~

~~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. Interest Maintenance Reserve (IMR)

The IMR shall be handled consistently with the treatment in the company's cash flow testing, and the amounts should be adjusted to a pre-tax basis.

B. Determination of Scenario Reserve

1. ~~General~~For a given scenario, the scenario reserve ~~is the sum of~~shall be determined using one of two methods described below:

a) The starting asset amount plus the greatest present value, as of the projection start date, of the projected accumulated deficiencies; ~~or~~

Guidance Note: The greatest present value of accumulated deficiencies can be negative.

b) The direct iteration method, where the scenario reserve is determined by solving 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 at the end of the projection horizon with no positive accumulated deficiencies at the end of any projection year during the projection periodstarting asset amount. ~~When using the direct Iteration method, the scenario reserve will equal the final starting asset amount determined according to Section 4.B.4.~~

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, unless using the direct iteration method pursuant to Section 4.B.1.b, the accumulated deficiencies shall be discounted at the NAER on additional assets, as defined in Section 4.B.3.

3. Determination of NAER on Additional Invested Asset Portfolio

- a. The additional invested asset portfolio for a scenario is a portfolio of general account assets as of the valuation date, outside of the starting asset portfolio, that is required in that projection scenario so that the projection would not have a positive accumulated deficiency at the end of any projection year. This portfolio may include only (i) General Account assets available to the company on the valuation date that do not constitute part of the starting asset portfolio; and (ii) cash assets.

Guidance Note:

Additional invested assets should be selected in a manner such that if the starting asset portfolio were revised to include the additional invested assets, the projection would not be expected to experience any positive accumulated deficiencies at the end of any projection year.

It is assumed that the accumulated deficiencies for this scenario projection are known.

- b. To determine the NAER on additional invested assets for a given scenario:
- i. Project the additional invested asset portfolio as of the valuation date to the end of the projection period,
- a) Investing any cash in the portfolio and reinvesting all investment proceeds using the company's investment policy.
- b) Excluding any liability cash flows.
- c) Incorporating the appropriate returns, defaults and investment expenses for the given scenario.
- ii. If the value of the projected additional invested asset portfolio does not equal or exceed the accumulated deficiencies at the end of each projection year for the scenario, increase the size of the initial additional invested asset portfolio as of the valuation date, and repeat the preceding step.
- iii. Determine a vector of annual earned rates that replicates the growth in the additional invested asset portfolio from the valuation date to the end of the projection period for the scenario. This vector will be the NAER for the given scenario.
- ~~iii.~~iv. If the depletion of assets within the projection results in an unreasonably high negative NAER upon borrowing, the NAER may be set to the assumed cost of borrowing associated with each projected time period, in accordance with Section 4.D.3.c, as a safe harbor.

Guidance Note: There are multiple ways to select the additional invested asset portfolio at the valuation date. Similarly, there are multiple ways to determine the earned rate vector. The company shall be consistent in its choice of methods, from one valuation to the next.

~~4. — Direct Iteration In lieu of the method described in Section 4.B.2 and Section 4.B.3 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 at the end of the projection horizon with no accumulated deficiencies at the end of any projection year during the projection period.~~

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 it 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

Treasury Department interest rate curves, as well as investment return paths for general account equity index funds, equities, and fixed income 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 meet the requirements described in Section 8.

D. Projection of Assets

1. Starting Asset Amount

a. 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. The amount of such asset values shall equal the sum of the following items, all as of the start of the projection:

~~i. — All of the separate account assets supporting the contracts;~~

~~ii.i.~~ Any hedge instruments held in support of the contracts being valued; and

~~iii.ii.~~ 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 (i) ~~and (ii)~~.

~~**Guidance Note:** Deferred hedge gains/losses developed under SSAP No. 108 — Derivatives Hedging Variable Annuity Guarantees are not included in the starting assets.~~

- b. 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 that the sum of the value of 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.~~

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. 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. However, for derivative instruments that are used in hedging and are not assumed to be sold during a particular projection interval, the company may account for them at an amortized cost in an appropriate manner elected by the company.

Guidance Note: Accounting for hedge assets should recognize any methodology prescribed by a company's state of domicile.

~~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.~~

4.3. 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 Treasury Department 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;
- iv. 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:

i. -5% Treasury

ii. 150% PBR credit rating 3 (Aa2/AA)

iii. 40% 6 (A2/A) and 50% PBR credit rating 63 (Aa2/AA)

vi.iv. 40% PBR credit rating 9 (Baa/BBB)

~~Policy loans, equities and derivative instruments associated with the execution of a clearly defined hedging strategy are not affected by this requirement.~~

~~Drafting Note: This limitation is being referred to Life Actuarial (A) Task Force for review.~~

b.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, provided that the assumed cost of borrowing is not lower than the rate at which positive cash flows are reinvested in the same time period, taking into account duration, ratings, and other attributes of the borrowing mechanism. 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.iv, recognizing that initial assets that mature

during the projection may have different characteristics than modeled reinvestment assets.

Guidance Note: This limitation is being referred to Life Actuarial (A) Task Force for review. The simple language above “provided that the assumed cost of borrowing is not lower than the rate at which positive cash flows are reinvested in the same time period” is not intended to impose a literal requirement. It is intended to reflect a general concept to prevent excessively optimistic borrowing assumptions. It is recognized that borrowing parameters and rules can be complicated, such that modeling limitations may not allow for literal compliance, in every time step, as long as the reserve is not materially affected. However, if the company is unable to fully apply this restriction, prudence dictates that a company shall not allow borrowing assumptions to materially reduce the reserve.

5.4. 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:
 - i. Model gross investment income and principal repayments in accordance with the contractual provisions of each asset and in a manner consistent with each scenario.
 - ii. Reflect asset default costs as prescribed in VM-20 Section 9.F and anticipated investment expenses through deductions to the gross investment income.
 - iii. Model the proceeds arising from modeled asset sales and determine the portion representing any realized capital gains and losses.
 - iv. 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 index funds and 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:
 - i. 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~~index crediting strategies, as discussed in Section 4.A.2.
 - ii. Project the gross investment return including realized and unrealized capital gains in a manner that is consistent with the stochastically generated scenarios.

iii. 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.

c. Cash flows for each projection interval for policy loan assets shall follow the requirements in Section 10.I.

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

1. Assumed Annuitization Purchase Rates ~~at Election~~

a. For payouts specified at issue (such as single premium immediate annuities, deferred income annuities, and certain structured settlements), such payout rates shall reflect the payout rate specified in the contract.

a.b. For purposes of projecting future elective 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. In contrast, for payouts specified at issue, the payout rates modeled should be consistent with those specified in the contract.

2. Projected Election of GMIBs, GMWBs and Other Annuitization Options

a. For contracts projected to elect future 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:~~

~~The contract is treated as if surrendered at an amount equal to the statutory reserve that would be required at such time for a fixed payout annuity benefit equivalent to the guaranteed benefit amount (e.g., GMIB or GMWB benefit payments)~~

~~The contract is assumed to will stay in force, and the projected periodic payments are paid, and the associated maintenance expenses are incurred.~~

~~b.~~ 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, the company must make a reasonable and supportable assumption regarding this parameter.~~

F. Frequency of Projection and Time Horizon

1. Use of an annual cash-flow frequency (“timestep”) is generally acceptable for benefits/features that are not sensitive to projection frequency. The lack of sensitivity to projection frequency should be validated by testing wherein the company should determine that the use of a more frequent—i.e., shorter—time step does not materially increase reserves. A more frequent time increment should always be used when the product features are sensitive to projection period frequency.
2. Care must be taken in simulating fee income and expenses when using an annual time step. ~~For example, recognizing fee income at the end of each period after market movements, but prior to persistency decrements, would normally be an inappropriate assumption.~~ It is also important that the frequency of the investment return model be linked appropriately to the projection horizon in the liability model. In particular, the horizon should be sufficiently long so as to capture the vast majority of costs (on a present value basis) from the scenarios.

Guidance Note: As a general guide, the forecast horizon should not be less than 20 years.

G. Compliance with ASOPs

When determining a stochastic reserve, 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 each applicable ASOP.

Section 5: Reinsurance Ceded and Assumed

Drafting Note: All revisions shown in this section are in comparison to Section 5 in VM-21.

A. Treatment of Reinsurance Ceded in the Aggregate Reserve

1. Aggregate Reserve Pre- and Post-Reinsurance Ceded

As noted in Section 3.B, the aggregate reserve is determined both pre-reinsurance ceded and 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 amount ~~valued using requirements in VM-A and VM-C~~ ~~determined using the Alternative Methodology~~, as applicable—on both bases. Sections 5.A.2 ~~and through~~ 5.A.34 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

- a. 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 projected~~ reinsurance premiums or other costs and all reinsurance recoveries, where the reinsurance cash flows reflect all the provisions in the reinsurance agreement, using prudent estimate assumptions both premiums and recoveries are determined by recognizing any limitations in the reinsurance treaties, such as caps on recoveries or floors on premiums.

- i. All significant terms and provisions within reinsurance treaties shall be reflected. In addition, it shall be assumed that each party is knowledgeable about the treaty provisions and will exercise them to their advantage.

Guidance Note: Renegotiation of the treaty upon the expiration of an experience refund provision or at any other time shall not be assumed if such would be beneficial to the company and not beneficial to the counterparty. This is applicable to both the ceding party and assuming party within a reinsurance arrangement.

- ii. If the company has knowledge that a counterparty is financially impaired, the company shall establish a margin for the risk of default by the counterparty. In the absence of knowledge that the counterparty is financially impaired, the company is not required to establish a margin for the risk of default by the counterparty.
 - ~~iii.~~ A company shall include the cash flows from a reinsurance agreement or amendment in calculating the aggregate reserve if such qualifies for credit in compliance with Appendix A-791 of the Accounting Practices and Procedures Manual. If a reinsurance agreement or amendment does not qualify for credit for reinsurance but treating the reinsurance agreement or amendment as if it did so qualify would result in a reduction to the company's surplus, then the company shall increase the minimum reserve by the absolute value of such reductions in surplus.

b. In order to determine the stochastic reserve on a pre-reinsurance ceded basis, accumulated deficiencies, scenario reserves, and the resulting stochastic reserve shall be determined ignoring the effects of reinsurance ceded within the projections. Different approaches may be used to determine the starting assets on the ceded portion of the contracts, dependent upon the characteristics of a given treaty:

i. For a standard coinsurance treaty, where the assets supporting the ceded liabilities were transferred to the assuming reinsurer, One acceptable approach involves a projection based on using the same starting assets on the ceded portion of the policies that are similar to those supporting the retained portion of the ceded policies or supporting similar types of policies. Scaling up each asset supporting the retained portion of the contract is also an acceptable method 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.

Guidance Note: For standard pro rata insurance treaties (does not include experience refunds), where allocated expenses are similar to the renewal expense allowance, reflecting the quota share applied to the present value of future reinsurance cash flows pertaining to the reinsured block of business may be considered as a possible approach to determine the ceded reserves.

ii. Alternatively, a treaty may contain an identifiable portfolio of assets associated with the ceded liabilities. This could be the case for several forms of reinsurance: funds withheld coinsurance; modified coinsurance; coinsurance with a trust. To the extent these assets would be available to the cedant, an acceptable approach could involve modeling this portfolio of assets. To the extent that these assets were insufficient to defease the ceded liabilities, the modeling would partially default to the approach discussed for a standard coinsurance treaty. To the extent these assets exceeded what might be needed to defease the ceded liabilities (perhaps an over collateralization requirement in a trust), the inclusion of such assets shall be limited.

Guidance Note: Section 3.5.2 in ASOP No. 52, *Principle-Based Reserves for Life Products under the NAIC Valuation Manual*, provides possible methods for constructing a hypothetical pre-reinsurance asset portfolio, if necessary, for purposes of the pre-reinsurance reserve calculation.

c. An assuming company shall use assumptions to project cash flows to and from ceding companies that reflect the assuming company's experience for the business segment to which the reinsured policies belong and reflect the terms of the reinsurance agreement.

3. Reserve Determined Upon Passing the Exclusion Test using the Alternative Methodology

If a company passes chooses to use the Alternative Methodology stochastic exclusion test and elects to use a methodology pursuant to applicable Sections VM-A and VM-C, 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 reserve 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 adjusted for any reinsurance ceded accordingly. In addition, the reserves valued under applicable Sections in VM-A and VM-C Alternative Methodology, unadjusted for reinsurance, shall be applied to the contracts falling under the scope of these requirements to determine the aggregate reserve prior to reinsurance.

It should be noted that the pre-reinsurance and post-reinsurance reserves may result in different outcomes for the exclusion test. In particular, it is possible that the pre-reinsurance reserves would pass the relevant exclusion test (and allow the use of VM-A and VM-C) while the post-reinsurance reserves might not.

4. To Be Determined~~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 also be calculated pre-reinsurance ceded using the methods described in Section 6 but ignoring the effects of the reinsurance ceded.~~

Section 6: To Be Determined

Section 7: Exclusion Testing

Drafting Note: All revisions shown in this section are in comparison to Section 6 in VM-20.

A. Stochastic Exclusion Test Requirement Overview

1. ~~Requirements to pass the Stochastic Exclusion Test:~~

1. The company may elect to exclude one or more groups of contracts from the stochastic reserve calculation if the stochastic exclusion test (SET) is satisfied for that group of contracts. The company has the option to calculate or not calculate the SET.
 - a. If the company does not elect to calculate the SET for one or more groups of contracts, or the company calculates the SET and fails the test for such groups of contracts, the reserve methodology described in Section 4 shall be used for calculating the aggregate reserve for those groups of contracts.
 - b. If the company elects to calculate the SET for one or more groups of contracts, and passes the test for such groups of contracts, then the company shall choose whether or not to use the reserve methodology described in Section 4 for those groups of contracts. If the reserve methodology described in Section 4 is not used for one or more groups of contracts, then the company shall use the reserve methodology pursuant to applicable requirements in VM-A and VM-C to calculate the aggregate reserve for those groups of contracts.
 - c. A company may not exclude a group of contracts from the stochastic reserve requirements if there are one or more future hedging programs associated with the contracts, with the exception of hedging programs solely supporting index credits as described in Section 9.A.1.

B. Types of Stochastic Exclusion Tests

Groups of contracts pass the SET if one of the following is met:

1. Stochastic Exclusion Ratio Test (SERT) ~~—Annually and within 12 months before the valuation date~~ the company demonstrates that the groups of contracts/policies pass the SERT defined in Section 7.C6.A.2.
2. Stochastic Exclusion Demonstration Test ~~—~~In the first year and at least once every three calendar years thereafter, the company provides a demonstration in the PBR Actuarial Report as specified in Section 7.D6.A.3.
3. SET Certification Method ~~—~~For groups of contracts/policies other than variable life that do not have guaranteed living benefits, future hedging programs, or ULSG-pension risk transfer business in the first year and at least every third calendar year thereafter, the company provides a certification by a qualified actuary that the group of contracts/policies is not subject to material aggregate risk levels across interest rate risk, longevity risk, or asset return volatility risk (i.e., the risk on non-fixed-income investments having substantial volatility of returns, such as common stocks and real estate investments). The company shall provide the certification and documentation supporting the certification to the commissioner upon request.

Guidance Note: The qualified actuary should develop documentation to support the actuarial certification that presents his or her analysis clearly and in detail sufficient for another actuary to

understand the analysis and reasons for the actuary's conclusion that the group of polices/contracts is not subject to material interest rate risk, longevity risk, or asset return volatility risk. Examples of methods a qualified actuary could use to support the actuarial certification include, but are not limited to:

- a) A demonstration that NPRs using requirements under VM-A and VM-C for the group of polices/contracts calculated ~~according to Section 3~~ are at least as great as the assets required to support the group of polices/contracts using the company's cash-flow testing model under each of the 16 scenarios identified in ~~Section 6~~this section or alternatively each of the New York seven scenarios.
- b) A demonstration that the group of polices/contracts passed the SERT within 36 months prior to the valuation date and the company has not had a material change in its interest rate risk.
- c) A qualitative risk assessment of the group of polices/contracts that concludes that the group of polices/contracts does not have material interest rate risk or asset return volatility. Such assessment would include an analysis of product guarantees, the company's non-guaranteed elements (NGEs) policy, assets backing the group of polices/contracts and the company's investment strategy.

C. Stochastic Exclusion Ratio Test

1. In order to exclude a group of polices/contracts from the stochastic reserve requirements ~~using the method allowed under Section 6.A.1.a, the stochastic exclusion ratio test (SERT)~~, a company shall demonstrate that the ratio of $(b-a)/ea$ is less than ~~6%~~ 10% where:
 - a. a = the adjusted ~~deterministic scenario~~ reserve described in Section 6.A.2.b.i Paragraph C.2.a.i below using economic scenario 9, the baseline economic scenario, as described in Appendix 1.E of VM-20.
 - b. b = the largest adjusted scenario reserve described in ~~Section 6.A.2.b.i Paragraph C.2.b below~~ under any of the other 15 economic scenarios described in Appendix 1.E of VM-20 under both 95% and 105% of anticipated experience mortality excluding margins.
 - ~~iii. c = an amount calculated from the baseline economic scenario described in Appendix 1.E that represents the present value of benefits for the policies, adjusted for reinsurance by subtracting ceded benefits. For clarity, premium, ceded premium, expense, reinsurance expense allowance, modified coinsurance reserve adjustment and reinsurance experience refund cash flows shall not be considered "benefits," but items such as death benefits, surrender or withdrawal benefits and policyholder dividends shall be. For this purpose, the company shall use the benefits cash flows from the calculation of quantity "a" and calculate the present value of those cash flows using the same path of discount rates as used for "a."~~

Guidance Note: Note that the numerator should be the largest adjusted DR scenario reserve for scenarios other than the baseline economic scenario, minus the adjusted DR scenario reserve for

the baseline economic scenario. This is not necessarily the same as the biggest difference from the adjusted DRscenario reserve for the baseline economic scenario, or the absolute value of the biggest difference from the adjusted DRscenario reserve for the baseline economic scenario, both of which could lead to an incorrect test result.

2. In calculating the ratio in Section 6.A.2.a subsection (1) above:
 - a. The company shall calculate an adjusted deterministic scenario reserve for the group of contracts/policies for ~~each of~~ the 16 scenarios that is equal to either (a) or (b) below:
 - i. The deterministic scenario reserve defined in Section 4.A, but with the following differences:
 - a) Using anticipated experience assumptions with no margins, with the exception of mortality factors described in Paragraph C.1.b of this section.
 - b) Using the interest rates and equity return assumptions specific to each scenario.
 - c) Using NAER and discount rates defined in Section 7.H4 specific to each scenario to discount the cash flows.
 - d) Shall reflect future mortality improvement in line with anticipated experience assumptions.
 - e) Shall not reflect correlation between longevity and economic risks.
 - ii. The gross premium reserve developed from the cash flows from the company's asset adequacy analysis models, using the experience assumptions of the company's cash-flow analysis, but with the following differences:
 - a) Using the interest rates and equity return assumptions specific to each scenario.
 - b) Using the mortality scalars described in Paragraph C.1.b of this section.
 - c) Using the methodology to determine NAER and discount rates defined in Section 7.H4 specific to each scenario to discount the cash flows, but using the company's cash-flow testing assumptions for default costs and reinvestment earnings.
 - b. The company shall use the most current ~~available baseline economic scenario and the 15 other~~ 16 economic scenarios published by the NAIC. The methodology for creating these scenarios can be found in Appendix 1 of VM-20.
 - c. The company shall use assumptions within each scenario that are dynamically adjusted as appropriate for consistency with each tested scenario.
 - d. The company may not group together contract types with significantly different risk profiles for purposes of calculating this ratio.

~~e. Mortality improvement beyond the projection start date may not be reflected in the mortality assumption for the purpose of calculating the stochastic exclusion ratio.~~

e. If the company has reinsurance arrangements that are pro rata coinsurance and do not materially impact the interest rate risk, longevity risk, or asset return volatility in the contract, then the company may elect to not conduct the exclusion test under a pre-reinsurance-ceded basis upon determining the pre-reinsurance reserve-ceded aggregate reserve.

3. If the ratio calculated in Section 6.A.2.a above this section is less than 6% [x] % pre-YRTnon-proportional reinsurance, but is greater than 6% [x] % post-YRTnon-proportional reinsurance, the group of contracts/policies will still pass the SERT if the company can demonstrate that the sensitivity of the adjusted deterministic scenario reserve to economic scenarios is comparable pre- and post-YRTnon-proportional reinsurance.

a. An example of an acceptable demonstration:

i. For convenience in notation • SERT = the ratio (b-a)/ea defined in Section 7.C.1(a) above

a) The pre-YRTnon-proportional reinsurance results are “gross of YRTnon-proportional,” with a subscript “gygn,” so denoted $SERT_{gy}SERT_{gn}$

b) The post-YRTnon-proportional results are “net of YRTnon-proportional,” with subscript “nynn,” so denoted $SERT_{ny}SERT_{nn}$

ii. If a block of business being tested is subject to one or more YRTnon-proportional reinsurance cessions as well as other forms of reinsurance, such as pro rata coinsurance, take “gross of YRTnon-proportional” to mean net of all non-YRTpro rata reinsurance but ignoring the YRTnon-proportional contract(s), and “net of YRTnon-proportional” to mean net of all reinsurance contracts. That is, treat YRTnon-proportional reinsurance as the last reinsurance in, and compute certain values below with and without that last component.

iii. So, if $SERT_{gy} \leq 0.060, SERT_{gn} \leq [x]$ but $SERT_{ny} > 0.060, SERT_{nn} > [x]$, then compute the largest percent increase in reserve (LPIR) = (b-a)/a, both “gross of YRTnon-proportional” and “net of YRTnon-proportional.”

$$LPIR_{gy}LPIR_{gn} = (b_{gy} - a_{gy})/a_{gy}a_{gn}$$

$$LPIR_{ny}LPIR_{nn} = (b_{ny} - a_{ny})/a_{ny}a_{nn}$$

Note that the scenario underlying $b_{gy}b_{gn}$ could be different from the scenario underlying $b_{ny}b_{nn}$.

If $SERT_{gy} \times LPIR_{ny}/LPIR_{gy} < 0.060, SERT_{gn} \times LPIR_{nn}/LPIR_{gn} < [x]$, then the block of contracts/policies passes the SERT.

- b. Another more qualitative approach is to calculate the adjusted ~~deterministic~~ scenario reserves for the 16 scenarios both gross and net of reinsurance to demonstrate that there is a similar pattern of sensitivity by scenario.
4. The SERT may not be used for a group of ~~contracts~~ policies if, using the current year's data, (i) the stochastic exclusion demonstration test ~~defined in Section 7.D~~ had already been attempted using the method ~~of Section 6.A.3.b.i or Section 6.A.3.b.ii in this section~~ and did not pass; or (ii) the qualified actuary had actively undertaken to perform the certification method ~~of Section 6.A.1.a.iii in this section~~ and concluded that such certification could not legitimately be made.

D. Stochastic Exclusion Demonstration Test

1. In order to exclude a group of ~~contracts~~ policies from the stochastic reserve requirements ~~using the methodology using the method as allowed under Section 6.A.1.a.ii above in this section~~, the company must provide a demonstration in the PBR Actuarial Report in the first year and at least once every three calendar years thereafter that complies with the following:
 - a. The demonstration shall provide a reasonable assurance that if the stochastic reserve was calculated on a stand-alone basis for the group of ~~contracts~~ policies subject to the stochastic reserve exclusion, the ~~resulting stochastic minimum~~ reserve for those groups of ~~policies~~ contracts would not ~~be higher than the statutory reserve determined pursuant to the applicable requirements in VM-A and VM-C increase~~. The demonstration shall take into account whether changing conditions over the current and two subsequent calendar years would be likely to change the conclusion to exclude the group of ~~policies~~ contracts from the stochastic reserve requirements.
 - b. If, as of the end of any calendar year, the company determines the ~~minimum aggregate~~ reserve for the group of ~~policies~~ contracts no longer adequately provides for all material risks, the exclusion shall be discontinued, and the company fails the SERT for those ~~policies~~ contracts.
 - c. The demonstration may be based on analysis from a date that precedes the valuation date for the initial year to which it applies if the demonstration includes an explanation of why the use of such a date will not produce a material change in the outcome, as compared to results based on an analysis as of the valuation date.
 - d. The demonstration shall provide an effective evaluation of the residual risk exposure remaining after risk mitigation techniques, such as derivative programs and reinsurance.
2. The company may use one of the following or another method acceptable to the insurance commissioner to demonstrate compliance with ~~Section 6.A.3.a subsection 7.D.1 above~~:
 - a. Demonstrate that the ~~statutory reserve calculated in accordance with VM-A and VM-C greater of [the quantity A and the quantity B]~~ is greater than the stochastic reserve calculated on a stand-alone basis, ~~where~~:

~~A = the deterministic reserve, and~~

~~B = the NPR less any associated due and deferred premium asset.~~

~~bii. Demonstrate that the statutory reserve calculated in accordance with VM-A and VM-C ~~greater of [the quantity A and the quantity B]~~ is greater than the scenario reserve that results from each of a sufficient number of adverse deterministic scenarios,⁵ where:~~

~~A = the deterministic reserve, and~~

~~B = the NPR less any associated due and deferred premium asset.~~

c. Demonstrate that the statutory reserve calculated in accordance with VM-A and VM-C ~~greater of [the quantity A and the quantity B]~~ is greater than the stochastic reserve calculated on a stand-alone basis, but using a representative sample of contracts~~policies~~ in the stochastic reserve calculations,⁵ where:

~~A = the deterministic reserve, and~~

~~B = the NPR less any associated due and deferred premium asset.~~

d. Demonstrate that any risk characteristics that would otherwise cause the stochastic reserve calculated on a stand-alone basis to exceed ~~greater of the deterministic reserve and the NPR, less any associated due and deferred premium asset~~ the statutory reserve calculated in accordance with VM-A and VM-C, are not present or have been substantially eliminated through actions such as hedging, investment strategy, reinsurance or passing the risk on to the policyholder by contract provision.

E. Deterministic Certification Option

1. The company has the option to determine the stochastic reserve for a group of contracts using a single deterministic economic scenario, subject to the following conditions.

a. The company certifies that economic conditions do not materially influence anticipated contract holder behavior for the group of policies. Examples of contract holder options that are materially influenced by economic conditions include surrender benefits, recurring premium payments, and guaranteed living benefits.

b. The company certifies that the group of policies is not supported by a reinvestment strategy that contains future hedge purchases.

c. The company must perform and disclose results from the stochastic exclusion ratio test following the requirements in Section 7.C, thereby disclosing the scenario reserve volatility across various economic scenarios.

d. The company must disclose a description of contracts and associated features in the certification.

Drafting Note: Consider revisiting Paragraph E.1.c to possibly either require i) falling below a preset threshold for the exclusion ratio test under a single longevity/mortality scenario; or ii) to pass the exclusion test if longevity is not included as part of the ratio test.

2. The stochastic reserve for the group of contracts under the Deterministic Certification Option is determined as follows:
 - a. Cash flows are projected in compliance with the applicable requirements in Section 4, Section 5, Section 10, and Section 11 of VM-22 over a single economic scenario (scenario 12 found in Appendix 1 of VM-20).
 - b. The stochastic reserve equals the scenario reserve following the requirements for Section 4.

Guidance Note: The Deterministic Certification Option is intended to provide a non-stochastic option for Single Premium Immediate Annuities (SPIAs) and similar payout annuity products that contain limited or no optionality in the asset and liability cash flow projections.

Section 8: To Be Determined (Scenario Generation for VM-21)

Section 9: Modeling Hedges under a Future Hedging Strategy

Drafting Note: All revisions shown in this section are in comparison to Section 9 in VM-21.

A. Initial Considerations

1. This section applies to modeling of hedges other than situations where the company (a) only hedges index credits, or (b) clearly separates index credit hedging from other hedging. In those situations, the modeling of hedges supporting index credits can be simplified including applying an index credit hedge margin, following the requirements in Section 4.A.4.b.i.
24. ~~Subject to Section 9.C.2,~~ 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 calculation of the stochastic reserve, determined in accordance with Section 3.D and Section 4.D.
32. ~~If the company is following a CDHS, in accordance with an investment policy adopted by the board of directors, or a committee of board members,~~ The company shall take into account the costs and benefits of hedge positions expected to be held by the company in the future along each scenario ~~based on the execution of the hedging strategy, and it is eligible to reduce the amount of the stochastic reserve using projections otherwise calculated. The investment policy must clearly articulate the company's hedging objectives, including the metrics that drive rebalancing/trading. This specification could include maximum tolerable values for investment losses, earnings, volatility, exposure, etc. in either absolute or relative terms over one or more investment horizons vis à vis the chance of occurrence.~~ Company management is responsible for developing, documenting, executing and evaluating the investment strategy for future hedge purchases. Prior to reflection in projections, the strategy for future hedge purposes shall be the actual practice of the company for a period of time not less than [6] months. ~~, including the hedging strategy, used to implement the investment policy.~~
43. For this purpose, the investment assets refer to all the assets, including derivatives supporting covered products and guarantees. This also is referred to as the investment portfolio. The investment strategy is the set of all asset holdings at all points in time in all scenarios. The hedging portfolio, which also is referred to as the hedging assets, is a subset of the investment assets. The hedging strategy is the hedging asset holdings at all points in time in all scenarios. There is no attempt to distinguish what is the hedging portfolio and what is the investment portfolio in this section. Nor is the distinction between investment strategy and hedging strategy formally made here. Where necessary to give effect to the intent of this section, the requirements applicable to the hedging portfolio or the hedging strategy are to apply to the overall investment portfolio and investment strategy.
54. This particularly applies to restrictions on the reasonableness or acceptability of the models that make up the stochastic cash-flow model used to perform the projections, since these restrictions are inherently restrictions on the joint modeling of the hedging and non-hedging portfolio. To give effect to these requirements, they must apply to the overall investment strategy and investment portfolio. ~~Before either a new or revised hedging strategy can be used to reduce the amount of the stochastic reserve otherwise calculated, the hedging strategy should be in place (i.e., effectively implemented by the company) for at least three months. The company may meet the time requirement by having evaluated~~

~~the effective implementation of the hedging strategy for at least three months without actually having executed the trades indicated by the hedging strategy (e.g., mock testing or by having effectively implemented the strategy with similar annuity products for at least three months).~~

B. Modeling Approaches

1. The analysis of the impact of the hedging strategy on cash flows is typically performed using either one of two types of methods as described below. Although a hedging strategy normally would be expected to reduce risk provisions, the nature of the hedging strategy and the costs to implement the strategy may result in an increase in the amount of the stochastic reserve otherwise calculated.
2. The fundamental characteristic of the first type of method, referred to as the “explicit method,” is that hedging positions and their resulting cash flows are included in the stochastic cash-flow model used to determine the scenario reserve, as discussed in Section 3.D, for each scenario.
3. The fundamental characteristic of the second type of method, referred to as the “implicit method,” is that the effectiveness of the current hedging strategy on future cash flows is evaluated, in part or in whole, outside of the stochastic cash-flow model. There are multiple ways that this type of modeling can be implemented. In this case, the reduction to the stochastic reserve otherwise calculated should be commensurate with the degree of effectiveness of the hedging strategy in reducing accumulated deficiencies otherwise calculated.
4. Regardless of the methodology used by the company, the ultimate effect of the current hedging strategy (including currently held hedge positions) on the stochastic reserve needs to recognize all risks, associated costs, imperfections in the hedges and hedging mismatch tolerances associated with the hedging strategy. The risks include, but are not limited to: basis, gap, price, parameter estimation and variation in assumptions (mortality, persistency, withdrawal, annuitization, etc.). Costs include, but are not limited to: transaction, margin (opportunity costs associated with margin requirements) and administration. In addition, the reduction to the stochastic reserve attributable to the hedging strategy may need to be limited due to the uncertainty associated with the company’s ability to implement the hedging strategy in a timely and effective manner. The level of operational uncertainty varies indirectly with the amount of time that the new or revised strategy has been in effect or mock tested.

Guidance Note: No hedging strategy is perfect. A given hedging strategy may eliminate or reduce some but not all risks, transform some risks into others, introduce new risks, or have other imperfections. For example, a delta-only hedging strategy does not adequately hedge the risks measured by the “Greeks” other than delta. ~~Another example is that financial indices underlying typical hedging instruments typically do not perform exactly like the separate account funds, and hence the use of hedging instruments has the potential for introducing basis risk~~

5. A safe harbor approach is permitted ~~for CDHS reflection~~ for those companies whose modeled hedge assets comprise only linear instruments not sensitive to implied volatility. For companies with option-based hedge strategies, electing this approach would require representing the option-based portion of the strategy as a delta-rho two-Greek hedge program. The normally modeled option portfolio would be replaced with a set of linear instruments that have the same first-order Greeks as the original option portfolio.

C. Calculation of Stochastic Reserve (Reported)

1. The company shall calculate CTE70 (best efforts)—the results obtained when the CTE70 is based on incorporating the [CDHS modeling of hedges](#) (including both currently held and future hedge positions) into the stochastic cash-flow model on a best efforts basis, including all of the factors and assumptions needed to ~~execute the CDHS model the hedges~~ (e.g., stochastic implied volatility). The determination of CTE70 (best efforts) may utilize either explicit or implicit modeling techniques.
2. The company shall calculate a CTE70 (adjusted) by recalculating the CTE70 assuming the company has no [CDHS hedging strategy except those to hedge interest credits and hedge assets held by the company on the valuation date](#), therefore following the requirements of Section 4.A.4.a [and 4.A.4.b.i.](#)

3. Because most models will include at least some approximations or idealistic assumptions, CTE70 (best efforts) may overstate the impact of the hedging strategy. To compensate for potential overstatement of the impact of the hedging strategy, the value for the stochastic reserve is given by:

$$\text{Stochastic reserve} = \text{CTE70 (best efforts)} + E \times \max[0, \text{CTE70 (adjusted)} - \text{CTE70 (best efforts)}]$$

4. The company shall specify a value for E (the “error factor”) in the range from 5% to 100% to reflect the company’s view of the potential error resulting from the level of sophistication of the stochastic cash-flow model and its ability to properly reflect the parameters of the hedging strategy (i.e., the Greeks being covered by the strategy), as well as the associated costs, risks and benefits. The greater the ability of the stochastic model to capture all risks and uncertainties, the lower the value of E . The value of E may be as low as 5% only if the model used to determine the CTE70 (best efforts) effectively reflects all of the parameters used in the hedging strategy. If certain economic risks are not hedged, yet the model does not generate scenarios that sufficiently capture those risks, E must be in the higher end of the range, reflecting the greater likelihood of error. Likewise, simplistic hedge cash-flow models shall assume a higher likelihood of error.
5. The company shall conduct a formal back-test, based on an analysis of at least the most recent 12 months, to assess how well the model is able to replicate the hedging strategy in a way that supports the determination of the value used for E .
6. Such a back-test shall involve one of the following analyses:
 - a. For companies that model hedge cash flows directly (“explicit method”), replace the stochastic scenarios used in calculating the CTE70 (best efforts) with a single scenario that represents the market path that actually manifested over the selected back-testing period and compare the projected hedge asset gains and losses against the actual hedge asset gains and losses – both realized and unrealized – observed over the same time period. For this calculation, the model assumptions may be replaced with parameters that reflect actual experience during the back-testing period. In order to isolate the comparison between the modeled hedge [results strategy](#) and actual hedge results for this calculation, the projected liabilities should accurately reflect the actual liabilities throughout the back-testing period; therefore, adjustments that facilitate this accuracy (e.g. reflecting actual experience instead of model assumptions, including new business, etc.) are permissible.

To support the choice of a low value of E, the company should ascertain that the projected hedge asset gains and losses are within close range of 100% (e.g., 80–125%) of the actual hedge asset gains and losses. The company may also support the choice of a low value of E by achieving a high R-squared (e.g., 0.80 or higher) when using a regression analysis technique.

- b. For companies that model hedge cash flows implicitly by quantifying the cost and benefit of hedging using the fair value of the hedged item (an “implicit method” or “cost of reinsurance method”), calculate the delta, rho and vega coverage ratios in each month over the selected back-testing period in the following manner:
 - i. Determine the hedge asset gains and losses—both realized and unrealized—incurred over the month attributable to equity, interest rate, and implied volatility movements.
 - ii. Determine the change in the fair value of the hedged item over the month attributable to equity, interest rate, and implied volatility movements. The hedged item should be defined in a manner that reflects the proportion of risks hedged (e.g., if a company elects to hedge 50% of a contract’s market risks, it should quantify the fair value of the hedged item as 50% of the fair value of the contract).
 - iii. Calculate the delta coverage ratio as the ratio between (i) and (ii) attributable to equity movements.
 - iv. Calculate the rho coverage ratio as the ratio between (i) and (ii) attributable to interest rate movements.
 - v. Calculate the vega coverage ratio as the ratio between (i) and (ii) attributable to implied volatility movements.
 - vi. To support the company’s choice of a low value of E, the company should be able to demonstrate that the delta and rho coverage ratios are both within close range of 100 % (e.g., 80–125%) consistently across the back-testing period.
 - vii. In addition, the company should be able to demonstrate that the vega coverage ratio is within close range of 100 % in order to use the prevailing implied volatility levels as of the valuation date in quantifying the fair value of the hedged item for the purpose of calculating CTE70 (best efforts). Otherwise, the company shall quantify the fair value of the hedged item for the purpose of calculating CTE70 (best efforts) in a manner consistent with the realized volatility of the scenarios captured in the CTE (best efforts).
 - c. Companies that do not model hedge cash flows explicitly, but that also do not use the implicit method as outlined in Section 9.C.6.b above, shall conduct the formal back-test in a manner that allows the company to clearly illustrate the appropriateness of the selected method for reflecting the cost and benefit of hedging, as well as the value used for E.
7. A company that does not have 12 months of experience to date shall set E to a value that reflects the amount of experience available, and the degree and nature of any change to the hedge program. For a material change in strategy, with no history, E should be at least 0.50.

However, E may be lower than 0.50 if some reliable experience is available and/or if the change in strategy is a refinement rather than a substantial change in strategy.

Guidance Note: The following examples are provided as guidance for determining the E factor when there has been a change to the hedge program:

- The error factor should be temporarily large (e.g., $\geq 50\%$) for substantial changes in hedge methodology (e.g., moving from a fair-value based strategy to a stop-loss strategy) where the company has not been able to provide a meaningful simulation of hedge performance based on the new strategy.
- A temporary moderate increase (e.g., 15–30%) in error factor should be used for substantial modifications to hedge programs or ~~CDHS~~ modeling where meaningful simulation has not been created (e.g., adding second-order hedging, such as gamma or rate convexity).
- No increase in the error factor may be used for incremental modifications to the hedge strategy (e.g., adding death benefits to a program that previously covered only living benefits, or moving from swaps to Treasury Department futures).

~~E. Additional Considerations for CTE70 (best efforts)~~

~~If the company is following a CDHS, the fair value of the portfolio of contracts falling within the scope of these requirements shall be computed and compared to the CTE70 (best efforts) and CTE70 (adjusted). If the CTE70 (best efforts) is below both the fair value and CTE70 (adjusted), the company should be prepared to explain why that result is reasonable.~~

~~For the purposes of this analysis, the stochastic reserve and fair value calculations shall be done without requiring the scenario reserve for any given scenario to be equal to or in excess of the cash surrender value in aggregate for the group of contracts modeled in the projection.~~

D. Specific Considerations and Requirements

1. As part of the process of choosing a methodology and assumptions for estimating the future effectiveness of the current hedging strategy (including currently held hedge positions) for purposes of reducing the stochastic reserve, the company should review actual historical hedging effectiveness. The company shall evaluate the appropriateness of the assumptions on future trading, transaction costs, other elements of the model, the strategy, the mix of business and other items that are likely to result in materially adverse results. This includes an analysis of model assumptions that, when combined with the reliance on the hedging strategy, are likely to result in adverse results relative to those modeled. The parameters and assumptions shall be adjusted (based on testing contingent on the strategy used and other assumptions) to levels that fully reflect the risk based on historical ranges and foreseeable future ranges of the assumptions and parameters. If this is not possible by parameter adjustment, the model shall be modified to reflect them at either anticipated experience or adverse estimates of the parameters.
2. A discontinuous hedging strategy is a hedging strategy where the relationships between the sensitivities to equity markets and interest rates (commonly referred to as the Greeks) associated with the guaranteed contract holder options embedded in the ~~variable-fixed indexed~~ annuities and other in-scope products and these same sensitivities associated with the hedging assets are subject to material discontinuities. This includes, but is not limited

to, a hedging strategy where material hedging assets will be obtained when the variable fixed indexed annuity account balances reach a predetermined level in relationship to the guarantees. Any hedging strategy, including a delta hedging strategy, can be a discontinuous hedging strategy if implementation of the strategy permits material discontinuities between the sensitivities to equity markets and interest rates associated with the guaranteed contract holder options embedded in the variable-fixed indexed annuities and other in-scope products and these same sensitivities associated with the hedging assets. There may be scenarios that are particularly costly to discontinuous hedging strategies, especially where those result in large discontinuous changes in sensitivities (Greeks) associated with the hedging assets. Where discontinuous hedging strategies contribute materially to a reduction in the stochastic reserve, the company must evaluate the interaction of future trigger definitions and the discontinuous hedging strategy, in addition to the items mentioned in the previous paragraph. This includes an analysis of model assumptions that, when combined with the reliance on the discontinuous hedging strategy, may result in adverse results relative to those modeled.

3. A strategy that has a strong dependence on acquiring hedging assets at specific times that depend on specific values of an index or other market indicators may not be implemented as precisely as planned.
4. The combination of elements of the stochastic cash-flow model—including the initial actual market asset prices, prices for trading at future dates, transaction costs and other assumptions—should be analyzed by the company as to whether the stochastic cash-flow model permits hedging strategies that make money in some scenarios without losing a reasonable amount in some other scenarios. This includes, but is not limited to:
 - a. Hedging strategies with no initial investment that never lose money in any scenario and in some scenarios make money.
 - b. Hedging strategies that, with a given amount of initial money, never make less than accumulation at the one-period risk-free rates in any scenario but make more than this in one or more scenarios.
5. If the stochastic cash-flow model allows for such situations, the company should be satisfied that the results do not materially rely directly or indirectly on the use of such strategies. If the results do materially rely directly or indirectly on the use of such strategies, the strategies may not be used to reduce the stochastic reserve otherwise calculated.
6. In addition to the above, the method used to determine prices of financial instruments for trading in scenarios should be compared to actual initial market prices. In addition to comparisons to initial market prices, there should be testing of the pricing models that are used to determine subsequent prices when scenarios involve trading financial instruments. This testing should consider historical relationships. For example, if a method is used where recent volatility in the scenario is one of the determinants of prices for trading in that scenario, then that model should approximate actual historic prices in similar circumstances in history.

Section 10: Guidance and Requirements for Setting Contract Holder Behavior Prudent Estimate Assumptions

Drafting Note: All revisions shown in this section are in comparison to Section 10 in VM-21.

A. General

Contract holder behavior assumptions encompass actions such as lapses, withdrawals, transfers, recurring deposits, benefit utilization, option election, etc. Contract holder behavior is difficult to predict accurately, and variance in behavior assumptions can significantly affect the results. In the absence of relevant and fully credible empirical data, the company should set behavior assumptions as guided by Principle 3 in Section 1.B.

In setting behavior assumptions, the company should examine, but not be limited by, the following considerations:

1. Behavior can vary by product, market, distribution channel, fund-index performance, interest credited (current and guaranteed rates), time/product duration, etc.
2. Options embedded in the product may affect behavior.
3. Utilization of options may be elective or non-elective in nature. Living benefits often are elective, and death benefit options are generally non-elective.
4. Elective contract holder options may be more driven by economic conditions than non-elective options.
5. As the value of a product option increases, there is an increased likelihood that contract holders will behave in a manner that maximizes their financial interest (e.g., lower lapses, higher benefit utilization, etc.).
6. Behavior formulas may have both rational and irrational components (irrational behavior is defined as situations where some contract holders may not always act in their best financial interest). The rational component should be dynamic, but the concept of rationality need not be interpreted in strict financial terms and might change over time in response to observed trends in contract holder behavior based on increased or decreased financial efficiency in exercising their contractual options.
7. Options that are ancillary to the primary product features may not be significant drivers of behavior. Whether an option is ancillary to the primary product features depends on many things, such as:
 - a. For what purpose was the product purchased?
 - b. Is the option elective or non-elective?
 - c. Is the value of the option well-known?
8. External influences may affect behavior.

B. Aggregate vs. Individual Margins

1. Prudent estimate assumptions are developed by applying a margin for uncertainty to the anticipated experience assumption. The issue of whether the level of the margin applied to

the anticipated experience assumption is determined in aggregate or independently for each and every behavior assumption is discussed in Principle 3 in Section 1.B.

2. Although this principle discusses the concept of determining the level of margins in aggregate, it notes that the application of this concept shall be guided by evolving practice and expanding knowledge. From a practical standpoint, it may not always be possible to completely apply this concept to determine the level of margins in aggregate for all behavior assumptions.
3. Therefore, the company shall determine prudent estimate assumptions independently for each behavior (e.g., mortality, lapses and benefit utilization), using the requirements and guidance in this section and throughout these requirements, unless the company can demonstrate that an appropriate method was used to determine the level of margin in aggregate for two or more behaviors.

C. Sensitivity Testing

The impact of behavior can vary by product, time period, etc. For any assumption that is not prescribed or stochastically modeled, the qualified actuary to whom responsibility for this group of contracts is assigned shall use sensitivity testing to ensure that the assumption is set at the conservative end of the plausible range. The company shall sensitivity test:

- Surrenders.
- Partial withdrawals.
- Benefit utilization.
- Other behavior assumptions if relevant to the risks in the product.

Sensitivity testing of assumptions is required and shall be more complex than, for example, base lapse assumption plus or minus +X% across all contracts. A more appropriate sensitivity test in this example might be to devise parameters in a dynamic lapse formula to reflect more out-of-the-money contracts lapsing and/or more holders of in-the-money contracts persisting and eventually using the guarantee. The company should apply more caution in setting assumptions for behaviors where testing suggests that stochastic modeling results are sensitive to small changes in such assumptions. For such sensitive behaviors, the company shall use higher margins when the underlying experience is less than fully relevant and credible.

The company shall examine the results of sensitivity testing to understand the materiality of prudent estimate assumptions on the modeled reserve. The company shall update the sensitivity tests periodically as appropriate, considering the materiality of the results of the tests. The company may update the tests less frequently when the tests show less sensitivity of the modeled reserve to changes in the assumptions being tested or the experience is not changing rapidly. Providing there is no material impact on the results of the sensitivity testing, the company may perform sensitivity testing:

1. Using samples of the contracts in force rather than performing the entire valuation for each alternative assumption set.
- ~~2.~~ Using data from prior periods.

D. Specific Considerations and Requirements

1. Within materiality considerations, the company should consider all relevant forms of contract holder behavior and persistency, including, but not limited to, the following:
 - a. Mortality (additional guidance and requirements regarding mortality is contained in Section 11).
 - b. Surrenders.
 - c. Partial withdrawals (systematic and elective).
 - d. ~~Fund Account~~ transfers (switching/exchanges).
 - e. Resets/ratchets of the guaranteed amounts (automatic and elective).
 - f. Future deposits.
 - g. Income start date
 - h. Commutation of benefit (from periodic payment to lump sum)
2. It may be acceptable to ignore certain items that might otherwise be explicitly modeled in an ideal world, particularly if the inclusion of such items reduces the calculated provisions.

For example:

- a. The impact of ~~fund—account~~ transfers (intra-contract ~~fundindex~~ “switching”) might be ignored, unless required under the terms of the contract (e.g., automatic asset re-allocation/rebalancing, ~~dollar—cost averaging—accounts, etc.~~) or if the contract provisions incentivize the contract holders to transfer between accounts.
- b. Future deposits might be excluded from the model, unless required by the terms of the contracts under consideration and then only in such cases where future premiums can reasonably be anticipated (e.g., with respect to timing and amount).
- c. For some non-elective benefits (nursing home benefits for example), a zero incidence rate after the surrender charge has ended, or the cash value has depleted, may be acceptable since use of a non-zero rate could reduce the modeled reserve.

Guidance Note: ~~For some non-elective benefits (nursing home benefits for example), unless relevant company experience exists to the contrary, the use of incidence rates greater than zero after the surrender charge has ended, or the cash value was depleted might be inappropriate may not be prudent since it would reduce the modeled reserve.~~

3. However, the company should exercise caution in assuming that current behavior will be indefinitely maintained. For example, it might be appropriate to test the impact of a shifting asset mix and/or consider future deposits to the extent they can reasonably be anticipated and increase the calculated amounts.

4. Normally, the underlying model assumptions would differ according to the attributes of the contract being valued. This would typically mean that contract holder behavior and persistency may be expected to vary according to such characteristics as (this is not an exhaustive list):
 - a. Gender.
 - b. Attained age.
 - c. Issue age.
 - d. Contract duration.
 - e. Time to maturity.
 - f. Tax status.
 - g. ~~Fund Account~~ value.
 - ~~g-h.~~ Interest credited (current and guaranteed).
 - ~~h-i.~~ Investment option- Available indices.
 - ~~i-j.~~ Guaranteed benefit amounts.
 - ~~j-k.~~ Surrender charges, ~~transaction-transfer~~ fees or other contract charges.
 - ~~k-l.~~ Distribution channel.
5. Unless there is clear evidence to the contrary, behavior assumptions should be no less conservative than past experience. Margins for contract holder behavior assumptions shall assume, without relevant and credible experience or clear evidence to the contrary, that contract holders' efficiency will increase over time.
6. In determining contract holder behavior assumptions, the company shall use actual experience data directly applicable to the business segment (i.e., direct data) if it is available. In the absence of direct data, the company should then look to use data from a segment that is similar to the business segment (i.e., other than direct experience), whether or not the segment is directly written by the company. If data from a similar business segment are used, the assumption shall be adjusted to reflect differences between the two segments. Margins shall reflect the data uncertainty associated with using data from a similar but not identical business segment.
7. Where relevant and fully credible empirical data do not exist for a given contract holder behavior assumption, the company shall set the contract holder behavior assumption to reflect the increased uncertainty such that the contract holder behavior assumption is shifted towards the conservative end of the plausible range of expected experience that serves to increase the stochastic reserve. If there are no relevant data, the company shall set the contract holder behavior assumption to reflect the increased uncertainty such that the contract holder behavior assumption is at the conservative end of the range. Such adjustments shall be consistent with the definition of prudent estimate, with the principles described in Section 1.B, and with the guidance and requirements in this section.
8. Ideally, contract holder behavior would be modeled dynamically according to the simulated economic environment and/or other conditions. It is important to note, however, that contract holder behavior should neither assume that all contract holders act with 100%

efficiency in a financially rational manner nor assume that contract holders will always act irrationally. These extreme assumptions may be used for modeling efficiency if the result is more conservative.

E. Dynamic Assumptions

1. Consistent with the concept of prudent estimate assumptions described earlier, the liability model should incorporate margins for uncertainty for all risk factors that are not dynamic (i.e., the non-scenario tested assumptions) and are assumed not to vary according to the financial interest of the contract holder.
2. The company should exercise care in using static assumptions when it would be more natural and reasonable to use a dynamic model or other scenario-dependent formulation for behavior. With due regard to considerations of materiality and practicality, the use of dynamic models is encouraged, but not mandatory. Risk factors that are not scenario tested but could reasonably be expected to vary according to a stochastic process, or future states of the world (especially in response to economic drivers) may require higher margins and/or signal a need for higher margins for certain other assumptions.
3. Risk factors that are modeled dynamically should encompass the plausible range of behavior consistent with the economic scenarios and other variables in the model, including the non-scenario tested assumptions. The company shall test the sensitivity of results to understand the materiality of making alternate assumptions and follow the guidance discussed above on setting assumptions for sensitive behaviors.

F. Consistency with the CTE Level

1. All behaviors (i.e., dynamic, formulaic and non-scenario tested) should be consistent with the scenarios used in the CTE calculations (generally, the top 30% of the loss distribution). To maintain such consistency, it is not necessary to iterate (i.e., successive runs of the model) in order to determine exactly which scenario results are included in the CTE measure. Rather, in light of the products being valued, the company should be mindful of the general characteristics of those scenarios likely to represent the tail of the loss distribution and consequently use prudent estimate assumptions for behavior that are reasonable and appropriate in such scenarios. For ~~variable-fixed~~ annuities, these “valuation” scenarios would typically display one or more of the following attributes:
 - a. Declining and/or volatile ~~separate account asset index~~ values, where applicable.
 - b. ~~Market index volatility, price~~ gaps and/or liquidity constraints.
 - c. Rapidly changing interest rates or persistently low interest rates.
 - d. Volatile credit spreads.
2. The behavior assumptions should be logical and consistent both individually and in aggregate, especially in the scenarios that govern the results. In other words, the company should not set behavior assumptions in isolation, but give due consideration to other elements of the model. The interdependence of assumptions (particularly those governing customer behaviors) makes this task difficult and by definition requires professional judgment, but it is important that the model risk factors and assumptions:
 - a. Remain logically and internally consistent across the scenarios tested.

- b. Represent plausible outcomes.
 - c. Lead to appropriate, but not excessive, asset requirements.
- 4. The company should remember that the continuum of “plausibility” should not be confined or constrained to the outcomes and events exhibited by historic experience.
 - 5. Companies should attempt to track experience for all assumptions that materially affect their risk profiles by collecting and maintaining the data required to conduct credible and meaningful studies of contract holder behavior.

G. **Additional Considerations and Requirements for Assumptions Applicable to Guaranteed Living Benefits**

Experience for contracts without guaranteed living benefits may be of limited use in setting a lapse assumption for contracts with in-the-money or at-the-money guaranteed living benefits. Such experience may only be used if it is appropriate (e.g., lapse experience on contracts without a living benefit may have relevance to the early durations of contracts with living benefits) and relevant to the business.

H. **Policy Loans**

If policy loans are applicable for the block of business, the company shall determine cash flows for each projection interval for policy loan assets by modeling existing loan balances either explicitly or by substituting assets that are a proxy for policy loans (e.g., bonds, cash, etc.) subject to the following:

- 1. If the company substitutes assets that are a proxy for policy loans, the company must demonstrate that such substitution:
 - a. Produces reserves that are no less than those that would be produced by modeling existing loan balances explicitly.
 - b. Complies with the contract holder behavior requirements stated in Section 10 above in this section.
- 2. If the company models policy loans explicitly, the company shall:
 - a. Treat policy loan activity as an aspect of contract holder behavior and subject to the requirements above in this section.
 - b. Assign loan balances either to exactly match each policy’s utilization or to reflect average utilization over a model segment or sub-segments.
 - c. Model policy loan interest in a manner consistent with policy provisions and with the scenario. Include interest paid in cash as a positive policy loan cash flow in that projection interval, but do not include interest added to the loan balance as a policy loan cash flow. (The increased balance will require increased repayment cash flows in future projection intervals.)
 - d. Model policy loan principal repayments, including those that occur automatically upon death or surrender. Include policy loan principal repayments as a positive policy loan cash flow, per Section 4.A.1.h.

- e. Model additional policy loan principal. Include additional policy loan principal as a negative policy loan cash flow, per Section 4.A.1.h (but do not include interest added to the loan balance as a negative policy loan cash flow).
- f. Model any investment expenses allocated to policy loans and include them either with policy loan cash flows or insurance expense cash flows.

I. Non-Guaranteed Elements

Consistent with the definition in VM-01, Non-Guaranteed Elements (NGEs) are elements within a contract that affect policy costs or values and not guaranteed or not determined at issue. NGEs consist of elements affecting contract holder costs or values that are both established and subject to change at the discretion of the insurer.

Examples of NGEs specific to fixed annuities include but are not limited to the following: fixed credited rates, index parameters (caps, spreads, participation rates, etc.), rider fees, rider benefit features being subject to change (rollup rates, rollup period, etc.), account value charges, and dividends under participating policies or contracts.

1. Except as noted below in Section 10.J.5, the company shall include NGE in the models to project future cash flows beyond the time the company has authorized their payment or crediting.
2. The projected NGE shall reflect factors that include, but are not limited to, the following (not all of these factors will necessarily be present in all situations):
 - a. The nature of contractual guarantees.
 - b. The company's past NGE practices and established NGE policies.
 - c. The timing of any change in NGE relative to the date of recognition of a change in experience.
 - d. The benefits and risks to the company of continuing to authorize NGE.
3. Projected NGE shall be established based on projected experience consistent with how actual NGE are determined.
4. Projected levels of NGE in the cash-flow model must be consistent with the experience assumptions used in each scenario. Contract holder behavior assumptions in the model must be consistent with the NGE assumed in the model.
5. The company may exclude any portion of an NGE that:
 - a. Is not based on some aspect of the policy's or contract's experience.
 - b. Is authorized by the board of directors and documented in the board minutes, where the documentation includes the amount of the NGE that arises from other sources.

However, if the board has guaranteed a portion of the NGE into the future, the company must model that amount. In other words, the company cannot exclude from its model any NGE that the board has guaranteed for future years, even if it could have otherwise excluded them, based on this subsection.

6. The liability for contract holder dividends declared but not yet paid that has been established according to statutory accounting principles as of the valuation date is reported separately from the statutory reserve. The contract holder dividends that give rise to this dividend liability as of the valuation date may or may not be included in the cash-flow model at the company's option.
 - a. If the contract holder dividends that give rise to the dividend liability are not included in the cash-flow model, then no adjustment is needed to the resulting aggregate stochastic reserve.
 - b. If the contract holder dividends that give rise to the dividend liability are included in the cash-flow model, then the resulting aggregate stochastic reserve should be reduced by the amount of the dividend liability.
7. All projected cash flows associated with NGEs shall reflect margins for adverse deviations and estimation error in prudent estimate assumptions.

Section 11: Guidance and Requirements for Setting Prudent Estimate Mortality Assumptions

Drafting Note: All revisions shown in this section are in comparison to Section 11 in VM-21.

A. Overview

1. Intent

The guidance and requirements in this section apply to setting prudent estimate mortality assumptions when determining ~~either the stochastic reserve or the reserve for any contracts determined using the Alternative Methodology~~. The intent is for prudent estimate mortality assumptions to be based on facts, circumstances and appropriate actuarial practice, with only a limited role for unsupported actuarial judgment. (Where more than one approach to appropriate actuarial practice exists, the company should select the practice that the company deems most appropriate under the circumstances.)

2. Description

Prudent estimate mortality assumptions shall be determined by first developing expected mortality curves based on either available experience or published tables. Where necessary, margins shall be applied to the experience to reflect data uncertainty. The expected mortality curves shall then be adjusted based on the credibility of the experience used to determine the expected mortality curve. Section 11.B addresses guidance and requirements for determining expected mortality curves, and Section 11.C addresses guidance and requirements for adjusting the expected mortality curves to determine prudent estimate mortality.

Finally, the credibility-adjusted tables shall be adjusted for mortality improvement (where such adjustment is permitted or required) using the guidance and requirements in Section 11.D.

3. Business Segments

For purposes of setting prudent estimate mortality assumptions, the products falling under the scope of these requirements shall be grouped into business segments with different mortality assumptions. The grouping, at a minimum, should differentiate ~~between whether the payout annuities or deferred annuity contracts that contain VAGLBs, and where the no VAGLB segments would include both deferred annuity contracts with no guaranteed benefits and contracts with only GMDBs~~. Where appropriate, the grouping should also differentiate between segments which are known or expected to contain contract holders with sociodemographic, geographic, or health factors reasonably expected to impact the mortality assumptions for the segment (e.g., annuitants drawn from different countries, geographic areas, industry groups, or impaired lives on individually underwritten contracts such as structured settlements). The grouping should also generally follow the pricing, marketing, management and/or reinsurance programs of the company.

Guidance Note: This paragraph contemplates situations where it may be appropriate to differentiate mortality assumptions by segment or even by contract due to varying sociodemographic, geographic, or health factors. Particularly, though not exclusively, in the context of group payout annuity contracts, companies may have credible, contract-specific mortality experience data or relevant pooled data from annuitants drawn from

similar industries or geographies that may be used to sub-divide inforce blocks into business segments for purposes of setting prudent estimate mortality assumptions.

For example, a company may sell group PRT contracts both to union plans in the U.S. and to private single-employer plans in another country. While both are “PRT contracts,” it would be appropriate to differentiate them for mortality assumption purposes, similar to how payout annuities vs. deferred annuities are distinguished.

Guidance Note: Distinct mortality or liability assumptions among different contracts within a group of contracts does not in itself preclude the group of contracts from being aggregated for the purposes of the broader stochastic reserve calculation.

4. Margin for Data Uncertainty

The expected mortality curves that are determined in Section 11.B may need to include a margin for data uncertainty. The margin could be in the form of an increase or a decrease in mortality, depending on the business segment under consideration. The margin shall be applied in a direction (i.e., increase or decrease in mortality) that results in a higher reserve. A sensitivity test may be needed to determine the appropriate direction of the provision for uncertainty to mortality. The test could be a prior year mortality sensitivity analysis of the business segment or an examination of current representative cells of the segment.

For purposes of this section, if mortality must be increased (decreased) to provide for uncertainty, the business segment is referred to as a plus (minus) segment.

It may be necessary, because of a change in the mortality risk profile of the segment, to reclassify a business segment from a plus (minus) segment to a minus (plus) segment to the extent compliance with this section requires such a reclassification. For example, a segment could require reclassification depending on whether it is gross or net of reinsurance.

B. Determination of Expected Mortality Curves

1. Experience Data

In determining expected mortality curves, the company shall use actual experience data directly applicable to the business segment (i.e., direct data) if it is available. In the absence of direct data, the company should then look to use data from a segment that is similar to the business segment (i.e., other than direct experience). See Section 11.B.2. for additional considerations. Finally, if there is no data, the company shall use the applicable table, as required in Section 11.B.3.

2. Data Other Than Direct Experience

Adjustments shall be applied to the data to reflect differences between the business segments, and margins shall be applied to the adjusted expected mortality curves to reflect the data uncertainty associated with using data from a similar but not identical business segment.

To the extent the mortality of a business segment is reinsured, any mortality charges that are consistent with the company’s own pricing and applicable to a substantial portion of the mortality risk also may be a reasonable starting point for the determination of the company’s expected mortality curves.

3. No Data Requirements

i. When little or no experience or information is available on a business segment, the company shall use expected mortality curves that would produce expected deaths no less than:

a. [2021 SOA Deferred Annuity Mortality Table] with [Projection Scale G2] for individual deferred annuities that do not contain guaranteed living benefits

$$q_x^{20XX+n} = q_x^{20XX}(1 - G2_x)^n$$

ii. When little or no experience or information is available on a business segment, the company shall use expected mortality curves that would produce expected deaths no greater than:

a. [The appropriate percentage (F_x) from Table 11.1 applied to the 2012 IAM Basic Mortality Table] with [Projection Scale G2] for individual payout annuity contracts and deferred annuity contracts with guaranteed living benefits

$$q_x^{2012+n} = q_x^{2012}(1 - G2_x)^n * F_x$$

b. [1983 Table "a"] for structured settlements or other contracts with impaired mortality

c. [1994 GAR Table] with [Projection Scale AA] for group annuities

$$q_x^{1994+n} = q_x^{1994}(1 - AA_x)^n$$

~~the appropriate percentage (F_x) from Table 1 of the 2012 IAM Basic Table with Projection Scale G2 for contracts with no VAGLBs and expected deaths no greater than the appropriate percentage (F_x) from Table 1 of the 2012 IAM Basic Mortality Table with Projection Scale G2 for contracts with VAGLBs. If mortality experience on the business segment is expected to be atypical (e.g., demographics of target markets are known to have higher [lower] mortality than typical), these "no data" mortality requirements may not be adequate.~~

Table 11.1

Attained Age (x)	F _x for VA with GLB	F _x for All Other
<=65	80.0%	100.0%
66	81.5%	102.0%
67	83.0%	104.0%
68	84.5%	106.0%
69	86.0%	108.0%
70	87.5%	110.0%
71	89.0%	112.0%
72	90.5%	114.0%
73	92.0%	116.0%
74	93.5%	118.0%
75	95.0%	120.0%
76	96.5%	119.0%

77	98.0%	118.0%
78	99.5%	117.0%
79	101.0%	116.0%
80	102.5%	115.0%
81	104.0%	114.0%
82	105.5%	113.0%
83	107.0%	112.0%
84	108.5%	111.0%
85	110.0%	110.0%
86	110.0%	110.0%
87	110.0%	110.0%
88	110.0%	110.0%
89	110.0%	110.0%
90	110.0%	110.0%
91	110.0%	110.0%
92	110.0%	110.0%
93	110.0%	110.0%
94	110.0%	110.0%
95	110.0%	110.0%
96	109.0%	109.0%
97	108.0%	108.0%
98	107.0%	107.0%
99	106.0%	106.0%
100	105.0%	105.0%
101	104.0%	104.0%
102	103.0%	103.0%
103	102.0%	102.0%
104	101.0%	101.0%
>=105	100.0%	100.0%

iii. For a business segment with non-U.S. insureds, an established industry or national mortality table may be used, with approval from the domiciliary commissioner.

4. Additional Considerations Involving Data

The following considerations shall apply to mortality data specific to the business segment for which assumptions are being determined (i.e., direct data discussed in Section 11.B.1 or other than direct data discussed in Section 11.B.2).

a. Underreporting of Deaths

Mortality data shall be examined for possible underreporting of deaths. Adjustments shall be made to the data if there is any evidence of underreporting. Alternatively, exposure by lives or amounts on contracts for which death benefits were in the money may be used to determine expected mortality curves. Underreporting on such exposures should be minimal; however, this reduced subset of data will have less credibility.

b. Experience by Contract Duration

Experience of a plus segment shall be examined to determine if mortality by contract duration increases materially due to selection at issue. In the absence of information, the company shall assume that expected mortality will increase by contract duration for an appropriate select period. As an alternative, if the company determines that mortality is affected by selection, the company could apply margins to the expected mortality in such a way that the actual mortality modeled does not depend on contract duration.

c. Modification and Relevance of Data

Even for a large company, the quantity of life exposures and deaths are such that a significant amount of smoothing may be required to determine expected mortality curves from mortality experience. Expected mortality curves, when applied to the recent historic exposures (e.g., three to seven years), should not result in an estimate of aggregate number of deaths less (greater) than the actual number deaths during the exposure period for plus (minus) segments.

In determining expected mortality curves (and the credibility of the underlying data), older data may no longer be relevant. The “age” of the experience data used to determine expected mortality curves should be documented.

d. Other Considerations

In determining expected mortality curves, consideration should be given to factors that include, but are not limited to, trends in mortality experience, trends in exposure, volatility in year-to-year A/E mortality ratios, mortality by lives relative to mortality by amounts, changes in the mix of business and product features that could lead to mortality selection.

C. Adjustment for Credibility to Determine Prudent Estimate Mortality

1. Adjustment for Credibility

The expected mortality curves determined in Section 11.B shall be adjusted based on the credibility of the experience used to determine the curves in order to arrive at prudent estimate mortality. The adjustment for credibility shall result in blending the expected mortality curves with ~~the mortality assumption described in Section 11.B.3.a mortality table consistent with a statutory valuation mortality table. For contracts with no VAGLBs, the table shall be consistent with the appropriate percentage (F_x) from Table 1 of the 2012 IAM Basic Table with Projection Scale G2; and for contracts with VAGLBs, the table shall be consistent with the appropriate percentage (F_x) from Table 1 of the 2012 IAM Basic Mortality Table with Projection Scale G2.~~ The approach used to adjust the curves shall suitably account for credibility.

Guidance Note: For example, when credibility is zero, an appropriate approach should result in a mortality assumption consistent with 100% of the ~~statutory valuation~~ mortality table used in the blending.

2. Adjustment of Statutory Valuation Mortality for Improvement

For purposes of the adjustment for credibility, the ~~statutory valuation~~-mortality table for a plus segment may be and the ~~statutory valuation~~-mortality table for a minus segment must be adjusted for mortality improvement. Such adjustment shall reflect the mortality improvement scale described in Section 11.B.3~~Projection Scale G2~~ from the effective date of the respective ~~statutory valuation~~-mortality table to the experience weighted average date underlying the data used to develop the expected mortality curves ~~(discussed in Section 11.B)~~.

3. Credibility Procedure

The credibility procedure used shall:

- a. Produce results that are reasonable.
- b. Not tend to bias the results in any material way.
- c. Be practical to implement.
- d. Give consideration to the need to balance responsiveness and stability.
- e. Take into account not only the level of aggregate claims but the shape of the mortality curve.
- f. Contain criteria for full credibility and partial credibility that have a sound statistical basis and be appropriately applied.

4. Further Adjustment of the Credibility-Adjusted Table for Mortality Improvement

The credibility-adjusted table used for plus segments may be and the credibility adjusted table used for minus segments must be adjusted for mortality improvement using the applicable mortality improvement scale described in Section 11.B.3 from the experience weighted average date underlying the company experience used in the credibility process to the valuation date.

Any adjustment for mortality improvement beyond the valuation date is discussed in Section 11.D.

D. Future Mortality Improvement

The mortality assumption resulting from the requirements of Section 11.C shall be adjusted for mortality improvements beyond the valuation date if such an adjustment would serve to increase the resulting stochastic reserve. If such an adjustment would reduce the stochastic reserve, such assumptions are permitted, but not required. In either case, the assumption must be based on current relevant data with a margin for uncertainty (increasing assumed rates of improvement if that results in a higher reserve or reducing them otherwise).

Section 12: Allocation of Aggregate Reserves to the Contract Level

Drafting Note: All revisions shown in this section are in comparison to Section 11 in VM-21.

Section 23.F states that the aggregate reserve shall be allocated to the contracts falling within the scope of these requirements. That allocation should be done for both the pre- and post-reinsurance ceded reserves. Contracts that have passed the stochastic exclusion test as defined in Section 7.B will not be included in the allocation of the aggregate reserve. For the purpose of this section, if a contract does not have a cash surrender value, then the cash surrender value is assumed to be zero.

Contracts for which the Deterministic Certification Option is elected in Section 7.E are intended to use the methodology described in this section to allocate aggregate reserves in excess of the cash surrender value to individual contracts.

The contract-level reserve for each contract shall be the sum of the following:

- A. The contract's cash surrender value.

Drafting Note: The American Academy of Actuaries Annuity Reserves and Capital Work Group is including two potential options for allocating the excess portion of the aggregate reserve over cash surrender value: (1) Use the same approach as VM-21 (2) Allocate based on an actuarial present value calculation.

The Work Group did not reach a consensus between these two approaches, so wording for both is included in the text below. The Work Group recommends field testing both approaches and considering the results in determining future decisions.

Option 1: VM-21 Approach

- B. An allocated portion of the excess of the aggregate reserve over the aggregate cash surrender value shall be allocated to each contract based on a measure of the risk of that product relative to its cash surrender value in the context of the company's in force contracts (assuming zero cash value for contracts that do not contain such). The measure of risk should consider the impact of risk mitigation programs, including hedge programs and reinsurance, that would affect the risk of the product. The specific method of assessing that risk and how it contributes to the company's aggregate reserve shall be defined by the company. The method should provide for an equitable allocation based on risk analysis. ~~For contracts valued under the alternative methodology, the alternative methodology calculations provide a contract level calculation that may be a reasonable basis for allocation.~~

1. As an example, consider a company with the results of the following three contracts:

Table 12.1: Sample Allocation of Aggregate Reserve

Contract (i)	1	2	3	Total
Cash Surrender Value, C	28	40	52	120
Risk adjusted measure, R	38	52	50	
Aggregate Reserve				140

Allocation Basis for the excess of the Aggregate Reserve over the Cash Surrender Value $A_i = \text{Max}(R_i - C_i, 0)$	10	12	0	22
Allocation of the excess of the Aggregate Reserve over the Cash Surrender Value $L_i = (A_i) / \sum A_i * [\text{Aggregate Reserve} - \sum C_i]$	9.09	10.91	0.00	20
Contract-level reserve $C_i + L_i$	37.09	50.91	52.00	140.00

2. In this example, the Aggregate Reserve exceeds the aggregate Cash Surrender Value by 20. The 20 is allocated proportionally across the three contracts based on the allocation basis of the larger of (i) zero; and (ii) a risk adjusted measure based on reserve principles. Therefore, contracts 1 and 2 receive 45% (9/22) and 55% (11/22), respectively, of the excess Aggregate Reserve. As Contract 3 presents no risk in excess of its cash surrender value, it does not receive an allocation of the excess Aggregate Reserve.

Option 2: Actuarial Present Value Approach

B. An allocated portion of the excess of the aggregate reserve over the aggregate cash surrender value is allocated to policies based on a calculation of the actuarial present value of projected liability cash flows in excess of the cash surrender value:

1. Discount the liability cash flows at the NAER, pursuant to requirements in Section 4, for the scenario that produces the scenario reserve closest to, but not less than the stochastic reserve defined in Section 3.D.
 - a. Groups of contracts that elect the Deterministic Certification Option defined in Section 7.E shall use the NAER in the single scenario used to calculate the reserve to discount liability cash flows.
2. If the actuarial present value is less than the cash surrender value, then the excess actuarial present value to be used for allocating the excess aggregate reserve over the cash value shall be floored at zero.
 - a. If all contracts have an excess actuarial present value that is floored at zero, then use the cash surrender value to allocate any excess aggregate reserve over the aggregate cash surrender value.
3. For projecting future liability cash flows, assume the same liability assumptions that were used to calculate the stochastic reserve defined in 3.D.
4. As a hypothetical example, consider a company with the results of the following five contracts:

Table 12.1: Hypothetical Sample Allocation of Aggregate Reserve

<u>Contract</u>	<u>Example Product Type</u>	<u>CSV* (1)</u>	<u>Scenario APV (2)</u>	<u>Excess (Floored) of the scenario APV over CSV* (3) = Max[(2), 0]</u>	<u>Aggregate Reserve CTE 70 (4)</u>	<u>Excess of Aggregate Reserve over Aggregate CSV* (5) = Max[(4 Total) - (1 Total), 0]</u>	<u>Allocated Excess Reserve (6) = (3) x [(5 Total) / (3 Total)]</u>	<u>Total Contract Level Reserve (7) = (1) + (6)</u>
<u>Contract 1:</u>	<u>Indexed Annuity with no GLWB**</u>	<u>95.0</u>	<u>90.0</u>	<u>0.0</u>			<u>0.0</u>	<u>95.0</u>
<u>Contract 2:</u>	<u>Indexed Annuity with low benefit GLWB**</u>	<u>92.0</u>	<u>95.0</u>	<u>3.0</u>			<u>3.6</u>	<u>95.6</u>
<u>Contract 3:</u>	<u>Indexed Annuity with medium benefit GLWB**</u>	<u>90.0</u>	<u>100.0</u>	<u>10.0</u>			<u>12.0</u>	<u>102.0</u>
<u>Contract 4:</u>	<u>Indexed Annuity with high benefit GLWB**</u>	<u>88.0</u>	<u>105.0</u>	<u>17.0</u>			<u>20.4</u>	<u>108.4</u>
<u>Contract 5:</u>	<u>Fixed Life Contingent Payout Annuity</u>	<u>0.0</u>	<u>70.0</u>	<u>70.0</u>			<u>84.0</u>	<u>84.0</u>
<u>Total</u>		<u>365.0</u>		<u>100.0</u>	<u>485.0</u>	<u>120.0</u>	<u>120.0</u>	<u>485.0</u>

*Cash Surrender Value

**Guaranteed Lifetime Withdrawal Benefit

Guidance Note: The actuarial present value (APV) in the section above is separate from the Guarantee Actuarial Present Value (GAPV) referred to in the additional standard projection amount calculation in VM-21. The GAPV is only applicable to guaranteed minimum benefits and uses prescribed liability assumptions. In contrast, the APV in this section applies to the entire contract, irrespective of whether guaranteed benefits are attached, and uses company prudent estimate liability assumptions.

3. ~~shall be allocated to each contract based on a measure of the risk of that product relative to its cash surrender value in the context of the company's in force contracts. The measure of risk should consider the impact of risk mitigation programs, including hedge programs and reinsurance, that would affect the risk of the product. The specific method of assessing that risk and how it contributes to the company's aggregate reserve shall be defined by the company. The method should provide for an equitable allocation based on risk analysis. For contracts valued under the alternative methodology, the alternative methodology calculations provide a contract level calculation that may be a reasonable basis for allocation.~~

4. ~~As an example, consider a company with the results of the following three contracts:~~

Table 12.1: Sample Allocation of Aggregate Reserve

~~In this example, the Aggregate Reserve exceeds the aggregate Cash Surrender Value by 20. The 20 is allocated proportionally across the three contracts based on the allocation basis of the larger of (i) zero; and (ii) a risk adjusted measure based on reserve principles. Therefore, contracts 1 and 2 receive 45% (9/22) and 55% (11/22), respectively, of the excess Aggregate Reserve. As Contract 3 presents no risk in excess of its cash surrender value, it does not receive an allocation of the excess Aggregate Reserv~~

Section 13: Statutory Maximum Valuation Interest Rates for Income Annuity Formulaic Reserves

Drafting Note: All revisions shown in this section are in comparison to the current VM-22 requirements.

A. Purpose and Scope

1. These requirements define for single premium immediate annuity contracts and other similar contracts, certificates and contract features the statutory maximum valuation interest rate that complies with Model #820. These are the maximum interest rate assumption requirements to be used in the CARVM and for certain contracts, the CRVM. These requirements do not preclude the use of a lower valuation interest rate assumption by the company if such assumption produces statutory reserves at least as great as those calculated using the maximum rate defined herein.
2. The following categories of contracts, certificates and contract features, whether group or individual, including both life contingent and term certain only contracts, directly written or assumed through reinsurance, with the exception of benefits arising from variable annuities, are covered in this section by VM-22:
 - a. Immediate annuity contracts issued after Dec. 31, 2017;
 - b. Deferred income annuity contracts issued after Dec. 31, 2017;
 - c. Structured settlements in payout or deferred status issued after Dec. 31, 2017;
 - d. Fixed payout annuities resulting from the exercise of settlement options or annuitizations of host contracts issued after Dec. 31, 2017;
 - e. Fixed payout annuities resulting from the exercise of settlement options or annuitizations of host contracts issued during 2017, for fixed payouts commencing after Dec. 31, 2018, or, at the option of the company, for fixed payouts commencing after Dec. 31, 2017;
 - f. Supplementary contracts, excluding contracts with no scheduled payments (such as retained asset accounts and settlements at interest), issued after Dec. 31, 2017;
 - g. Fixed income payment streams, attributable to contingent deferred annuities (CDAs) issued after Dec. 31, 2017, once the underlying contract funds are exhausted;
 - h. Fixed income payment streams attributable to guaranteed living benefits associated with deferred annuity contracts issued after Dec. 31, 2017, once the contract funds are exhausted; and
 - i. Certificates with premium determination dates after Dec. 31, 2017, emanating from non-variable group annuity contracts specified in Model #820, Section 5.C.2, purchased for the purpose of providing certificate holders benefits upon their retirement.

Guidance Note: For Section 13.A.2.d+B-4, Section 13.A.2.e+B-5, Section 13.A.2.f+B-6 and Section 13.A.2.h+B-8 above, there is no restriction on the type of contract that may give rise to the benefit.

3. Exemptions:
 - a. With the permission of the domiciliary commissioner, for the categories of annuity contracts, certificates and/or contract features in scope as outlined in Section

[13.A.2.d1-B.4](#), Section [13.A.2.e1-B.5](#), Section [13.A.2.f1-B.6](#), Section [13.A.2.g1-B.7](#) or Section [13.A.2.h1-B.8](#), the company may use the same maximum valuation interest rate used to value the payment stream in accordance with the guidance applicable to the host contract. In order to obtain such permission, the company must demonstrate that its investment policy and practices are consistent with this approach.

4. The maximum valuation interest rates for the contracts, certificates and contract features within the scope of [Section 13 of VM-22](#) supersede those described in Appendix VM-A and Appendix VM-C, but they do not otherwise change how those appendices are to be interpreted. In particular, *Actuarial Guideline IX-B—Clarification of Methods Under Standard Valuation Law for Individual Single Premium Immediate Annuities, Any Deferred Payments Associated Therewith, Some Deferred Annuities and Structured Settlements Contracts (AG-9-B)* (see VM-C) provides guidance on valuation interest rates and is, therefore, superseded by these requirements for contracts, certificates and contract features in scope. Likewise, any valuation interest rate references in *Actuarial Guideline IX-C—Use of Substandard Annuity Mortality Tables in Valuing Impaired Lives Under Individual Single Premium Immediate Annuities (AG-9-C)* (see VM-C) are also superseded by these requirements.

B. Definitions

1. The term “reference period” means the length of time used in assigning the Valuation Rate Bucket for the purpose of determining the statutory maximum valuation interest rate and is determined as follows:
 - a. For contracts, certificates or contract features with life contingencies and substantially similar payments, the reference period is the length of time, rounded to the nearest year, from the premium determination date to the earlier of: i) the date of the last non-life-contingent payment under the contract, certificate or contract feature; and ii) the date of the first life-contingent payment under the contract, certificate or contract feature, or
 - b. For contracts, certificates or contract features with no life-contingent payments and substantially similar payments, the reference period is the length of time, rounded to the nearest year, from the premium determination date to the date of the last non-life-contingent payment under the contract, certificate or contract feature, or
 - c. For contracts, certificates or contract features where the payments are not substantially similar, the actuary should apply prudent judgment and select the Valuation Rate Bucket with Macaulay duration that is a best fit to the Macaulay duration of the payments in question.

Guidance Note: Contracts with installment refunds or similar features should consider the length of the installment period calculated from the premium determination date as the non-life contingent period for the purpose of determining the reference period.

Guidance Note: The determination in Section [13.B.1.c2-A.3](#) above shall be made based on the materiality of the payments that are not substantially similar relative to the life-contingent payments.

2. The term “jumbo contract” means a contract with an initial consideration equal to or greater than \$250 million. Considerations for contracts issued by an insurer to the same contract holder within 90 days shall be combined for purposes of determining whether the contracts meet this threshold.

Guidance Note: If multiple contracts meet this criterion in aggregate, then each contract is a jumbo contract.

3. The term “non-jumbo contract” means a contract that does not meet the definition of a jumbo contract.
4. The term “premium determination date” means the date as of which the valuation interest rate for the contract, certificate or contract feature being valued is determined.
5. The term “initial age” means the age of the annuitant as of his or her age last birthday relative to the premium determination date. For joint life contracts, certificates or contract features, the “initial age” means the initial age of the younger annuitant. If a contract, certificate or contract feature for an annuitant is being valued on a standard mortality table as an impaired annuitant, “initial age” means the rated age. If a contract, certificate or contract feature is being valued on a substandard mortality basis, “initial age” means an equivalent rated age.
6. The term “Table X spreads” means the prescribed VM-22 [Section 13](#) current market benchmark spreads for the quarter prior to the premium determination date, as published on the Industry tab of the NAIC website. The process used to determine Table X spreads is the same as that specified in VM-20 Appendix 2.D for Table F, except that JP Morgan and Bank of America bond spreads are averaged over the quarter rather than the last business day of the month.
7. The term “expected default cost” means a vector of annual default costs by weighted average life. This is calculated as a weighted average of the VM-20 Table A prescribed annual default costs published on the Industry tab of the NAIC website in effect for the quarter prior to the premium determination date, using the prescribed portfolio credit quality distribution as weights.
8. The term “expected spread” means a vector of spreads by weighted average life. This is calculated as a weighted average of the Table X spreads, using the prescribed portfolio credit quality distribution as weights.
9. The term “prescribed portfolio credit quality distribution” means the following credit rating distribution:
 - a. 5% Treasuries
 - b. 15% Aa bonds (5% Aa1, 5% Aa2, 5% Aa3)
 - c. 40% A bonds (13.33% A1, 13.33% A2, 13.33% A3)*
 - d. 40% Baa bonds (13.33% Baa1, 13.33% Baa2, 13.33% Baa3)*

*40%/3 is used unrounded in the calculations.

C. Determination of the Statutory Maximum Valuation Interest Rate

1. Valuation Rate Buckets
 - a. For the purpose of determining the statutory maximum valuation interest rate, the contract, certificate or contract feature being valued must be assigned to one of four Valuation Rate Buckets labeled A through D.

- b. If the contract, certificate or contract feature has no life contingencies, the Valuation Rate Bucket is assigned based on the length of the reference period (RP), as follows:

Table 3-1: Assignment to Valuation Rate Bucket by Reference Period Only

RP ≤ 5 Years	5Y < RP ≤ 10Y	10Y < RP ≤ 15Y	RP > 15Y
A	B	C	D

- c. If the contract, certificate or contract feature has life contingencies, the Valuation Rate Bucket is assigned based on the length of the RP and the initial age of the annuitant, as follows:

Table 3-2: Assignment to Valuation Rate Bucket by Reference Period and Initial Age

Initial Age	RP ≤ 5Y	5Y < RP ≤ 10Y	10Y < RP ≤ 15Y	RP > 15Y
90+	A	B	C	D
80–89	B	B	C	D
70–79	C	C	C	D
< 70	D	D	D	D

2. Premium Determination Dates

- a. The following table specifies the decision rules for setting the premium determination date for each of the contracts, certificates and contract features listed in Section 1:

Table 3-3: Premium Determination Dates

Section	Item Description	Premium determination date
A.2.a	Immediate annuity	Date consideration is determined and committed to by contract holder
A.2.b	Deferred income annuity	Date consideration is determined and committed to by contract holder
A.2.c	Structured settlements	Date consideration is determined and committed to by contract holder
A.2.d and A.2.e	Fixed payout annuities resulting from settlement options or annuitizations from host contracts	Date consideration for benefit is determined and committed to by contract holder
A.2.f	Supplementary contracts	Date of issue of supplementary contract

A.2.g	Fixed income payment streams from CDAs, AV becomes 0	Date on which AV becomes 0
A.2.h	Fixed income payment streams from guaranteed living benefits, AV becomes 0	Date on which AV becomes 0
A.2.i	Group annuity and related certificates	Date consideration is determined and committed to by contract holder

Guidance Note: For the purposes of the items in the table above, the phrase “date consideration is determined and committed to by the contract holder” should be interpreted by the company in a manner that is consistent with its standard practices. For some products, that interpretation may be the issue date or the date the premium is paid.

b. Immaterial Change in Consideration

If the premium determination date is based on the consideration, and if the consideration changes by an immaterial amount (defined as a change in present value of less than 10% and less than \$1 million) subsequent to the original premium determination date, such as due to a data correction, then the original premium determination date shall be retained. In the case of a group annuity contract where a single premium is intended to cover multiple certificates, certificates added to the contract after the premium determination date that do not trigger the company’s right to reprice the contract shall be treated as if they were included in the contract as of the premium determination date.

3. Statutory Maximum Valuation Interest Rate

- a. For a given contract, certificate or contract feature, the statutory maximum valuation interest rate is determined based on its assigned Valuation Rate Bucket (Section [13.C.1A](#)) and its Premium Determination Date (Section [13.C.2-B](#)) and whether the contract associated with it is a jumbo contract or a non-jumbo contract.
- b. Statutory maximum valuation interest rates for jumbo contracts are determined and published daily by the NAIC on the Industry tab of the NAIC website. For a given premium determination date, the statutory maximum valuation interest rate is the daily statutory maximum valuation interest rate published for that premium determination date.
- c. Statutory maximum valuation interest rates for non-jumbo contracts are determined and published quarterly by the NAIC on the Industry tab of the NAIC website by the third business day of the quarter. For a given premium determination date, the statutory maximum valuation interest rate is the quarterly statutory maximum valuation interest rate published for the quarter in which the premium determination date falls.
- d. Quarterly Valuation Rate:

For each Valuation Rate Bucket, the quarterly valuation rate is defined as follows:

$$I_q = R + S - D - E$$

Where:

- a. R is the reference rate for that Valuation Rate Bucket (defined in Section 13.C.4D);
 - b. S is the spread rate for that Valuation Rate Bucket (defined in Section 13.C.5E);
 - c. D is the default cost rate for that Valuation Rate Bucket (defined in Section 13.C.6F);
- and
- d. E is the spread deduction defined as 0.25%.
- e. Daily Valuation Rate:

For each Valuation Rate Bucket, the daily valuation rate is defined as follows:

$$I_d = I_q + C_{d-1} - C_q$$

Where:

- a. I_q is the quarterly valuation rate for the calendar quarter preceding the business day immediately preceding the premium determination date;
- b. C_{d-1} is the daily corporate rate (defined in Section 13.C.7G) for the business day immediately preceding the premium determination date; and
- c. C_q is the average daily corporate rate (defined in Section 13.C.8H) corresponding to the same period used to develop I_q .

For jumbo contracts, the daily statutory maximum valuation interest rate is the daily valuation rate (I_d) rounded to the nearest one-hundredth of one percent (1/100 of 1%).

4. Reference Rate

Reference rates are updated quarterly as described below:

- a. The “quarterly Treasury rate” is the average of the daily Treasury rates for a given maturity over the calendar quarter prior to the premium determination date. The quarterly Treasury rate is downloaded from <https://fred.stlouisfed.org>, and is rounded to two decimal places.
- b. Download the quarterly Treasury rates for two-year, five-year, 10-year and 30-year U.S. Treasuries.
- c. The reference rate for each Valuation Rate Bucket is calculated as the weighted average of the quarterly Treasury rates using Table 1 weights (defined in Section 13.C.9J) effective for the calendar year in which the premium determination date falls.

5. Spread

The spreads for each Valuation Rate Bucket are updated quarterly as described below:

- a. Use the Table X spreads from the NAIC website for WALs two, five, 10 and 30 years only to calculate the expected spread.

- b. Calculate the spread for each Valuation Rate Bucket, which is a weighted average of the expected spreads for WALs two, five, 10 and 30 using Table 2 weights (defined in Section 3.I) effective for the calendar year in which the premium determination date falls.
6. Default costs for each Valuation Rate Bucket are updated annually as described below:
- a. Use the VM-20 prescribed annual default cost table (Table A) in effect for the quarter prior to the premium determination date for WAL two, WAL five and WAL 10 years only to calculate the expected default cost. Table A is updated and published annually on the Industry tab of the NAIC website during the second calendar quarter and is used for premium determination dates starting in the third calendar quarter.
 - b. Calculate the default cost for each Valuation Rate Bucket, which is a weighted average of the expected default costs for WAL two, WAL five and WAL 10, using Table 3 weights (defined in Section 13.C.9~~4~~) effective for the calendar year in which the premium determination date falls.

7. Daily Corporate Rate

Daily corporate rates for each valuation rate bucket are updated daily as described below:

- a. Each day, download the Bank of America Merrill Lynch U.S. corporate effective yields as of the previous business day's close for each index series shown in the sample below from the St. Louis Federal Reserve website: <https://research.stlouisfed.org/fred2/categories/32348>. To access a specific series, search the St. Louis Federal Reserve website for the series name by inputting the name into the search box in the upper right corner, or input the following web address: [https://research.stlouisfed.org/fred2/series/\[replace with series name from the table below\]](https://research.stlouisfed.org/fred2/series/[replace with series name from the table below]).

Table 3-4: Index Series Names

Maturity	Series Name
1Y – 3Y	BAMLC1A0C13YEY
3Y – 5Y	BAMLC2A0C35YEY
5Y – 7Y	BAMLC3A0C57YEY
7Y – 10Y	BAMLC4A0C710YEY
10Y – 15Y	BAMLC7A0C1015YEY
15Y+	BAMLC8A0C15PYEY

- b. Calculate the daily corporate rate for each valuation rate bucket, which is a weighted average of the Bank of America Merrill Lynch U.S. corporate effective yields, using Table 4 weights (defined in Section 13.C.9~~4~~) effective for the calendar year in which the business date immediately preceding the premium determination date falls.
8. Average Daily Corporate Rate

Average daily corporate rates are updated quarterly as described below:

- a. Download the quarterly average Bank of America Merrill Lynch U.S. corporate effective yields for each index series shown in Section 3.G.1 from the St. Louis Federal Reserve website: <https://research.stlouisfed.org/fred2/categories/32348>. To access a specific series, search the St. Louis Federal Reserve website for the series name by inputting the name into the search box in the upper right corner, or input the following web address: [https://research.stlouisfed.org/fred2/series/\[replace with series name from Section 13.C.7.aG-4\]](https://research.stlouisfed.org/fred2/series/[replace with series name from Section 13.C.7.aG-4]).
- b. Calculate the average daily corporate rate for each valuation rate bucket, which is a weighted average of the quarterly average Bank of America Merrill Lynch U.S. corporate effective yields, using Table 4 weights (defined in Section 13.C.9I) for the same calendar year as the weight tables (i.e. Tables 1, 2, and 3) used in calculating I_q in Section 13.C.3.e5.

9. Weight Tables 1 through 4

The system for calculating the statutory maximum valuation interest rates relies on a set of four tables of weights that are based on duration and asset/liability cash-flow matching analysis for representative annuities within each valuation rate bucket. A given set of weight tables is applicable to the calculations for every day of the calendar year.

In the fourth quarter of each calendar year, the weights used within each valuation rate bucket for determining the applicable valuation interest rates for the following calendar year will be updated using the process described below. In each of the four tables of weights, the weights in a given row (valuation rate bucket) must add to exactly 100%.

Weight Table 1

The process for determining Table 1 weights is described below:

- a. Each valuation rate bucket has a set of representative annuity forms. These annuity forms are as follows:
 - i. Bucket A:
 - a) Single Life Annuity age 91 with 0 and five-year certain periods.
 - b) Five-year certain only.
 - ii. Bucket B:
 - a) Single Life Annuity age 80 and 85 with 0, five-year and 10-year certain periods.
 - b) 10-year certain only.
 - iii. Bucket C:
 - a) Single Life Annuity age 70 with 0 and 15-year certain periods.
 - b) Single Life Annuity age 75 with 0, 10-year and 15-year certain periods.
 - c) 15-year certain only.
 - iv. Bucket D:

- a) Single Life Annuity age 55, 60 and 65 with 0 and 15-year certain periods.
 - b) 25-year certain only.
- b. Annual cash flows are projected assuming annuity payments are made at the end of each year. These cash flows are averaged for each valuation rate bucket across the annuity forms for that bucket using the statutory valuation mortality table in effect for the following calendar year for individual annuities for males (ANB).
 - c. The average daily rates in the third quarter for the two-year, five-year, 10-year and 30-year U.S. Treasuries are downloaded from <https://fred.stlouisfed.org> as input to calculate the present values in Step [d4](#).
 - d. The average cash flows are summed into four time period groups: years 1–3, years 4–7, years 8–15 and years 16–30. (**Note:** The present value of cash flows beyond year 30 are discounted to the end of year 30 and included in the years 16–30 group. This present value is based on the lower of 3% and the 30-year Treasury rate input in Step [c3](#).)
 - e. The present value of each summed cash-flow group in Step [d4](#) is then calculated by using the Step 3 U.S. Treasury rates for the midpoint of that group (and using the linearly interpolated U.S. Treasury rate when necessary).
 - f. The duration-weighted present value of the cash flows is determined by multiplying the present value of the cash-flow groups by the midpoint of the time period for each applicable group.
 - g. Weightings for each cash-flow time period group within a valuation rate bucket are calculated by dividing the duration weighted present value of the cash flow by the sum of the duration weighted present value of cash flow for each valuation rate bucket.

Weight Tables 2 through 4

Weight Tables 2 through 4 are determined using the following process:

- i. Table 2 is identical to Table 1.
 - ii. Table 3 is based on the same set of underlying weights as Table 1, but the 10-year and 30-year columns are combined since VM-20 default rates are only published for maturities of up to 10 years.
 - iii. Table 4 is derived from Table 1 as follows:
 - a) Column 1 of Table 4 is identical to column 1 of Table 1.
 - b) Column 2 of Table 4 is 50% of column 2 of Table 1.
 - c) Column 3 of Table 4 is identical to column 2 of Table 4.
 - d) Column 4 of Table 4 is 50% of column 3 of Table 1.
 - e) Column 5 of Table 4 is identical to column 4 of Table 4.
 - f) Column 6 of Table 4 is identical to column 4 of Table 1.
10. Group Annuity Contracts

For a group annuity purchased under a retirement or deferred compensation plan (Section [13.A.2.iB.9](#)), the following apply:

- a. The statutory maximum valuation interest rate shall be determined separately for each certificate, considering its premium determination date, the certificate holder's initial age, the reference period corresponding to its form of payout and whether the contract is a jumbo contract or a non-jumbo contract.

Guidance Note: Under some group annuity contracts, certificates may be purchased on different dates.

- b. In the case of a certificate whose form of payout has not been elected by the beneficiary at its premium determination date, the statutory maximum valuation interest rate shall be based on the reference period corresponding to the normal form of payout as defined in the contract or as is evidenced by the underlying pension plan documents or census file. If the normal form of payout cannot be determined, the maximum valuation interest rate shall be based on the reference period corresponding to the annuity form available to the certificate holder that produces the most conservative rate.

Guidance Note: The statutory maximum valuation interest rate will not change when the form of payout is elected.

This page intentionally left blank

Valuation Manual Section II. Reserve Requirements

Subsection 2: Annuity Products

- A. This subsection establishes reserve requirements for all contracts classified as annuity contracts as defined in SSAP No. 50 in the AP&P Manual.
- B. Minimum reserve requirements for variable annuity (VA) contracts and similar business, specified in VM-21, Requirements for Principle-Based Reserves for Variable Annuities, shall be those provided by VM-21. The minimum reserve requirements of VM-21 are considered PBR requirements for purposes of the *Valuation Manual*.
- C. Minimum reserve requirements for fixed annuity contracts issued prior to 1/1/2024 are those requirements as found in VM-A and VM-C as applicable, with the exception of the minimum requirements for the valuation interest rate for single premium immediate annuity contracts, and other similar contracts, issued after Dec. 31, 2017, including those fixed payout annuities emanating from host contracts issued on or after Jan. 1, 2017, and on or before Dec. 31, 2017. The maximum valuation interest rate requirements for those contracts and fixed payout annuities are defined in Section 13 of VM-22, Statutory Maximum Valuation Interest Rates for Income Annuity Formulaic Reserves.
- ~~C.D.~~ Minimum reserve requirements for fixed annuity contracts issued on 1/1/2024 and later are those requirements as found in Sections 1 through 12 of VM-22.
- E. The below principles may serve as key considerations for assessing whether VM-21 or VM-22 requirements apply:
1. Index-linked or modified guaranteed annuity contracts or riders that satisfy both of the following conditions may be a key consideration for application of VM-22 requirements:
 - a. Guarantees the principal amount of purchase payments, net of any partial withdrawals, and interest credited thereto, less any deduction (without regard to its timing) for sales, administrative or other expenses or charges.
 - b. Credits a rate of interest under the contract that is at least equal to the minimum rate required to be credited by the standard nonforfeiture law in the jurisdiction in which the contract is issued.

Guidance Note: Paragraph E.1.b is intended to apply prior to the application of any market value adjustments for modified guaranteed annuities where the underlying assets are held in a separate account. If meeting Paragraph E.1.b prior to the application of any market value adjustments and Paragraph E.1.a above, it may be appropriate to value such contracts under VM-22 requirements.

2. Index-linked or modified guaranteed annuity contracts that do not satisfy either of the two conditions listed above in Paragraph E.1.i and E.1.ii may be a key consideration for application of VM-21 requirements.

Subsection 6: Riders and Supplemental Benefits

Drafting Note: All revisions shown in this section are in comparison to Subsection 6 in Section II of the Valuation Manual.

Guidance Note: Policies, designs, or contracts with riders and supplemental benefits which are created to simply disguise ~~benefits riders~~ subject to the Valuation Manual section describing the reserve methodology for the base product to which they are attached, VM-20 Section 3.A.1 or exploit a perceived loophole, must be reserved in a manner similar to more typical designs with similar riders.

- A. If a rider or supplemental benefit is attached to a health insurance product, ~~annuity product~~, deposit-type contract, or credit life or disability product, it may be valued with the base contract unless it is required to be separated by regulation or other requirements.
- B. For supplemental benefits on life insurance policies or annuity contracts, including Guaranteed Insurability, Accidental Death or Disability Benefits, Convertibility, Nursing Home Benefits or Disability Waiver of Premium Benefits, the supplemental benefit may be ~~included~~ valued with the base policy or contract and follow the reserve requirements for the base policy or contract under VM-20, VM-21, VM-22, VM-A, and/or VM-C, as applicable.
- C. ULSG and other secondary guarantee riders on a life insurance policy shall be valued with the base policy and follow the reserve requirements for ULSG policies under VM-20, VM-A and/or VM-C, as applicable.
- D. Any guaranteed minimum benefits on life insurance policies or annuity contracts not subject to Paragraph C above including, but not limited to, Guaranteed Minimum Accumulation Benefits, Guaranteed Minimum Death Benefits, Guaranteed Minimum Income Benefits, Guaranteed Minimum Withdrawal Benefits, Guaranteed Lifetime Income Benefits, Guaranteed Lifetime Withdrawal Benefits, Guaranteed Payout Annuity Floors, Waiver of Surrender Charges, Return of Premium, Systematic Withdrawal Benefits under Required Minimum Distributions, and all similar guaranteed benefits shall be valued with the base policy or contract and follow the reserve requirements for the base policy or contract under VM-20, VM-21, VM-22, and VM-A and/or VM-C, as applicable.
- ~~D.E.~~ If a rider or supplemental benefit to a life insurance policy or annuity contract that is not addressed in Paragraphs B, C, or ~~C~~ above possesses any of the following attributes, the rider or supplemental benefit shall be ~~included~~ valued with the base policy or contract and follow the reserve requirements for the base policy or contract under VM-20, VM-21, VM-22, and VM-A and/or VM-C, as applicable.
1. The rider or supplemental benefit does not have a separately identified premium or charge.
 2. ~~The~~ After issuance, the rider or supplemental benefit premium, charge, value or benefits are determined by referencing the base ~~policy or policy contract~~ policy or contract features or performance.
 3. ~~The~~ After issuance, the base ~~policy or policy contract~~ policy or contract value or benefits are determined by referencing the rider or supplemental benefit features or performance. The deduction of rider or benefit premium or charge from the contract value is not sufficient for a determination by reference.

E.F. If a term life insurance rider on the named insured[s] on the base life insurance policy does not meet the conditions of ~~p~~Paragraph ~~DE~~ above, and either (1) guarantees level or near level premiums until a specified duration followed by a material premium increase; or (2) for a rider for which level or near level premiums are expected for a period followed by a material premium increase, the rider is separated from the base policy and follows the reserve requirements for term policies under VM20, VM-A and/or VM-C, as applicable.

F.G. For all other riders or supplemental benefits on life insurance policies or annuity contracts not addressed in Paragraphs B through ~~EF~~ above, the riders or supplemental benefits may be ~~included~~valued with the base policy or contract and follow the reserve requirements for the base policy or contract under VM-20, VM-21, VM-22, VM-A and/or VM-C, as applicable. For a given rider, the election to include riders or supplemental benefits with the base policy or contract shall be determined at the policy form level, not on a policy-by-policy basis, and shall be treated consistently from year-to-year, unless otherwise approved by the domiciliary commissioner.

G.H. Any supplemental benefits and riders offered on life insurance policies or annuity contracts that would have a material impact on the reserve if elected later in the contract life, such as joint income benefits, nursing home benefits, or withdrawal provisions on annuity contracts, shall be considered when determining reserves using the following principles:

1. Policyholders with living benefits and annuitization in the same contract will generally use the more valuable of the two benefits.
2. When advantageous, policyholders will commence living benefit payouts if not started yet.



AMERICAN ACADEMY *of* ACTUARIES

Objective. Independent. Effective.™

July 16, 2021
Bruce Sartain, Chair
Valuation Manual (VM)-22 (A) Subgroup
Life Actuarial (A) Task Force
National Association of Insurance Commissioners (NAIC)

Dear Mr. Sartain,

The American Academy of Actuaries¹ Annuity Reserves and Capital Work Group (ARCWG) presented a fixed annuity principle-based reserving (PBR) framework proposal to the VM-22 Subgroup during its October 21, 2020 meeting. This document provides ARCWG's initial draft of NAIC Valuation Manual Section II and VM-22 requirements associated with the ARCWG proposal. We ask for the VM-22 Subgroup's consideration of the language herein as a foundation for further drafting efforts, in your efforts to advance toward an NAIC fixed annuity PBR framework.

Please let us know if you have any follow-up inquiries in response to this document. Again, we appreciate the opportunity to propose the fixed annuity framework and all of the efforts made by the VM-22 Subgroup to focus on this topic.

Sincerely,
Ben Slutsker
Chairperson, Annuity Reserves and Capital Work Group
American Academy of Actuaries

¹ The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

VM-22 PBR: Requirements for Principle-Based Reserves for Non-Variable Annuities

Drafting Overview: This document is the ARCWG-proposed draft Valuation Manual wording for VM-22 PBR for non-variable annuities. The edits reflected in this draft are made in association with the recommendations in the Annuity Reserves Work Group-proposed VM-22 presentation, exposed by the VM-22 Subgroup in October 2020. Each section shows editorial mark-ups compared to existing VM-20 or VM-21 wording, which is included as a draft note at the beginning of each section (with the only exceptions being Sections 1 and 2 that do not contain mark-ups to existing Valuation Manual wording).

Table of Contents

Section 1: Background	4
A. Purpose	4
B. Principles	4
C. Risks Reflected.....	5
D. Specific Definitions for VM-22.....	7
Section 2: Scope and Effective Date	11
A. Scope	11
B. Effective Date & Transition	11
Section 3: Reserve Methodology.....	13
A. Aggregate Reserve.....	13
B. Impact of Reinsurance Ceded	13
C. To Be Determined.....	13
D. The Stochastic Reserve.....	13
E. Exclusion Test.....	14
F. Allocation of the Aggregate Reserve to Contracts	14
G. Prudent Estimate Assumptions:.....	14
Section 4: Determination of Stochastic Reserve	16
A. Projection of Accumulated Deficiencies	16
B. Determination of Scenario Reserve	20
C. Projection Scenarios	21
D. Projection of Assets	22
E. Projection of Annuitization Benefits	25
F. Frequency of Projection and Time Horizon	25
G. Compliance with ASOPs.....	25
Section 5: Reinsurance Ceded and Assumed	27
A. Treatment of Reinsurance Ceded in the Aggregate Reserve	27
Section 6: To Be Determined	29
Section 7: Exclusion Testing	30
A. Stochastic Exclusion Test Requirement Overview.....	30

B. Types of Stochastic Exclusion Tests	30
C. Stochastic Exclusion Ratio Test	31
D. Stochastic Exclusion Demonstration Test	33
E. Deterministic Certification Option	34
Section 8: To Be Determined (Scenario Generation for VM-21).....	36
Section 9: Modeling Hedges under a Future Hedging Strategy	37
A. Initial Considerations.....	37
B. Modeling Approaches	37
C. Calculation of Stochastic Reserve (Reported).....	38
D. Specific Considerations and Requirements	40
Section 10: Guidance and Requirements for Setting Contract Holder Behavior Prudent Estimate Assumptions	43
A. General	43
B. Aggregate vs. Individual Margins	43
C. Sensitivity Testing.....	44
D. Specific Considerations and Requirements	44
E. Dynamic Assumptions.....	46
F. Consistency with the CTE Level.....	47
G. Additional Considerations and Requirements for Assumptions Applicable to Guaranteed Living Benefits.....	47
H. Policy Loans	48
I. Non-Guaranteed Elements.....	48
Section 11: Guidance and Requirements for Setting Prudent Estimate Mortality Assumptions.....	51
A. Overview	51
B. Determination of Expected Mortality Curves	52
C. Adjustment for Credibility to Determine Prudent Estimate Mortality	55
D. Future Mortality Improvement	56
Section 12: Allocation of Aggregate Reserves to the Contract Level	57
Section 13: Statutory Maximum Valuation Interest Rates for Income Annuity Formulaic Reserves.....	60
A. Purpose and Scope.....	60
B. Definitions	61
C. Determination of the Statutory Maximum Valuation Interest Rate	62
Valuation Manual Section II. Reserve Requirements	71
Subsection 2: Annuity Products	71
Subsection 6: Riders and Supplemental Benefits	72

Section 1: Background

A. Purpose

These requirements establish the minimum reserve valuation standard for non-variable annuity contracts as defined in Section 2.A and issued on or after 1/1/2024. For all contracts encompassed by the Scope, these requirements constitute the Commissioners Annuity Reserve Valuation Method (CARVM) and, for certain contracts, the Commissioners Reserve Valuation Method (CRVM).

Guidance Note: CRVM requirements apply to some group pension contracts.

B. Principles

The projection methodology used to calculate the stochastic reserve 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 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 with an element of conservatism consistent with statutory reporting objectives.

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 cash flow analysis 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.

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

- ii. Commercial mortgage loan roll-over rates (roll-over of bullet loans).
 - iii. Uncertainty in the timing or duration of asset cash flows (e.g., shortening (prepayment risk) and lengthening (extension risk)).
 - iv. Performance of equities, real estate, and Schedule BA assets.
 - v. Call risk on callable assets.
 - vi. Separate account fund performance.
 - 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 or deposits (high interest rate guarantees in low interest rate environments).
 - vii. Applicable expense risks, including fluctuation maintenance expenses directly attributable to the business, future commission expenses, and expense inflation/growth.
- 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 associated with the policies or contracts being valued, or their supporting assets.
 - b. Determined to not be capable of materially affecting the reserve.
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 sudden and significant levels of withdrawals and surrenders.
 - 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.

D. Specific Definitions for VM-22

Buffer Annuity

Interchangeable term for Registered Index-Linked Annuity (RILA). See definition for Registered Index-Linked Annuity below.

Deferred Income Annuity (DIA)

An annuity which guarantees a periodic payment for the life of the annuitant or a term certain and payments begin one year or later after (or from) the issue date if the contract holder survives to a predetermined future age.

Fixed Indexed Annuity (FIA)

An annuity with an account value where the contract holder has the option for a portion or all of the account value to grow at a rate linked to an external index, typically with guaranteed principal.

Flexible Premium Deferred Annuity (FPDA)

An annuity with an account value established with a premium amount but allows for additional deposits to be paid into the annuity over time, resulting in an increase to the account value. The contract also has a guaranteed interest rate during the accumulation phase and has guaranteed mortality and interest rates applicable at the time of conversion to the payout phase.

Funding Agreement

A contract issued to an institutional investor (domestic and international non-qualified fixed income investors) that provides fixed or floating interest rate guarantees.

Guaranteed Investment Contract (GIC)

Insurance contract typically issued to a retirement plan (defined contribution) under which the insurer accepts a deposit (or series of deposits) from the purchaser and guarantees to pay a specified interest rate on the funds deposited during a specified period of time.

Index Credit Hedge Margin

A margin capturing the risk of inefficiencies in the company's hedging program supporting index credits. This includes basis risk, persistency risk, and the risk associated with modeling decisions and simplifications. It also includes any uncertainty of costs associated with managing the hedging program and changes due to investment and management decisions.

Index Credit

Any interest credit, multiplier, factor, bonus, charge reduction, or other enhancement to policy values that is linked to an index or indices. Amounts credited to the policy resulting from a floor on an index account are included.

Index Crediting Strategy

The strategy defined in a contract to determine index credits for a contract. This refers to underlying index, index parameters, date, timing, and other elements of the crediting method.

Index Parameter

Cap, floor, participation rate, spreads, or other features describing how the contract utilizes the index.

Longevity Reinsurance

An agreement, typically a reinsurance arrangement covering one or more group or individual annuity contracts, under which an insurance company assumes the longevity risk associated with

periodic payments made to specified annuitants under one or more immediate or deferred payout annuity contracts. A common example is participants in one or more underlying retirement plans.

Typically, the reinsurer pays a portion of the actual benefits due to the underlying annuitants (or, in some cases, a pre-agreed amount per annuitant), while the ceding insurance company retains the assets supporting the reinsured annuity payments and pays periodic, ongoing premiums to the reinsurer over the expected lifetime of benefits paid to the specified annuitants. Such agreements may contain net settlement provisions such that only one party makes ongoing cash payments in a particular period. Under these agreements, longevity risk may be transferred on either a permanent basis or for a prespecified period of time, and these agreements may or may not permit early termination.

Agreements which are not treated as reinsurance under Statement of Statutory Accounting Principles (SSAP) No. 61R are not included in this definition. In particular, contracts under which payments are made based on the aggregate mortality experience of a population of lives which are not covered by an underlying group or individual annuity contract (e.g., mortality index-based longevity swaps) are not included in this definition.

Market Value Adjustment (MVA) Annuity

An annuity with an account value where withdrawals and full surrenders are subject to adjustments based on interest rates or index returns at the time of withdrawal/surrender. There could be ceilings and floors on the amount of the market-value adjustment.

Modified Guaranteed Annuity (MGA)

A type of market-value adjusted annuity contract where the underlying assets are held in an insurance company separate account and the value of which are guaranteed if held for specified periods of time. The contract contains nonforfeiture values that are based upon a market-value adjustment formula if held for shorter periods.

Multiple Year Guaranteed Annuity (MYGA)

A type of fixed annuity that provides a pre-determined and contractually guaranteed interest rate for specified periods of time, after which there is typically an annual reset or renewal of a multiple year guarantee period.

Pension Risk Transfer (PRT) Annuity

An annuity, typically a group contract or reinsurance agreement, issued by an insurance company providing periodic payments to annuitants receiving immediate or deferred benefits from one or more retirement plans. Typically, the insurance company holds the assets supporting the benefits, which may be held in the general or separate account, and retains not only longevity risk but also asset risks (e.g., credit risk and reinvestment risk).

Registered Index-Linked Annuity (RILA)

An annuity with an account value where the contract holder has the option for a portion or all of the account value to grow at a rate linked to an external index, similar to a Fixed Indexed Annuity, but with downside risk exposure that may not guarantee full principal repayment. These contracts may include a cap on upside returns, and may also include a floor on downside returns which may be below zero percent.

Single Premium Immediate Annuity (SPIA)

An annuity purchased with a single premium amount which guarantees a periodic payment for the life of the annuitant or a term certain and payments begin within one year after (or from) the issue date.

Single Premium Deferred Annuity (SPDA)

An annuity with an account value established with a single premium amount that grows with a guaranteed interest rate during the accumulation phase and has guaranteed mortality and interest rates applicable at the time of conversion to the payout phase. May also include cases where the premium is accepted for a limited amount of time early in the contract life, such as only in the first duration.

Stable Value Contract

A contract that provides limited investment guarantees, typically preserving principal while crediting steady, positive returns and protecting against losses or declines in yield. Underlying asset portfolios typically consist of fixed income securities, which may sit in the insurer's general account, a separate account, or in a third-party trust. These contracts often support defined contribution or defined benefit retirement plan liabilities.

Structured Settlement Contract (SSC)

A contract that provides periodic benefits and is purchased with a single premium amount stemming from various types of claims pertaining to court settlements or out-of-court settlements from tort actions arising from accidents, medical malpractice, and other causes. Adverse mortality is typically expected for these contracts.

Synthetic GIC

Contract that simulates the performance of a traditional GIC through a wrapper, swap, or other financial instruments, with the main difference being that the assets are owned by the policyholder or plan trust.

Term Certain Payout Annuity

A contract issued, which offers guaranteed periodic payments for a specified period of time, not contingent upon mortality or morbidity of the annuitant.

Two-Tiered Annuity

A deferred annuity with two tiers of account values. One, with a higher accumulation interest rate, is only available for annuitization or death. The other typically contains a lower accumulation interest rate, and is only available upon surrender.

Section 2: Scope and Effective Date

A. Scope

Subject to the requirements of this VM-22 are annuity contracts, certificates and contract features, whether group or individual, including both life contingent and term-certain-only, directly written or assumed through reinsurance issued on or after 1/1/2024, with the exception of contracts or benefits listed below.

Products out of scope include:

- Contracts or benefits that are subject to VM-21 (such as variable annuities, RILAs, buffer annuities, and structured annuities)
- GICs
- Synthetic GICs
- Stable Value Contracts
- Funding Agreements

Products in scope of VM-22 include fixed annuities which consist of, but are not limited to, the following the list:

- **Account Value Based Annuities**
 - Deferred Annuities (SPDA & FPDA)
 - Multi-Year Guarantee Annuities (MYGA)
 - Fixed Indexed Annuities (FIA)
 - Market-Value Adjustments (MVA)
 - Two-tiered Annuities
 - Guarantees/Benefits/Riders on Fixed Annuity Contracts
- **Payout Annuities**
 - Single Premium Immediate Annuities (SPIA)
 - Deferred Income Annuities (DIA)
 - Term Certain Payout Annuity
 - Pension Risk Transfer Annuities (PRT)
 - Structured Settlement Contracts (SSC)
 - Longevity Reinsurance

The company may elect to exclude one or more groups of contracts from the stochastic reserve calculation in certain situations, pursuant to the exclusion test requirements defined in Section 3.E of VM-22.

B. Effective Date & Transition

Effective Date

These requirements apply for valuation dates on or after January 1, 2024.

Transition

A company may elect to establish minimum reserves pursuant to applicable requirements in VM-A and VM-C for business otherwise subject to VM-22 PBR requirements and issued during the

first three years following the effective date of VM-22 PBR. If a company during the three years elects to apply VM-22 PBR to a block of such business, then a company must continue to apply the requirements of VM-22 PBR for future issues of this business. Irrespective of the transition date, a company shall apply VM-22 PBR requirements to applicable blocks of business on a prospective basis starting at least three years after the effective date.

Section 3: Reserve Methodology

A. Aggregate Reserve

The aggregate reserve for contracts falling within the scope of these requirements shall equal the stochastic reserve (following the requirements of Section 4) less any applicable PIMR for all contracts not valued under applicable requirements in VM-A and VM-C, plus the reserve for any contracts valued under applicable requirements in VM-A and VM-C.

Guidance Note: Contracts valued under applicable requirements in VM-A and VM-C are ones that pass the exclusion test and elect to not model PBR stochastic reserves, per the requirements in Section 3.E.

B. Impact of Reinsurance Ceded

All components in the aggregate reserve shall be determined post-reinsurance ceded, that is net of any reinsurance cash flows arising from treaties that meet the statutory requirements that allow the treaty to be accounted for as reinsurance. A pre-reinsurance ceded reserve also needs to be determined by ignoring all reinsurance cash flows (costs and benefits) in the reserve calculation.

C. To Be Determined

D. The Stochastic Reserve

1. The stochastic reserve shall be determined based on asset and liability projections for the contracts falling within the scope of these requirements, excluding those contracts valued using the methodology pursuant to applicable requirements in VM-A and VM-C, over a broad range of stochastically generated projection scenarios described in Section 8 and using prudent estimate assumptions as required in Section 3.F herein.
2. The stochastic reserve amount for any group of contracts shall be determined as CTE70 of the scenario reserves following the requirements of Section 4, with the exception of groups of contracts for which a company elects the Deterministic Certification Option in Section 7.E, which shall be determined as the scenario reserve following the requirements of Section 4.
3. The reserve may be determined in aggregate across various groups of contracts as a single model segment when determining the stochastic reserve if the business and risks are not managed separately or are part of the same integrated risk management program. Aggregation is permitted if a resulting group of contracts (or model segment) follows the listed principles:
 - a. Aggregate in a manner that is consistent with the company's risk management strategy and reflects the likelihood of any change in risk offsets that could arise from shifts between product types, and
 - b. Using prudent actuarial judgement, consider the following elements when aggregating groups of contracts: whether groups of contracts are part of the same portfolio (or different portfolios that interact), same integrated risk management system, administered/managed together
4. Do not aggregate groups of contracts for which the company elects to use the Deterministic Certification Option in Section 7.E with any groups of contracts that do not use such option.

5. To the extent that these limits on aggregation result in more than one model segment, the stochastic reserve shall equal the sum of the stochastic reserve amounts computed for each model segment and scenario reserve amounts computed for each model segment for which the company elects to use the Deterministic Certification Option in Section 7.E.

E. Exclusion Test

1. To the extent that certain groups of contracts pass one of the defined stochastic exclusion tests in Section 7.B, these groups of contracts may be valued using the methodology pursuant to applicable requirements in VM-A and VM-C, with the statutory maximum valuation rate for immediate annuities specified in Section 13.
 - a. For dividend-paying contracts, a dividend liability shall be established upon following requirements in VM-A and VM-C, as described above, for the base contract.

Guidance Note: The intention of contracts that pass the stochastic exclusion test is to provide the option to value contracts under VM-A and VM-C. This may apply to pre-PBR CARVM requirements in accordance with Actuarial Guideline XXXIII (AG33) methodology with type A, B, C rates for SPIAs issued before 2018; AG33 methodology with pre-PBR VM-22 rates for SPIAs issued on/after 2018; Actuarial Guideline XXXV (AG35) pre-PBR methodology for Fixed Indexed Annuities; and AG33 methodology (with interest rate updates for modernization initiatives on new contracts) for non-SPIAs.

2. The approach for grouping contracts when performing the exclusion tests should follow the same principles that underlie the aggregation approach for model segments discussed for Stochastic Reserves in Section D above.

F. Allocation of the Aggregate Reserve to Contracts

The aggregate reserve shall be allocated to the contracts falling within the scope of these requirements using the method outlined in Section 12.

G. Prudent Estimate Assumptions:

1. With respect to the Stochastic Reserve in Section 3.C, the company shall establish the prudent estimate assumption for each risk factor in compliance with the requirements in Section 12 of Model #820 and must periodically review and update the assumptions as appropriate in accordance with these requirements.
2. The qualified actuary, to whom responsibility for this group of contracts is assigned, shall annually review relevant emerging experience for the purpose of assessing the appropriateness of the anticipated experience assumption. If the results of statistical testing or other testing indicate that previously anticipated experience for a given factor is inadequate, then the qualified actuary shall set a new, adequate, anticipated experience assumption for the factor.
3. To determine the prudent estimate assumptions, the stochastic reserve shall also follow the requirements in Sections 4 and 9 for asset assumptions, Section 10 for policyholder behavior assumptions, and Section 11 for mortality assumptions.

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 it shall 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 using prudent estimate liability assumptions defined in Sections 10 and 11 and asset assumptions defined in Section 4.D. The company shall project cash flows including the following:

- a. Revenues received by the company including gross premiums received from the policyholder (including any due premiums as of the projected start date).
- b. All material benefits projected to be paid to policyholders—including, but not limited to, death claims, surrender benefits and withdrawal benefits—reflecting the impact of all guarantees and adjusted to take into account amounts projected to be charged to account values on general account business. Any guarantees, in addition to market value adjustments assessed on projected withdrawals or surrenders, shall be taken into account.

Guidance Note: Amounts charged to account values on general account business are not revenue; examples include rider charges and expense charges.

- c. Non-Guaranteed Elements (NGE) cash flows as described in Section 10.J.
- d. Insurance company expenses (including overhead and investment expense), commissions, contractual fees and charges, and revenue-sharing income received by the company (net of applicable expenses).
- e. Net cash flows associated with any reinsurance.
- f. Cash flows from hedging instruments as described in Section 4.A.4.
- g. Cash receipts or disbursements associated with invested assets (other than policy loans) as described in Section 4.D.4, including investment income, realized capital gains and losses, principal repayments, asset default costs, investment expenses, asset prepayments, and asset sales.
- h. If modeled explicitly, cash flows related to policy loans as described in Section 10.I.2, including interest income, new loan payments and principal repayments.

Guidance Note: Future net policy loan cash flows include: policy loan interest paid in cash plus repayments of policy loan principal, including repayments occurring at death or surrender (note that the future benefits in Section 4.A.1.b are before consideration of policy

loans), less additional policy loan principal (but excluding policy loan interest that is added to the policy loan principal balance).

2. Grouping of Index Crediting Strategies

Index crediting strategies may be grouped for modeling using an approach that recognizes the investment guidelines and objectives of each index crediting strategy. In assigning each index crediting strategy to a grouping for projection purposes, the fundamental characteristics of the index crediting strategy 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).

Index accounts sharing similar index crediting strategies may also be grouped for modeling to an appropriately crafted proxy strategy normally expressed as a linear combination of recognized market indices, sub-indices or funds, in order to develop the investment return paths and associated interest crediting. Each index crediting strategy's specific risk characteristics, associated index parameters, and relationship to the stochastically generated scenarios in Section 8 should be considered before grouping or assigning to a proxy strategy. Grouping and/or development of a proxy strategy may not be done in a manner that intentionally understates the resulting reserve.

3. Model Cells

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

- a. For a company that does not have a future hedging program tied directly to the contracts falling under the scope of VM-22 stochastic reserve requirements:
 - i. The company shall not consider the cash flows from any future hedge purchases or any rebalancing of existing hedge assets in its modeling.
 - ii. Existing 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 starting assets. The hedge assets may then be considered in one of two ways:
 - a) Include the asset cash flows from any contractual payments and maturity values in the projection model; or
 - b) No hedge positions—in which case the hedge positions held on the valuation date are replaced with cash and/or other general account assets in an amount equal to the aggregate market value of these hedge positions.

Guidance Note: If the hedge positions held on the valuation date are replaced with cash, then as with any other cash, such amounts may then be invested following the company's investment strategy.

A company may switch from method a) to method b) at any time, but it may only change from b) to a) with the approval of the domiciliary commissioner.

- b. For a company that has a future hedging program tied directly to the contracts falling under the scope of VM-22 stochastic reserve requirements:
 - i. For a hedging program with hedge payoffs that offset interest credits associated with indexed interest strategies (indexed interest credits):
 - a) In modeling cash flows, the company shall include the cash flows from future hedge purchases or any rebalancing of existing hedge assets that are intended solely to offset interest credits to policyholders
 - b) Existing hedging instruments that are currently held by the company for this purpose in support of the contracts falling under the scope of these requirements shall be included in the starting assets. Existing hedging instruments that are currently held by the company for any other purpose should be modeled consistently with the requirements of Section 4.A.4.a.ii.
 - c) An Index Credit Hedge Margin for these instruments shall be reflected by reducing index interest credit hedge payoffs by a margin multiple that shall be justified by sufficient and credible company experience and be no less than [X%] multiplicatively of the interest credited. In the absence of sufficient and credible company experience, a margin of [Y%] shall be assumed. There is no cap on the index credit hedge margin if company experience indicates actual error is greater than [Y%]. It is permissible to substitute stress-testing for sufficient and credible experience if such stress-testing comprehensively considers a robust range of future market conditions.
 - ii. For a company that hedges any contractual obligation or risks other than indexed interest credits, the detailed requirements for the modeling of hedges are defined in Section 9. The following requirements 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) The projections shall take into account the appropriate costs and benefits of hedge positions expected to be held in the future.

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 the 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 only future hedge purchases associated with indexed interest credited. These are discussed in greater detail in Section 9.

- c) Consistent with Section 4.A.4.b.i., the index credit hedge margin for instruments associated with indexed interest credited shall be reflected by reducing hedge payoffs by a margin multiple as defined in Section 4.A.4.b.i.c).
- d) The use of products not falling under the scope of these requirements as a hedge shall not be recognized in the determination of accumulated deficiencies.

Guidance Note: Section 4.A.4.b.i is intended to address common situations for products with index crediting strategies where the company only hedges index credits or clearly separates index credit hedging from other hedging. In this case the hedge positions are considered similarly to other fixed income assets supporting the contracts, and a margin is reflected rather than modeling using a CTE70 adjusted run with no future hedge purchases. If a company has a more comprehensive hedge strategy combining index credits, guaranteed benefit, and other risks (e.g., full fair value or economic hedging), an appropriate and documented bifurcation method should be used in the application of sections 4.A.4.b.i and 4.A.4.b.ii above for the hedge modeling and justification. Such bifurcation methods may quantify the specific risk exposure attributable to index credit liabilities versus other liabilities such as guaranteed living benefits, and apply such for the basis for allocation.

Guidance Note: The requirements of Section 4.A.4 govern the determination of reserves for annuity contracts 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.

5. Revenue Sharing

If applicable, 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 requirements set forth in VM 21 Section 4.A.5 are met.

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. Interest Maintenance Reserve (IMR)

The IMR shall be handled consistently with the treatment in the company's cash flow testing, and the amounts should be adjusted to a pre-tax basis.

B. Determination of Scenario Reserve

1. For a given scenario, the scenario reserve shall be determined using one of two methods described below:

- a) The starting asset amount plus the greatest present value, as of the projection start date, of the projected accumulated deficiencies; or

Guidance Note: The greatest present value of accumulated deficiencies can be negative.

- b) The direct iteration method, where the scenario reserve is determined by solving 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 at the end of the projection horizon with no positive accumulated deficiencies at the end of any projection year during the projection period.

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, unless using the direct iteration method pursuant to Section 4.B.1.b, the accumulated deficiencies shall be discounted at the NAER on additional assets, as defined in Section 4.B.3.

3. Determination of NAER on Additional Invested Asset Portfolio

- a. The additional invested asset portfolio for a scenario is a portfolio of general account assets as of the valuation date, outside of the starting asset portfolio, that is required in that projection scenario so that the projection would not have a positive accumulated deficiency at the end of any projection year. This portfolio may include only (i) General Account assets available to the company on the valuation date that do not constitute part of the starting asset portfolio; and (ii) cash assets.

Guidance Note:

Additional invested assets should be selected in a manner such that if the starting asset portfolio were revised to include the additional invested assets, the projection would not be expected to experience any positive accumulated deficiencies at the end of any projection year.

It is assumed that the accumulated deficiencies for this scenario projection are known.

- b. To determine the NAER on additional invested assets for a given scenario:

- i. Project the additional invested asset portfolio as of the valuation date to the end of the projection period,
 - a) Investing any cash in the portfolio and reinvesting all investment proceeds using the company's investment policy.
 - b) Excluding any liability cash flows.
 - c) Incorporating the appropriate returns, defaults and investment expenses for the given scenario.
- ii. If the value of the projected additional invested asset portfolio does not equal or exceed the accumulated deficiencies at the end of each projection year for the scenario, increase the size of the initial additional invested asset portfolio as of the valuation date, and repeat the preceding step.
- iii. Determine a vector of annual earned rates that replicates the growth in the additional invested asset portfolio from the valuation date to the end of the projection period for the scenario. This vector will be the NAER for the given scenario.
- iv. If the depletion of assets within the projection results in an unreasonably high negative NAER upon borrowing, the NAER may be set to the assumed cost of borrowing associated with each projected time period, in accordance with Section 4.D.3.c, as a safe harbor.

Guidance Note: There are multiple ways to select the additional invested asset portfolio at the valuation date. Similarly, there are multiple ways to determine the earned rate vector. The company shall be consistent in its choice of methods, from one valuation to the next.

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 it 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

Treasury Department interest rate curves, as well as investment return paths for index funds, equities, and fixed income assets 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 meet the requirements described in Section 8.

D. Projection of Assets

1. Starting Asset Amount

- a. 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. The amount of such asset values shall equal the sum of the following items, all as of the start of the projection:
 - i. Any hedge instruments held in support of the contracts being valued; and
 - ii. 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 (i).
- b. 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.

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. 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. However, for derivative instruments that are used in hedging and are not assumed to be sold during a particular projection interval, the company may account for them at an amortized cost in an appropriate manner elected by the company.

Guidance Note: Accounting for hedge assets should recognize any methodology prescribed by a company's state of domicile.

3. 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 Treasury Department 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;
 - iv. 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:
- i. 5% Treasury
 - ii. 15% PBR credit rating 3 (Aa2/AA)
 - iii. 40% PBR credit rating 6 (A2/A)
 - iv. 40% PBR credit rating 9 (Baa/BBB)
- 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, provided that the assumed cost of borrowing is not lower than the rate at which positive cash flows are reinvested in the same time period, taking into account duration, ratings, and other attributes of the borrowing mechanism. 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.ii and Section 4.D.4.a.iv, recognizing that initial assets that mature during the projection may have different characteristics than modeled reinvestment assets.

Guidance Note: This limitation is being referred to Life Actuarial (A) Task Force for review. The simple language above “provided that the assumed cost of borrowing is not lower than the rate at which positive cash flows are reinvested in the same time period” is not intended to impose a literal requirement. It is intended to reflect a general concept to prevent excessively optimistic borrowing assumptions. It is recognized that borrowing parameters and rules can be complicated, such that modeling limitations may not allow for literal compliance, in every time step, as long as the reserve is not materially affected. However, if the company is unable to fully apply this restriction, prudence dictates that a company shall not allow borrowing assumptions to materially reduce the reserve.

4. 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:
 - i. Model gross investment income and principal repayments in accordance with the contractual provisions of each asset and in a manner consistent with each scenario.
 - ii. Reflect asset default costs as prescribed in VM-20 Section 9.F and anticipated investment expenses through deductions to the gross investment income.
 - iii. Model the proceeds arising from modeled asset sales and determine the portion representing any realized capital gains and losses.
 - iv. 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 index funds and 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:
 - i. 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 index crediting strategies, as discussed in Section 4.A.2.
 - ii. Project the gross investment return including realized and unrealized capital gains in a manner that is consistent with the stochastically generated scenarios.
 - iii. 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.

- c. Cash flows for each projection interval for policy loan assets shall follow the requirements in Section 10.I.

E. Projection of Annuitization Benefits

1. Assumed Annuitization Purchase Rates
 - a. For payouts specified at issue (such as single premium immediate annuities, deferred income annuities, and certain structured settlements), such payout rates shall reflect the payout rate specified in the contract.
 - b. For purposes of projecting future elective annuitization benefits 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. In contrast, for payouts specified at issue, the payout rates modeled should be consistent with those specified in the contract.
2. Projected Election of GMIBs, GMWBs and Other Annuitization Options

For contracts projected to elect future 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 the contract will stay in force, the projected periodic payments are paid, and the associated maintenance expenses are incurred.

F. Frequency of Projection and Time Horizon

1. Use of an annual cash-flow frequency (“timestep”) is generally acceptable for benefits/features that are not sensitive to projection frequency. The lack of sensitivity to projection frequency should be validated by testing wherein the company should determine that the use of a more frequent—i.e., shorter—time step does not materially increase reserves. A more frequent time increment should always be used when the product features are sensitive to projection period frequency.
2. Care must be taken in simulating fee income and expenses when using an annual time step. It is also important that the frequency of the investment return model be linked appropriately to the projection horizon in the liability model. In particular, the horizon should be sufficiently long so as to capture the vast majority of costs (on a present value basis) from the scenarios.

Guidance Note: As a general guide, the forecast horizon should not be less than 20 years.
--

G. Compliance with ASOPs

When determining a stochastic reserve, 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 each applicable ASOP.

Section 5: Reinsurance Ceded and Assumed

A. Treatment of Reinsurance Ceded in the Aggregate Reserve

1. Aggregate Reserve Pre- and Post-Reinsurance Ceded

As noted in Section 3.B, the aggregate reserve is determined both pre-reinsurance ceded and post-reinsurance ceded. Therefore, it is necessary to determine the components needed to determine the aggregate reserve—i.e., the stochastic reserve and/or the reserve amount valued using requirements in VM-A and VM-C, as applicable—on both bases. Sections 5.A.2 and 5.A.3 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

- a. 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 projected reinsurance premiums or other costs and all reinsurance recoveries, where the reinsurance cash flows reflect all the provisions in the reinsurance agreement, using prudent estimate assumptions.
 - i. All significant terms and provisions within reinsurance treaties shall be reflected. In addition, it shall be assumed that each party is knowledgeable about the treaty provisions and will exercise them to their advantage.

Guidance Note: Renegotiation of the treaty upon the expiration of an experience refund provision or at any other time shall not be assumed if such would be beneficial to the company and not beneficial to the counterparty. This is applicable to both the ceding party and assuming party within a reinsurance arrangement.

- ii. If the company has knowledge that a counterparty is financially impaired, the company shall establish a margin for the risk of default by the counterparty. In the absence of knowledge that the counterparty is financially impaired, the company is not required to establish a margin for the risk of default by the counterparty.
 - iii. A company shall include the cash flows from a reinsurance agreement or amendment in calculating the aggregate reserve if such qualifies for credit in compliance with Appendix A-791 of the Accounting Practices and Procedures Manual. If a reinsurance agreement or amendment does not qualify for credit for reinsurance but treating the reinsurance agreement or amendment as if it did so qualify would result in a reduction to the company's surplus, then the company shall increase the minimum reserve by the absolute value of such reductions in surplus.
- b. In order to determine the stochastic reserve on a pre-reinsurance ceded basis, accumulated deficiencies, scenario reserves, and the resulting stochastic reserve shall be determined ignoring the effects of reinsurance ceded within the projections. Different approaches may be used to determine the starting assets on the ceded portion of the contracts, dependent upon the characteristics of a given treaty:
 - i. For a standard coinsurance treaty, where the assets supporting the ceded liabilities were transferred to the assuming reinsurer, one acceptable approach involves a projection

based on using starting assets on the ceded portion of the policies that are similar to those supporting the retained portion of the ceded policies or supporting similar types of policies. Scaling up each asset supporting the retained portion of the contract is also an acceptable method.

Guidance Note: For standard pro rata insurance treaties (does not include experience refunds), where allocated expenses are similar to the renewal expense allowance, reflecting the quota share applied to the present value of future reinsurance cash flows pertaining to the reinsured block of business may be considered as a possible approach to determine the ceded reserves.

- ii. Alternatively, a treaty may contain an identifiable portfolio of assets associated with the ceded liabilities. This could be the case for several forms of reinsurance: funds withheld coinsurance; modified coinsurance; coinsurance with a trust. To the extent these assets would be available to the cedant, an acceptable approach could involve modeling this portfolio of assets. To the extent that these assets were insufficient to defease the ceded liabilities, the modeling would partially default to the approach discussed for a standard coinsurance treaty. To the extent these assets exceeded what might be needed to defease the ceded liabilities (perhaps an over collateralization requirement in a trust), the inclusion of such assets shall be limited.

Guidance Note: Section 3.5.2 in ASOP No. 52, *Principle-Based Reserves for Life Products under the NAIC Valuation Manual*, provides possible methods for constructing a hypothetical pre-reinsurance asset portfolio, if necessary, for purposes of the pre-reinsurance reserve calculation.

- c. An assuming company shall use assumptions to project cash flows to and from ceding companies that reflect the assuming company's experience for the business segment to which the reinsured policies belong and reflect the terms of the reinsurance agreement.

3. Reserve Determined Upon Passing the Exclusion Test

If a company passes the stochastic exclusion test and elects to use a methodology pursuant to applicable Sections VM-A and VM-C, as allowed in Section 3.E, it is important to note that the methodology produces reserves on a pre-reinsurance ceded basis. Therefore, the reserve must be adjusted for any reinsurance ceded accordingly. In addition, reserves valued under applicable Sections in VM-A and VM-C, unadjusted for reinsurance, shall be applied to the contracts falling under the scope of these requirements to determine the aggregate reserve prior to reinsurance.

It should be noted that the pre-reinsurance and post-reinsurance reserves may result in different outcomes for the exclusion test. In particular, it is possible that the pre-reinsurance reserves would pass the relevant exclusion test (and allow the use of VM-A and VM-C) while the post-reinsurance reserves might not.

4. To Be Determined

Section 6: To Be Determined

Section 7: Exclusion Testing

A. Stochastic Exclusion Test Requirement Overview

1. The company may elect to exclude one or more groups of contracts from the stochastic reserve calculation if the stochastic exclusion test (SET) is satisfied for that group of contracts. The company has the option to calculate or not calculate the SET.
 - a. If the company does not elect to calculate the SET for one or more groups of contracts, or the company calculates the SET and fails the test for such groups of contracts, the reserve methodology described in Section 4 shall be used for calculating the aggregate reserve for those groups of contracts.
 - b. If the company elects to calculate the SET for one or more groups of contracts, and passes the test for such groups of contracts, then the company shall choose whether or not to use the reserve methodology described in Section 4 for those groups of contracts. If the reserve methodology described in Section 4 is not used for one or more groups of contracts, then the company shall use the reserve methodology pursuant to applicable requirements in VM-A and VM-C to calculate the aggregate reserve for those groups of contracts.
 - c. A company may not exclude a group of contracts from the stochastic reserve requirements if there are one or more future hedging programs associated with the contracts, with the exception of hedging programs solely supporting index credits as described in Section 9.A.1.

B. Types of Stochastic Exclusion Tests

Groups of contracts pass the SET if one of the following is met:

1. Stochastic Exclusion Ratio Test (SERT)—Annually the company demonstrates that the groups of contracts pass the SERT defined in Section 7.C.
2. Stochastic Exclusion Demonstration Test—In the first year and at least once every three calendar years thereafter, the company provides a demonstration in the PBR Actuarial Report as specified in Section 7.D.
3. SET Certification Method—For groups of contracts that do not have guaranteed living benefits, future hedging programs, or pension risk transfer business in the first year and at least every third calendar year thereafter, the company provides a certification by a qualified actuary that the group of contracts is not subject to material aggregate risk levels across interest rate risk, longevity risk, or asset return volatility risk (i.e., the risk on non-fixed-income investments having substantial volatility of returns, such as common stocks and real estate investments). The company shall provide the certification and documentation supporting the certification to the commissioner upon request.

Guidance Note: The qualified actuary should develop documentation to support the actuarial certification that presents his or her analysis clearly and in detail sufficient for another actuary to understand the analysis and reasons for the actuary's conclusion that the group of contracts is not subject to material interest rate risk, longevity risk, or asset return volatility risk. Examples of methods a qualified actuary could use to support the actuarial certification include, but are not limited to:

- a) A demonstration that using requirements under VM-A and VM-C for the group of contracts calculated are at least as great as the assets required to support the group of contracts using the company's cash-flow testing model under each of the 16 scenarios identified in this section or alternatively each of the New York seven scenarios.
- b) A demonstration that the group of contracts passed the SERT within 36 months prior to the valuation date and the company has not had a material change in its interest rate risk.
- c) A qualitative risk assessment of the group of contracts that concludes that the group of contracts does not have material interest rate risk or asset return volatility. Such assessment would include an analysis of product guarantees, the company's non-guaranteed elements (NGEs) policy, assets backing the group of contracts and the company's investment strategy.

C. Stochastic Exclusion Ratio Test

1. In order to exclude a group of contracts from the stochastic reserve requirements under the stochastic exclusion ratio test (SERT), a company shall demonstrate that the ratio of $(b-a)/a$ is less than $[x]\%$ where:
 - a. a = the adjusted scenario reserve described in Paragraph C.2.a.i below using economic scenario 9, the baseline economic scenario, as described in Appendix 1.E of VM-20.
 - b. b = the largest adjusted scenario reserve described in Paragraph C.2.b below under any of the other 15 economic scenarios described in Appendix 1.E of VM-20 under both $[95]\%$ and $[105]\%$ of anticipated experience mortality excluding margins.

Guidance Note: Note that the numerator should be the largest adjusted scenario reserve for scenarios other than the baseline economic scenario, minus the adjusted scenario reserve for the baseline economic scenario. This is not necessarily the same as the biggest difference from the adjusted scenario reserve for the baseline economic scenario, or the absolute value of the biggest difference from the adjusted scenario reserve for the baseline economic scenario, both of which could lead to an incorrect test result.

2. In calculating the ratio in subsection (1) above:
 - a. The company shall calculate an adjusted scenario reserve for the group of contracts for the 16 scenarios that is equal to either (i) or (ii) below:
 - i. The scenario reserve defined in Section 4, but with the following differences:
 - a) Using anticipated experience assumptions with no margins, with the exception of mortality factors described in Paragraph C.1.b of this section.
 - b) Using the interest rates and equity return assumptions specific to each scenario.
 - c) Using NAER and discount rates defined in Section 4 specific to each scenario to discount the cash flows.

- d) Shall reflect future mortality improvement in line with anticipated experience assumptions.
- e) Shall not reflect correlation between longevity and economic risks.
- ii. The gross premium reserve developed from the cash flows from the company's asset adequacy analysis models, using the experience assumptions of the company's cash-flow analysis, but with the following differences:
 - a) Using the interest rates and equity return assumptions specific to each scenario.
 - b) Using the mortality scalars described in Paragraph C.1.b of this section.
 - c) Using the methodology to determine NAER and discount rates defined in Section 4 specific to each scenario to discount the cash flows, but using the company's cash-flow testing assumptions for default costs and reinvestment earnings.
- b. The company shall use the most current 16 economic scenarios published by the NAIC. The methodology for creating these scenarios can be found in Appendix 1 of VM-20.
- c. The company shall use assumptions within each scenario that are dynamically adjusted as appropriate for consistency with each tested scenario.
- d. The company may not group together contract types with significantly different risk profiles for purposes of calculating this ratio.
- e. If the company has reinsurance arrangements that are pro rata coinsurance and do not materially impact the interest rate risk, longevity risk, or asset return volatility in the contract, then the company may elect to not conduct the exclusion test under a pre-reinsurance-ceded basis upon determining the pre-reinsurance reserve-ceded aggregate reserve.
- 3. If the ratio calculated in this section is less than [x]% pre-non-proportional reinsurance, but is greater than [x]% post-non-proportional reinsurance, the group of contracts will still pass the SERT if the company can demonstrate that the sensitivity of the adjusted scenario reserve to economic scenarios is comparable pre- and post-non-proportional reinsurance.
 - a. An example of an acceptable demonstration:
 - i. For convenience in notation • $SERT = \frac{(b-a)}{a}$ defined in Section 7.C.1 above
 - a) The pre-non-proportional reinsurance results are “gross of non-proportional,” with a subscript “gn,” so denoted $SERT_{gn}$
 - b) The post-non-proportional results are “net of non-proportional,” with subscript “nn,” so denoted $SERT_{nn}$

- ii. If a block of business being tested is subject to one or more non-proportional reinsurance cessions as well as other forms of reinsurance, such as pro rata coinsurance, take “gross of non-proportional” to mean net of all prorata reinsurance but ignoring the non-proportional contract(s), and “net of non-proportional” to mean net of *all* reinsurance contracts. That is, treat non-proportional reinsurance as the last reinsurance in, and compute certain values below with and without that last component.
- iii. So, if $SERT_{gn} \leq [x]$ but $SERT_{nn} > [x]$, then compute the largest percent increase in reserve (LPIR) = $(b-a)/a$, both “gross of non-proportional” and “net of non-proportional.”

$$LPIR_{gn} = (b_{gy} - a_{gy})/a_{gn}$$

$$LPIR_{nn} = (b_{ny} - a_{ny})/a_{nn}$$

Note that the scenario underlying b_{gn} could be different from the scenario underlying b_{nn} .

If $SERT_{gn} \times LPIR_{nn}/LPIR_{gn} < [x]$, then the block of contracts passes the SERT.

- b. Another more qualitative approach is to calculate the adjusted scenario reserves for the 16 scenarios both gross and net of reinsurance to demonstrate that there is a similar pattern of sensitivity by scenario.
4. The SERT may not be used for a group of contracts if, using the current year’s data, (i) the stochastic exclusion demonstration test defined in Section 7.D had already been attempted using the method in this section and did not pass; or (ii) the qualified actuary had actively undertaken to perform the certification method in this section and concluded that such certification could not legitimately be made.

D. Stochastic Exclusion Demonstration Test

1. In order to exclude a group of contracts from the stochastic reserve requirements using the methodology in this section, the company must provide a demonstration in the PBR Actuarial Report in the first year and at least once every three calendar years thereafter that complies with the following:
 - a. The demonstration shall provide a reasonable assurance that if the stochastic reserve was calculated on a stand-alone basis for the group of contracts subject to the stochastic reserve exclusion, the resulting stochastic reserve for those groups of contracts would not be higher than the statutory reserve determined pursuant to the applicable requirements in VM-A and VM-C. The demonstration shall take into account whether changing conditions over the current and two subsequent calendar years would be likely to change the conclusion to exclude the group of contracts from the stochastic reserve requirements.
 - b. If, as of the end of any calendar year, the company determines the aggregate reserve for the group of contracts no longer adequately provides for all material risks, the exclusion shall be discontinued, and the company fails the SERT for those contracts.

- c. The demonstration may be based on analysis from a date that precedes the valuation date for the initial year to which it applies if the demonstration includes an explanation of why the use of such a date will not produce a material change in the outcome, as compared to results based on an analysis as of the valuation date.
 - d. The demonstration shall provide an effective evaluation of the residual risk exposure remaining after risk mitigation techniques, such as derivative programs and reinsurance.
2. The company may use one of the following or another method acceptable to the insurance commissioner to demonstrate compliance with subsection 7.D.1 above:
 - a. Demonstrate that the statutory reserve calculated in accordance with VM-A and VM-C is greater than the stochastic reserve calculated on a stand-alone basis.
 - b. Demonstrate that the statutory reserve calculated in accordance with VM-A and VM-C is greater than the scenario reserve that results from each of a sufficient number of adverse deterministic scenarios.
 - c. Demonstrate that the statutory reserve calculated in accordance with VM-A and VM-C is greater than the stochastic reserve calculated on a stand-alone basis, but using a representative sample of contracts in the stochastic reserve calculations.
 - d. Demonstrate that any risk characteristics that would otherwise cause the stochastic reserve calculated on a stand-alone basis to exceed the statutory reserve calculated in accordance with VM-A and VM-C, are not present or have been substantially eliminated through actions such as hedging, investment strategy, reinsurance or passing the risk on to the policyholder by contract provision.

E. Deterministic Certification Option

1. The company has the option to determine the stochastic reserve for a group of contracts using a single deterministic economic scenario, subject to the following conditions.
 - a. The company certifies that economic conditions do not materially influence anticipated contract holder behavior for the group of policies. Examples of contract holder options that are materially influenced by economic conditions include surrender benefits, recurring premium payments, and guaranteed living benefits.
 - b. The company certifies that the group of policies is not supported by a reinvestment strategy that contains future hedge purchases.
 - c. The company must perform and disclose results from the stochastic exclusion ratio test following the requirements in Section 7.C, thereby disclosing the scenario reserve volatility across various economic scenarios.

- d. The company must disclose a description of contracts and associated features in the certification.

Drafting Note: Consider revisiting Paragraph E.1.c to possibly either require i) falling below a preset threshold for the exclusion ratio test under a single longevity/mortality scenario; or ii) to pass the exclusion test if longevity is not included as part of the ratio test.

2. The stochastic reserve for the group of contracts under the Deterministic Certification Option is determined as follows:
 - a. Cash flows are projected in compliance with the applicable requirements in Section 4, Section 5, Section 10, and Section 11 of VM-22 over a single economic scenario (scenario 12 found in Appendix 1 of VM-20).
 - b. The stochastic reserve equals the scenario reserve following the requirements for Section 4.

Guidance Note: The Deterministic Certification Option is intended to provide a non-stochastic option for Single Premium Immediate Annuities (SPIAs) and similar payout annuity products that contain limited or no optionality in the asset and liability cash flow projections.

Section 8: To Be Determined (Scenario Generation for VM-21)

Section 9: Modeling Hedges under a Future Hedging Strategy

A. Initial Considerations

1. This section applies to modeling of hedges other than situations where the company (a) only hedges index credits, or (b) clearly separates index credit hedging from other hedging. In those situations, the modeling of hedges supporting index credits can be simplified including applying an index credit hedge margin, following the requirements in Section 4.A.4.b.i.
2. 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 calculation of the stochastic reserve, determined in accordance with Section 3.D and Section 4.D.
3. The company shall take into account the costs and benefits of hedge positions expected to be held by the company in the future along each scenario. Company management is responsible for developing, documenting, executing and evaluating the investment strategy for future hedge purchases. Prior to reflection in projections, the strategy for future hedge purposes shall be the actual practice of the company for a period of time not less than 6 months.
4. For this purpose, the investment assets refer to all the assets, including derivatives supporting covered products and guarantees. This also is referred to as the investment portfolio. The investment strategy is the set of all asset holdings at all points in time in all scenarios. The hedging portfolio, which also is referred to as the hedging assets, is a subset of the investment assets. The hedging strategy is the hedging asset holdings at all points in time in all scenarios. There is no attempt to distinguish what is the hedging portfolio and what is the investment portfolio in this section. Nor is the distinction between investment strategy and hedging strategy formally made here. Where necessary to give effect to the intent of this section, the requirements applicable to the hedging portfolio or the hedging strategy are to apply to the overall investment portfolio and investment strategy.
5. This particularly applies to restrictions on the reasonableness or acceptability of the models that make up the stochastic cash-flow model used to perform the projections, since these restrictions are inherently restrictions on the joint modeling of the hedging and non-hedging portfolio. To give effect to these requirements, they must apply to the overall investment strategy and investment portfolio.

B. Modeling Approaches

1. The analysis of the impact of the hedging strategy on cash flows is typically performed using either one of two types of methods as described below. Although a hedging strategy normally would be expected to reduce risk provisions, the nature of the hedging strategy and the costs to implement the strategy may result in an increase in the amount of the stochastic reserve otherwise calculated.
2. The fundamental characteristic of the first type of method, referred to as the “explicit method,” is that hedging positions and their resulting cash flows are included in the stochastic cash-flow model used to determine the scenario reserve, as discussed in Section 3.D, for each scenario.

3. The fundamental characteristic of the second type of method, referred to as the “implicit method,” is that the effectiveness of the current hedging strategy on future cash flows is evaluated, in part or in whole, outside of the stochastic cash-flow model. There are multiple ways that this type of modeling can be implemented. In this case, the reduction to the stochastic reserve otherwise calculated should be commensurate with the degree of effectiveness of the hedging strategy in reducing accumulated deficiencies otherwise calculated.
4. Regardless of the methodology used by the company, the ultimate effect of the current hedging strategy (including currently held hedge positions) on the stochastic reserve needs to recognize all risks, associated costs, imperfections in the hedges and hedging mismatch tolerances associated with the hedging strategy. The risks include, but are not limited to: basis, gap, price, parameter estimation and variation in assumptions (mortality, persistency, withdrawal, annuitization, etc.). Costs include, but are not limited to: transaction, margin (opportunity costs associated with margin requirements) and administration. In addition, the reduction to the stochastic reserve attributable to the hedging strategy may need to be limited due to the uncertainty associated with the company’s ability to implement the hedging strategy in a timely and effective manner. The level of operational uncertainty varies indirectly with the amount of time that the new or revised strategy has been in effect or mock tested.

Guidance Note: No hedging strategy is perfect. A given hedging strategy may eliminate or reduce some but not all risks, transform some risks into others, introduce new risks, or have other imperfections. For example, a delta-only hedging strategy does not adequately hedge the risks measured by the “Greeks” other than delta.

5. A safe harbor approach is permitted for those companies whose modeled hedge assets comprise only linear instruments not sensitive to implied volatility. For companies with option-based hedge strategies, electing this approach would require representing the option-based portion of the strategy as a delta-rho two-Greek hedge program. The normally modeled option portfolio would be replaced with a set of linear instruments that have the same first-order Greeks as the original option portfolio.

C. Calculation of Stochastic Reserve (Reported)

1. The company shall calculate CTE70 (best efforts)—the results obtained when the CTE70 is based on incorporating the modeling of hedges (including both currently held and future hedge positions) into the stochastic cash-flow model on a best efforts basis, including all of the factors and assumptions needed to model the hedges (e.g., stochastic implied volatility). The determination of CTE70 (best efforts) may utilize either explicit or implicit modeling techniques.
2. The company shall calculate a CTE70 (adjusted) by recalculating the CTE70 assuming the company has no hedging strategy except those to hedge interest credits and hedge assets held by the company on the valuation date, therefore following the requirements of Section 4.A.4.a and 4.A.4.b.i.
3. Because most models will include at least some approximations or idealistic assumptions, CTE70 (best efforts) may overstate the impact of the hedging strategy. To compensate for potential overstatement of the impact of the hedging strategy, the value for the stochastic reserve is given by:

$$\text{Stochastic reserve} = \text{CTE70 (best efforts)} + E \times \max[0, \text{CTE70 (adjusted)} - \text{CTE70 (best efforts)}]$$

4. The company shall specify a value for E (the “error factor”) in the range from 5% to 100% to reflect the company’s view of the potential error resulting from the level of sophistication of the stochastic cash-flow model and its ability to properly reflect the parameters of the hedging strategy (i.e., the Greeks being covered by the strategy), as well as the associated costs, risks and benefits. The greater the ability of the stochastic model to capture all risks and uncertainties, the lower the value of E . The value of E may be as low as 5% only if the model used to determine the CTE70 (best efforts) effectively reflects all of the parameters used in the hedging strategy. If certain economic risks are not hedged, yet the model does not generate scenarios that sufficiently capture those risks, E must be in the higher end of the range, reflecting the greater likelihood of error. Likewise, simplistic hedge cash-flow models shall assume a higher likelihood of error.
5. The company shall conduct a formal back-test, based on an analysis of at least the most recent 12 months, to assess how well the model is able to replicate the hedging strategy in a way that supports the determination of the value used for E .
6. Such a back-test shall involve one of the following analyses:
 - a. For companies that model hedge cash flows directly (“explicit method”), replace the stochastic scenarios used in calculating the CTE70 (best efforts) with a single scenario that represents the market path that actually manifested over the selected back-testing period and compare the projected hedge asset gains and losses against the actual hedge asset gains and losses – both realized and unrealized – observed over the same time period. For this calculation, the model assumptions may be replaced with parameters that reflect actual experience during the back-testing period. In order to isolate the comparison between the modeled hedge results and actual hedge results for this calculation, the projected liabilities should accurately reflect the actual liabilities throughout the back-testing period; therefore, adjustments that facilitate this accuracy (e.g. reflecting actual experience instead of model assumptions, including new business, etc.) are permissible.

To support the choice of a low value of E , the company should ascertain that the projected hedge asset gains and losses are within close range of 100% (e.g., 80–125%) of the actual hedge asset gains and losses. The company may also support the choice of a low value of E by achieving a high R-squared (e.g., 0.80 or higher) when using a regression analysis technique.

- b. For companies that model hedge cash flows implicitly by quantifying the cost and benefit of hedging using the fair value of the hedged item (an “implicit method” or “cost of reinsurance method”), calculate the delta, rho and vega coverage ratios in each month over the selected back-testing period in the following manner:
 - i. Determine the hedge asset gains and losses—both realized and unrealized—incurred over the month attributable to equity, interest rate, and implied volatility movements.
 - ii. Determine the change in the fair value of the hedged item over the month attributable to equity, interest rate, and implied volatility movements. The hedged item should be defined in a manner that reflects the proportion of risks hedged (e.g., if a company elects to hedge 50% of a contract’s market risks, it should quantify the fair value of the hedged item as 50% of the fair value of the contract).
 - iii. Calculate the delta coverage ratio as the ratio between (i) and (ii) attributable to equity movements.

- iv. Calculate the rho coverage ratio as the ratio between (i) and (ii) attributable to interest rate movements.
 - v. Calculate the vega coverage ratio as the ratio between (i) and (ii) attributable to implied volatility movements.
 - vi. To support the company's choice of a low value of E, the company should be able to demonstrate that the delta and rho coverage ratios are both within close range of 100 % (e.g., 80–125%) consistently across the back-testing period.
 - vii. In addition, the company should be able to demonstrate that the vega coverage ratio is within close range of 100 % in order to use the prevailing implied volatility levels as of the valuation date in quantifying the fair value of the hedged item for the purpose of calculating CTE70 (best efforts). Otherwise, the company shall quantify the fair value of the hedged item for the purpose of calculating CTE70 (best efforts) in a manner consistent with the realized volatility of the scenarios captured in the CTE (best efforts).
- c. Companies that do not model hedge cash flows explicitly, but that also do not use the implicit method as outlined in Section 9.C.6.b above, shall conduct the formal back-test in a manner that allows the company to clearly illustrate the appropriateness of the selected method for reflecting the cost and benefit of hedging, as well as the value used for E.
7. A company that does not have 12 months of experience to date shall set E to a value that reflects the amount of experience available, and the degree and nature of any change to the hedge program. For a material change in strategy, with no history, E should be at least 0.50. However, E may be lower than 0.50 if some reliable experience is available and/or if the change in strategy is a refinement rather than a substantial change in strategy.

Guidance Note: The following examples are provided as guidance for determining the E factor when there has been a change to the hedge program:

- The error factor should be temporarily large (e.g., $\geq 50\%$) for substantial changes in hedge methodology (e.g., moving from a fair-value based strategy to a stop-loss strategy) where the company has not been able to provide a meaningful simulation of hedge performance based on the new strategy.
- A temporary moderate increase (e.g., 15–30%) in error factor should be used for substantial modifications to hedge programs or modeling where meaningful simulation has not been created (e.g., adding second-order hedging, such as gamma or rate convexity).
- No increase in the error factor may be used for incremental modifications to the hedge strategy (e.g., adding death benefits to a program that previously covered only living benefits, or moving from swaps to Treasury Department futures).

D. Specific Considerations and Requirements

1. As part of the process of choosing a methodology and assumptions for estimating the future effectiveness of the current hedging strategy (including currently held hedge positions) for

purposes of reducing the stochastic reserve, the company should review actual historical hedging effectiveness. The company shall evaluate the appropriateness of the assumptions on future trading, transaction costs, other elements of the model, the strategy, the mix of business and other items that are likely to result in materially adverse results. This includes an analysis of model assumptions that, when combined with the reliance on the hedging strategy, are likely to result in adverse results relative to those modeled. The parameters and assumptions shall be adjusted (based on testing contingent on the strategy used and other assumptions) to levels that fully reflect the risk based on historical ranges and foreseeable future ranges of the assumptions and parameters. If this is not possible by parameter adjustment, the model shall be modified to reflect them at either anticipated experience or adverse estimates of the parameters.

2. A discontinuous hedging strategy is a hedging strategy where the relationships between the sensitivities to equity markets and interest rates (commonly referred to as the Greeks) associated with the guaranteed contract holder options embedded in the fixed indexed annuities and other in-scope products and these same sensitivities associated with the hedging assets are subject to material discontinuities. This includes, but is not limited to, a hedging strategy where material hedging assets will be obtained when the fixed indexed annuity account balances reach a predetermined level in relationship to the guarantees. Any hedging strategy, including a delta hedging strategy, can be a discontinuous hedging strategy if implementation of the strategy permits material discontinuities between the sensitivities to equity markets and interest rates associated with the guaranteed contract holder options embedded in the fixed indexed annuities and other in-scope products and these same sensitivities associated with the hedging assets. There may be scenarios that are particularly costly to discontinuous hedging strategies, especially where those result in large discontinuous changes in sensitivities (Greeks) associated with the hedging assets. Where discontinuous hedging strategies contribute materially to a reduction in the stochastic reserve, the company must evaluate the interaction of future trigger definitions and the discontinuous hedging strategy, in addition to the items mentioned in the previous paragraph. This includes an analysis of model assumptions that, when combined with the reliance on the discontinuous hedging strategy, may result in adverse results relative to those modeled.
3. A strategy that has a strong dependence on acquiring hedging assets at specific times that depend on specific values of an index or other market indicators may not be implemented as precisely as planned.
4. The combination of elements of the stochastic cash-flow model—including the initial actual market asset prices, prices for trading at future dates, transaction costs and other assumptions—should be analyzed by the company as to whether the stochastic cash-flow model permits hedging strategies that make money in some scenarios without losing a reasonable amount in some other scenarios. This includes, but is not limited to:
 - a. Hedging strategies with no initial investment that never lose money in any scenario and in some scenarios make money.
 - b. Hedging strategies that, with a given amount of initial money, never make less than accumulation at the one-period risk-free rates in any scenario but make more than this in one or more scenarios.
5. If the stochastic cash-flow model allows for such situations, the company should be satisfied that the results do not materially rely directly or indirectly on the use of such strategies. If the results do materially rely directly or indirectly on the use of such strategies, the strategies may not be used to reduce the stochastic reserve otherwise calculated.

6. In addition to the above, the method used to determine prices of financial instruments for trading in scenarios should be compared to actual initial market prices. In addition to comparisons to initial market prices, there should be testing of the pricing models that are used to determine subsequent prices when scenarios involve trading financial instruments. This testing should consider historical relationships. For example, if a method is used where recent volatility in the scenario is one of the determinants of prices for trading in that scenario, then that model should approximate actual historic prices in similar circumstances in history.

Section 10: Guidance and Requirements for Setting Contract Holder Behavior Prudent Estimate Assumptions

A. General

Contract holder behavior assumptions encompass actions such as lapses, withdrawals, transfers, recurring deposits, benefit utilization, option election, etc. Contract holder behavior is difficult to predict accurately, and variance in behavior assumptions can significantly affect the results. In the absence of relevant and fully credible empirical data, the company should set behavior assumptions as guided by Principle 3 in Section 1.B.

In setting behavior assumptions, the company should examine, but not be limited by, the following considerations:

1. Behavior can vary by product, market, distribution channel, index performance, interest credited (current and guaranteed rates), time/product duration, etc.
2. Options embedded in the product may affect behavior.
3. Utilization of options may be elective or non-elective in nature. Living benefits often are elective, and death benefit options are generally non-elective.
4. Elective contract holder options may be more driven by economic conditions than non-elective options.
5. As the value of a product option increases, there is an increased likelihood that contract holders will behave in a manner that maximizes their financial interest (e.g., lower lapses, higher benefit utilization, etc.).
6. Behavior formulas may have both rational and irrational components (irrational behavior is defined as situations where some contract holders may not always act in their best financial interest). The rational component should be dynamic, but the concept of rationality need not be interpreted in strict financial terms and might change over time in response to observed trends in contract holder behavior based on increased or decreased financial efficiency in exercising their contractual options.
7. Options that are ancillary to the primary product features may not be significant drivers of behavior. Whether an option is ancillary to the primary product features depends on many things, such as:
 - a. For what purpose was the product purchased?
 - b. Is the option elective or non-elective?
 - c. Is the value of the option well-known?
8. External influences may affect behavior.

B. Aggregate vs. Individual Margins

1. Prudent estimate assumptions are developed by applying a margin for uncertainty to the anticipated experience assumption. The issue of whether the level of the margin applied to the anticipated experience assumption is determined in aggregate or independently for each and every behavior assumption is discussed in Principle 3 in Section 1.B.

2. Although this principle discusses the concept of determining the level of margins in aggregate, it notes that the application of this concept shall be guided by evolving practice and expanding knowledge. From a practical standpoint, it may not always be possible to completely apply this concept to determine the level of margins in aggregate for all behavior assumptions.
3. Therefore, the company shall determine prudent estimate assumptions independently for each behavior (e.g., mortality, lapses and benefit utilization), using the requirements and guidance in this section and throughout these requirements, unless the company can demonstrate that an appropriate method was used to determine the level of margin in aggregate for two or more behaviors.

C. Sensitivity Testing

The impact of behavior can vary by product, time period, etc. For any assumption that is not prescribed or stochastically modeled, the qualified actuary to whom responsibility for this group of contracts is assigned shall use sensitivity testing to ensure that the assumption is set at the conservative end of the plausible range. The company shall sensitivity test:

- Surrenders.
- Partial withdrawals.
- Benefit utilization.
- Other behavior assumptions if relevant to the risks in the product.

Sensitivity testing of assumptions is required and shall be more complex than, for example, base lapse assumption plus or minus X% across all contracts. A more appropriate sensitivity test in this example might be to devise parameters in a dynamic lapse formula to reflect more out-of-the-money contracts lapsing and/or more holders of in-the-money contracts persisting and eventually using the guarantee. The company should apply more caution in setting assumptions for behaviors where testing suggests that stochastic modeling results are sensitive to small changes in such assumptions. For such sensitive behaviors, the company shall use higher margins when the underlying experience is less than fully relevant and credible.

The company shall examine the results of sensitivity testing to understand the materiality of prudent estimate assumptions on the modeled reserve. The company shall update the sensitivity tests periodically as appropriate, considering the materiality of the results of the tests. The company may update the tests less frequently when the tests show less sensitivity of the modeled reserve to changes in the assumptions being tested or the experience is not changing rapidly. Providing there is no material impact on the results of the sensitivity testing, the company may perform sensitivity testing:

1. Using samples of the contracts in force rather than performing the entire valuation for each alternative assumption set.
2. Using data from prior periods.

D. Specific Considerations and Requirements

1. Within materiality considerations, the company should consider all relevant forms of contract holder behavior and persistency, including, but not limited to, the following:

- a. Mortality (additional guidance and requirements regarding mortality is contained in Section 11).
 - b. Surrenders.
 - c. Partial withdrawals (systematic and elective).
 - d. Account transfers (switching/exchanges).
 - e. Resets/ratchets of the guaranteed amounts (automatic and elective).
 - f. Future deposits.
 - g. Income start date
 - h. Commutation of benefit (from periodic payment to lump sum)
2. It may be acceptable to ignore certain items that might otherwise be explicitly modeled in an ideal world, particularly if the inclusion of such items reduces the calculated provisions.

For example:

- a. The impact of account transfers (intra-contract index “switching”) might be ignored, unless required under the terms of the contract (e.g., automatic asset re-allocation/rebalancing,) or if the contract provisions incentivize the contract holders to transfer between accounts.
 - b. Future deposits might be excluded from the model, unless required by the terms of the contracts under consideration and then only in such cases where future premiums can reasonably be anticipated (e.g., with respect to timing and amount).
 - c. For some non-elective benefits (nursing home benefits for example), a zero incidence rate after the surrender charge has ended, or the cash value has depleted, may be acceptable since use of a non-zero rate could reduce the modeled reserve.
3. However, the company should exercise caution in assuming that current behavior will be indefinitely maintained. For example, it might be appropriate to test the impact of a shifting asset mix and/or consider future deposits to the extent they can reasonably be anticipated and increase the calculated amounts.
4. Normally, the underlying model assumptions would differ according to the attributes of the contract being valued. This would typically mean that contract holder behavior and persistency may be expected to vary according to such characteristics as (this is not an exhaustive list):
- a. Gender.
 - b. Attained age.
 - c. Issue age.
 - d. Contract duration.
 - e. Time to maturity.

- f. Tax status.
 - g. Account value.
 - h. Interest credited (current and guaranteed).
 - i. Available indices.
 - j. Guaranteed benefit amounts.
 - k. Surrender charges, transfer fees or other contract charges.
 - l. Distribution channel.
5. Unless there is clear evidence to the contrary, behavior assumptions should be no less conservative than past experience. Margins for contract holder behavior assumptions shall assume, without relevant and credible experience or clear evidence to the contrary, that contract holders' efficiency will increase over time.
 6. In determining contract holder behavior assumptions, the company shall use actual experience data directly applicable to the business segment (i.e., direct data) if it is available. In the absence of direct data, the company should then look to use data from a segment that is similar to the business segment (i.e., other than direct experience), whether or not the segment is directly written by the company. If data from a similar business segment are used, the assumption shall be adjusted to reflect differences between the two segments. Margins shall reflect the data uncertainty associated with using data from a similar but not identical business segment.
 7. Where relevant and fully credible empirical data do not exist for a given contract holder behavior assumption, the company shall set the contract holder behavior assumption to reflect the increased uncertainty such that the contract holder behavior assumption is shifted towards the conservative end of the plausible range of expected experience that serves to increase the stochastic reserve. If there are no relevant data, the company shall set the contract holder behavior assumption to reflect the increased uncertainty such that the contract holder behavior assumption is at the conservative end of the range. Such adjustments shall be consistent with the definition of prudent estimate, with the principles described in Section 1.B, and with the guidance and requirements in this section.
 8. Ideally, contract holder behavior would be modeled dynamically according to the simulated economic environment and/or other conditions. It is important to note, however, that contract holder behavior should neither assume that all contract holders act with 100% efficiency in a financially rational manner nor assume that contract holders will always act irrationally. These extreme assumptions may be used for modeling efficiency if the result is more conservative.

E. Dynamic Assumptions

1. Consistent with the concept of prudent estimate assumptions described earlier, the liability model should incorporate margins for uncertainty for all risk factors that are not dynamic (i.e., the non-scenario tested assumptions) and are assumed not to vary according to the financial interest of the contract holder.
2. The company should exercise care in using static assumptions when it would be more natural and reasonable to use a dynamic model or other scenario-dependent formulation for behavior. With due regard to considerations of materiality and practicality, the use of

dynamic models is encouraged, but not mandatory. Risk factors that are not scenario tested but could reasonably be expected to vary according to a stochastic process, or future states of the world (especially in response to economic drivers) may require higher margins and/or signal a need for higher margins for certain other assumptions.

3. Risk factors that are modeled dynamically should encompass the plausible range of behavior consistent with the economic scenarios and other variables in the model, including the non-scenario tested assumptions. The company shall test the sensitivity of results to understand the materiality of making alternate assumptions and follow the guidance discussed above on setting assumptions for sensitive behaviors.

F. Consistency with the CTE Level

1. All behaviors (i.e., dynamic, formulaic and non-scenario tested) should be consistent with the scenarios used in the CTE calculations (generally, the top 30% of the loss distribution). To maintain such consistency, it is not necessary to iterate (i.e., successive runs of the model) in order to determine exactly which scenario results are included in the CTE measure. Rather, in light of the products being valued, the company should be mindful of the general characteristics of those scenarios likely to represent the tail of the loss distribution and consequently use prudent estimate assumptions for behavior that are reasonable and appropriate in such scenarios. For fixed annuities, these “valuation” scenarios would typically display one or more of the following attributes:
 - a. Declining and/or volatile index values, where applicable.
 - b. Price gaps and/or liquidity constraints.
 - c. Rapidly changing interest rates or persistently low interest rates.
 - d. Volatile credit spreads.
2. The behavior assumptions should be logical and consistent both individually and in aggregate, especially in the scenarios that govern the results. In other words, the company should not set behavior assumptions in isolation, but give due consideration to other elements of the model. The interdependence of assumptions (particularly those governing customer behaviors) makes this task difficult and by definition requires professional judgment, but it is important that the model risk factors and assumptions:
 - a. Remain logically and internally consistent across the scenarios tested.
 - b. Represent plausible outcomes.
 - c. Lead to appropriate, but not excessive, asset requirements.
4. The company should remember that the continuum of “plausibility” should not be confined or constrained to the outcomes and events exhibited by historic experience.
5. Companies should attempt to track experience for all assumptions that materially affect their risk profiles by collecting and maintaining the data required to conduct credible and meaningful studies of contract holder behavior.

G. Additional Considerations and Requirements for Assumptions Applicable to Guaranteed Living Benefits

Experience for contracts without guaranteed living benefits may be of limited use in setting a lapse assumption for contracts with in-the-money or at-the-money guaranteed living benefits. Such experience may only be used if it is appropriate (e.g., lapse experience on contracts without a living benefit may have relevance to the early durations of contracts with living benefits) and relevant to the business.

H. Policy Loans

If policy loans are applicable for the block of business, the company shall determine cash flows for each projection interval for policy loan assets by modeling existing loan balances either explicitly or by substituting assets that are a proxy for policy loans (e.g., bonds, cash, etc.) subject to the following:

1. If the company substitutes assets that are a proxy for policy loans, the company must demonstrate that such substitution:
 - a. Produces reserves that are no less than those that would be produced by modeling existing loan balances explicitly.
 - b. Complies with the contract holder behavior requirements stated in Section 10 above in this section.
2. If the company models policy loans explicitly, the company shall:
 - a. Treat policy loan activity as an aspect of contract holder behavior and subject to the requirements above in this section.
 - b. Assign loan balances either to exactly match each policy's utilization or to reflect average utilization over a model segment or sub-segments.
 - c. Model policy loan interest in a manner consistent with policy provisions and with the scenario. Include interest paid in cash as a positive policy loan cash flow in that projection interval, but do not include interest added to the loan balance as a policy loan cash flow. (The increased balance will require increased repayment cash flows in future projection intervals.)
 - d. Model policy loan principal repayments, including those that occur automatically upon death or surrender. Include policy loan principal repayments as a positive policy loan cash flow, per Section 4.A.1.h.
 - e. Model additional policy loan principal. Include additional policy loan principal as a negative policy loan cash flow, per Section 4.A.1.h (but do not include interest added to the loan balance as a negative policy loan cash flow).
 - f. Model any investment expenses allocated to policy loans and include them either with policy loan cash flows or insurance expense cash flows.

I. Non-Guaranteed Elements

Consistent with the definition in VM-01, Non-Guaranteed Elements (NGEs) are elements within a contract that affect policy costs or values and not guaranteed or not determined at issue. NGEs consist of elements affecting contract holder costs or values that are both established and subject to change at the discretion of the insurer.

Examples of NGEs specific to fixed annuities include but are not limited to the following: fixed credited rates, index parameters (caps, spreads, participation rates, etc.), rider fees, rider benefit features being subject to change (rollup rates, rollup period, etc.), account value charges, and dividends under participating policies or contracts.

1. Except as noted below in Section 10.J.5, the company shall include NGE in the models to project future cash flows beyond the time the company has authorized their payment or crediting.
2. The projected NGE shall reflect factors that include, but are not limited to, the following (not all of these factors will necessarily be present in all situations):
 - a. The nature of contractual guarantees.
 - b. The company's past NGE practices and established NGE policies.
 - c. The timing of any change in NGE relative to the date of recognition of a change in experience.
 - d. The benefits and risks to the company of continuing to authorize NGE.
3. Projected NGE shall be established based on projected experience consistent with how actual NGE are determined.
4. Projected levels of NGE in the cash-flow model must be consistent with the experience assumptions used in each scenario. Contract holder behavior assumptions in the model must be consistent with the NGE assumed in the model.
5. The company may exclude any portion of an NGE that:
 - a. Is not based on some aspect of the policy's or contract's experience.
 - b. Is authorized by the board of directors and documented in the board minutes, where the documentation includes the amount of the NGE that arises from other sources.

However, if the board has guaranteed a portion of the NGE into the future, the company must model that amount. In other words, the company cannot exclude from its model any NGE that the board has guaranteed for future years, even if it could have otherwise excluded them, based on this subsection.
6. The liability for contract holder dividends declared but not yet paid that has been established according to statutory accounting principles as of the valuation date is reported separately from the statutory reserve. The contract holder dividends that give rise to this dividend liability as of the valuation date may or may not be included in the cash-flow model at the company's option.
 - a. If the contract holder dividends that give rise to the dividend liability are not included in the cash-flow model, then no adjustment is needed to the resulting aggregate stochastic reserve.
 - b. If the contract holder dividends that give rise to the dividend liability are included in the cash-flow model, then the resulting aggregate stochastic reserve should be reduced by the amount of the dividend liability.
7. All projected cash flows associated with NGEs shall reflect margins for adverse deviations and estimation error in prudent estimate assumptions.

Section 11: Guidance and Requirements for Setting Prudent Estimate Mortality Assumptions

A. Overview

1. Intent

The guidance and requirements in this section apply to setting prudent estimate mortality assumptions when determining the stochastic reserve. The intent is for prudent estimate mortality assumptions to be based on facts, circumstances and appropriate actuarial practice, with only a limited role for unsupported actuarial judgment. (Where more than one approach to appropriate actuarial practice exists, the company should select the practice that the company deems most appropriate under the circumstances.)

2. Description

Prudent estimate mortality assumptions shall be determined by first developing expected mortality curves based on either available experience or published tables. Where necessary, margins shall be applied to the experience to reflect data uncertainty. The expected mortality curves shall then be adjusted based on the credibility of the experience used to determine the expected mortality curve. Section 11.B addresses guidance and requirements for determining expected mortality curves, and Section 11.C addresses guidance and requirements for adjusting the expected mortality curves to determine prudent estimate mortality.

Finally, the credibility-adjusted tables shall be adjusted for mortality improvement (where such adjustment is permitted or required) using the guidance and requirements in Section 11.D.

3. Business Segments

For purposes of setting prudent estimate mortality assumptions, the products falling under the scope of these requirements shall be grouped into business segments with different mortality assumptions. The grouping, at a minimum, should differentiate between payout annuities or deferred annuity contracts that contain GLBs, and deferred annuity contracts with no guaranteed benefits or only GMDBs. Where appropriate, the grouping should also differentiate between segments which are known or expected to contain contract holders with sociodemographic, geographic, or health factors reasonably expected to impact the mortality assumptions for the segment (e.g., annuitants drawn from different countries, geographic areas, industry groups, or impaired lives on individually underwritten contracts such as structured settlements). The grouping should also generally follow the pricing, marketing, management and/or reinsurance programs of the company.

Guidance Note: This paragraph contemplates situations where it may be appropriate to differentiate mortality assumptions by segment or even by contract due to varying sociodemographic, geographic, or health factors. Particularly, though not exclusively, in the context of group payout annuity contracts, companies may have credible, contract-specific mortality experience data or relevant pooled data from annuitants drawn from similar industries or geographies that may be used to sub-divide inforce blocks into business segments for purposes of setting prudent estimate mortality assumptions.

For example, a company may sell group PRT contracts both to union plans in the U.S. and to private single-employer plans in another country. While both are “PRT contracts,” it would be appropriate to differentiate them for mortality assumption purposes, similar to

how payout annuities vs. deferred annuities are distinguished.

Guidance Note: Distinct mortality or liability assumptions among different contracts within a group of contracts does not in itself preclude the group of contracts from being aggregated for the purposes of the broader stochastic reserve calculation.

4. Margin for Data Uncertainty

The expected mortality curves that are determined in Section 11.B may need to include a margin for data uncertainty. The margin could be in the form of an increase or a decrease in mortality, depending on the business segment under consideration. The margin shall be applied in a direction (i.e., increase or decrease in mortality) that results in a higher reserve. A sensitivity test may be needed to determine the appropriate direction of the provision for uncertainty to mortality. The test could be a prior year mortality sensitivity analysis of the business segment or an examination of current representative cells of the segment.

For purposes of this section, if mortality must be increased (decreased) to provide for uncertainty, the business segment is referred to as a plus (minus) segment.

It may be necessary, because of a change in the mortality risk profile of the segment, to reclassify a business segment from a plus (minus) segment to a minus (plus) segment to the extent compliance with this section requires such a reclassification. For example, a segment could require reclassification depending on whether it is gross or net of reinsurance.

B. Determination of Expected Mortality Curves

1. Experience Data

In determining expected mortality curves, the company shall use actual experience data directly applicable to the business segment (i.e., direct data) if it is available. In the absence of direct data, the company should then look to use data from a segment that is similar to the business segment (i.e., other than direct experience). See Section 11.B.2. for additional considerations. Finally, if there is no data, the company shall use the applicable table, as required in Section 11.B.3.

2. Data Other Than Direct Experience

Adjustments shall be applied to the data to reflect differences between the business segments, and margins shall be applied to the adjusted expected mortality curves to reflect the data uncertainty associated with using data from a similar but not identical business segment.

To the extent the mortality of a business segment is reinsured, any mortality charges that are consistent with the company's own pricing and applicable to a substantial portion of the mortality risk also may be a reasonable starting point for the determination of the company's expected mortality curves.

3. No Data Requirements

- i. When little or no experience or information is available on a business segment, the company shall use expected mortality curves that would produce expected deaths no less than:

- a. [2021 SOA Deferred Annuity Mortality Table] with [Projection Scale G2] for individual deferred annuities that do not contain guaranteed living benefits

$$q_x^{20XX+n} = q_x^{20XX}(1 - G2_x)^n$$

- ii. When little or no experience or information is available on a business segment, the company shall use expected mortality curves that would produce expected deaths no greater than:

- a. [The appropriate percentage (F_x) from Table 11.1 applied to the 2012 IAM Basic Mortality Table] with [Projection Scale G2] for individual payout annuity contracts and deferred annuity contracts with guaranteed living benefits

$$q_x^{2012+n} = q_x^{2012}(1 - G2_x)^n * F_x$$

- b. [1983 Table "a"] for structured settlements or other contracts with impaired mortality

- c. [1994 GAR Table] with [Projection Scale AA] for group annuities

$$q_x^{1994+n} = q_x^{1994}(1 - AA_x)^n$$

Table 11.1

Attained Age (x)	F_x
<=65	80.0%
66	81.5%
67	83.0%
68	84.5%
69	86.0%
70	87.5%
71	89.0%
72	90.5%
73	92.0%
74	93.5%
75	95.0%
76	96.5%
77	98.0%
78	99.5%
79	101.0%
80	102.5%
81	104.0%
82	105.5%
83	107.0%
84	108.5%
85	110.0%

86	110.0%	
87	110.0%	
88	110.0%	
89	110.0%	
90	110.0%	
91	110.0%	
92	110.0%	
93	110.0%	
94	110.0%	
95	110.0%	
96	109.0%	
97	108.0%	
98	107.0%	
99	106.0%	
100	105.0%	
101	104.0%	
102	103.0%	
103	102.0%	
104	101.0%	
>=105	100.0%	

iii. For a business segment with non-U.S. insureds, an established industry or national mortality table may be used, with approval from the domiciliary commissioner.

4. Additional Considerations Involving Data

The following considerations shall apply to mortality data specific to the business segment for which assumptions are being determined (i.e., direct data discussed in Section 11.B.1 or other than direct data discussed in Section 11.B.2).

a. Underreporting of Deaths

Mortality data shall be examined for possible underreporting of deaths. Adjustments shall be made to the data if there is any evidence of underreporting. Alternatively, exposure by lives or amounts on contracts for which death benefits were in the money may be used to determine expected mortality curves. Underreporting on such exposures should be minimal; however, this reduced subset of data will have less credibility.

b. Experience by Contract Duration

Experience of a plus segment shall be examined to determine if mortality by contract duration increases materially due to selection at issue. In the absence of information, the company shall assume that expected mortality will increase by contract duration for an appropriate select period. As an alternative, if the company determines that mortality is affected by selection, the company could apply margins to the expected mortality in such a way that the actual mortality modeled does not depend on contract duration.

c. Modification and Relevance of Data

Even for a large company, the quantity of life exposures and deaths are such that a significant amount of smoothing may be required to determine expected mortality curves from mortality experience. Expected mortality curves, when applied to the recent historic exposures (e.g., three to seven years), should not result in an estimate of aggregate number of deaths less (greater) than the actual number deaths during the exposure period for plus (minus) segments.

In determining expected mortality curves (and the credibility of the underlying data), older data may no longer be relevant. The “age” of the experience data used to determine expected mortality curves should be documented.

d. Other Considerations

In determining expected mortality curves, consideration should be given to factors that include, but are not limited to, trends in mortality experience, trends in exposure, volatility in year-to-year A/E mortality ratios, mortality by lives relative to mortality by amounts, changes in the mix of business and product features that could lead to mortality selection.

C. Adjustment for Credibility to Determine Prudent Estimate Mortality

1. Adjustment for Credibility

The expected mortality curves determined in Section 11.B shall be adjusted based on the credibility of the experience used to determine the curves in order to arrive at prudent estimate mortality. The adjustment for credibility shall result in blending the expected mortality curves with the mortality assumption described in Section 11.B.3. The approach used to adjust the curves shall suitably account for credibility.

Guidance Note: For example, when credibility is zero, an appropriate approach should result in a mortality assumption consistent with 100% of the mortality table used in the blending.

2. Adjustment of Statutory Valuation Mortality for Improvement

For purposes of the adjustment for credibility, the mortality table for a plus segment may be and the mortality table for a minus segment must be adjusted for mortality improvement. Such adjustment shall reflect the mortality improvement scale described in Section 11.B.3 from the effective date of the respective mortality table to the experience weighted average date underlying the data used to develop the expected mortality curves.

3. Credibility Procedure

The credibility procedure used shall:

- a. Produce results that are reasonable.
- b. Not tend to bias the results in any material way.
- c. Be practical to implement.
- d. Give consideration to the need to balance responsiveness and stability.
- e. Take into account not only the level of aggregate claims but the shape of the mortality curve.

- f. Contain criteria for full credibility and partial credibility that have a sound statistical basis and be appropriately applied.
4. Further Adjustment of the Credibility-Adjusted Table for Mortality Improvement

The credibility-adjusted table used for plus segments may be and the credibility adjusted table used for minus segments must be adjusted for mortality improvement using the applicable mortality improvement scale described in Section 11.B.3 from the experience weighted average date underlying the company experience used in the credibility process to the valuation date.

Any adjustment for mortality improvement beyond the valuation date is discussed in Section 11.D.

D. Future Mortality Improvement

The mortality assumption resulting from the requirements of Section 11.C shall be adjusted for mortality improvements beyond the valuation date if such an adjustment would serve to increase the resulting stochastic reserve. If such an adjustment would reduce the stochastic reserve, such assumptions are permitted, but not required. In either case, the assumption must be based on current relevant data with a margin for uncertainty (increasing assumed rates of improvement if that results in a higher reserve or reducing them otherwise).

Section 12: Allocation of Aggregate Reserves to the Contract Level

Section 3.F states that the aggregate reserve shall be allocated to the contracts falling within the scope of these requirements. That allocation should be done for both the pre- and post-reinsurance ceded reserves. Contracts that have passed the stochastic exclusion test as defined in Section 7.B will not be included in the allocation of the aggregate reserve. For the purpose of this section, if a contract does not have a cash surrender value, then the cash surrender value is assumed to be zero.

Contracts for which the Deterministic Certification Option is elected in Section 7.E are intended to use the methodology described in this section to allocate aggregate reserves in excess of the cash surrender value to individual contracts.

The contract-level reserve for each contract shall be the sum of the following:

- A. The contract's cash surrender value.

Drafting Note: The American Academy of Actuaries Annuity Reserves and Capital Work Group is including two potential options for allocating the excess portion of the aggregate reserve over cash surrender value: (1) Use the same approach as VM-21 (2) Allocate based on an actuarial present value calculation.

The Work Group did not reach a consensus between these two approaches, so wording for both is included in the text below. The Work Group recommends field testing both approaches and considering the results in determining future decisions.

Option 1: VM-21 Approach

- B. An allocated portion of the excess of the aggregate reserve over the aggregate cash surrender value shall be allocated to each contract based on a measure of the risk of that product relative to its cash surrender value in the context of the company's in force contracts (assuming zero cash value for contracts that do not contain such). The measure of risk should consider the impact of risk mitigation programs, including hedge programs and reinsurance, that would affect the risk of the product. The specific method of assessing that risk and how it contributes to the company's aggregate reserve shall be defined by the company. The method should provide for an equitable allocation based on risk analysis.
- As an example, consider a company with the results of the following three contracts:

Table 12.1: Sample Allocation of Aggregate Reserve

Contract (i)	1	2	3	Total
Cash Surrender Value, C	28	40	52	120
Risk adjusted measure, R	38	52	50	
Aggregate Reserve				140
Allocation Basis for the excess of the Aggregate Reserve over the Cash Surrender Value $A_i = \text{Max}(R_i - C_i, 0)$	10	12	0	22

Allocation of the excess of the Aggregate Reserve over the Cash Surrender Value $Li = (Ai)/\Sigma Ai * [Aggregate Reserve - \Sigma Ci]$	9.09	10.91	0.00	20
Contract-level reserve $Ci + Li$	37.09	50.91	52.00	140.00

2. In this example, the Aggregate Reserve exceeds the aggregate Cash Surrender Value by 20. The 20 is allocated proportionally across the three contracts based on the allocation basis of the larger of (i) zero; and (ii) a risk adjusted measure based on reserve principles. Therefore, contracts 1 and 2 receive 45% (9/22) and 55% (11/22), respectively, of the excess Aggregate Reserve. As Contract 3 presents no risk in excess of its cash surrender value, it does not receive an allocation of the excess Aggregate Reserve.

Option 2: Actuarial Present Value Approach

- B. The excess of the aggregate reserve over the aggregate cash surrender value is allocated to policies based on a calculation of the actuarial present value of projected liability cash flows in excess of the cash surrender value:
 1. Discount the liability cash flows at the NAER, pursuant to requirements in Section 4, for the scenario that produces the scenario reserve closest to, but not less than the stochastic reserve defined in Section 3.D.
 - a. Groups of contracts that elect the Deterministic Certification Option defined in Section 7.E shall use the NAER in the single scenario used to calculate the reserve to discount liability cash flows.
 2. If the actuarial present value is less than the cash surrender value, then the excess actuarial present value to be used for allocating the excess aggregate reserve over the cash value shall be floored at zero.
 - a. If all contracts have an excess actuarial present value that is floored at zero, then use the cash surrender value to allocate any excess aggregate reserve over the aggregate cash surrender value.
 3. For projecting future liability cash flows, assume the same liability assumptions that were used to calculate the stochastic reserve defined in 3.D.
 4. As a hypothetical example, consider a company with the results of the following five contracts:

Table 12.1: Hypothetical Sample Allocation of Aggregate Reserve

Contract	Example Product Type	CSV* (1)	Scenario APV (2)	Excess (Floored) of the scenario APV over CSV* (3) = $\text{Max}[(2), 0]$	Aggregate Reserve CTE 70 (4)	Excess of Aggregate Reserve over Aggregate CSV* (5) = $\text{Max}[(4 \text{ Total}) - (1 \text{ Total}), 0]$	Allocated Excess Reserve (6) = (3) x $[(5 \text{ Total}) / (3 \text{ Total})]$	Total Contract Level Reserve (7) = (1) + (6)
Contract 1:	Indexed Annuity with no GLWB**	95.0	90.0	0.0			0.0	95.0
Contract 2:	Indexed Annuity with low benefit GLWB**	92.0	95.0	3.0			3.6	95.6
Contract 3:	Indexed Annuity with medium benefit GLWB**	90.0	100.0	10.0			12.0	102.0
Contract 4:	Indexed Annuity with high benefit GLWB**	88.0	105.0	17.0			20.4	108.4
Contract 5:	Fixed Life Contingent Payout Annuity	0.0	70.0	70.0			84.0	84.0
Total		365.0		100.0	485.0	120.0	120.0	485.0

*Cash Surrender Value

**Guaranteed Lifetime Withdrawal Benefit

Guidance Note: The actuarial present value (APV) in the section above is separate from the Guarantee Actuarial Present Value (GAPV) referred to in the additional standard projection amount calculation in VM-21. The GAPV is only applicable to guaranteed minimum benefits and uses prescribed liability assumptions. In contrast, the APV in this section applies to the entire contract, irrespective of whether guaranteed benefits are attached, and uses company prudent estimate liability assumptions.

Section 13: Statutory Maximum Valuation Interest Rates for Income Annuity Formulaic Reserves

A. Purpose and Scope

1. These requirements define for single premium immediate annuity contracts and other similar contracts, certificates and contract features the statutory maximum valuation interest rate that complies with Model #820. These are the maximum interest rate assumption requirements to be used in the CARVM and for certain contracts, the CRVM. These requirements do not preclude the use of a lower valuation interest rate assumption by the company if such assumption produces statutory reserves at least as great as those calculated using the maximum rate defined herein.
2. The following categories of contracts, certificates and contract features, whether group or individual, including both life contingent and term certain only contracts, directly written or assumed through reinsurance, with the exception of benefits arising from variable annuities, are covered in this section:
 - a. Immediate annuity contracts issued after Dec. 31, 2017;
 - b. Deferred income annuity contracts issued after Dec. 31, 2017;
 - c. Structured settlements in payout or deferred status issued after Dec. 31, 2017;
 - d. Fixed payout annuities resulting from the exercise of settlement options or annuitizations of host contracts issued after Dec. 31, 2017;
 - e. Fixed payout annuities resulting from the exercise of settlement options or annuitizations of host contracts issued during 2017, for fixed payouts commencing after Dec. 31, 2018, or, at the option of the company, for fixed payouts commencing after Dec. 31, 2017;
 - f. Supplementary contracts, excluding contracts with no scheduled payments (such as retained asset accounts and settlements at interest), issued after Dec. 31, 2017;
 - g. Fixed income payment streams, attributable to contingent deferred annuities (CDAs) issued after Dec. 31, 2017, once the underlying contract funds are exhausted;
 - h. Fixed income payment streams attributable to guaranteed living benefits associated with deferred annuity contracts issued after Dec. 31, 2017, once the contract funds are exhausted; and
 - i. Certificates with premium determination dates after Dec. 31, 2017, emanating from non-variable group annuity contracts specified in Model #820, Section 5.C.2, purchased for the purpose of providing certificate holders benefits upon their retirement.

<p>Guidance Note: For Section 13.A.2.d, Section 13.A.2.e, Section 13.A.2.f and Section 13.A.2.h above, there is no restriction on the type of contract that may give rise to the benefit.</p>
--

3. Exemptions:
 - a. With the permission of the domiciliary commissioner, for the categories of annuity contracts, certificates and/or contract features in scope as outlined in Section 13.A.2.d, Section 13.A.2.e, Section 13.A.2.f, Section 13.A.2.g or Section 13.A.2.h, the company may use the same maximum valuation interest rate used to value the payment stream in accordance with the guidance applicable to the host contract. In order to obtain such

permission, the company must demonstrate that its investment policy and practices are consistent with this approach.

4. The maximum valuation interest rates for the contracts, certificates and contract features within the scope of Section 13 of VM-22 supersede those described in Appendix VM-A and Appendix VM-C, but they do not otherwise change how those appendices are to be interpreted. In particular, *Actuarial Guideline IX-B—Clarification of Methods Under Standard Valuation Law for Individual Single Premium Immediate Annuities, Any Deferred Payments Associated Therewith, Some Deferred Annuities and Structured Settlements Contracts* (AG-9-B) (see VM-C) provides guidance on valuation interest rates and is, therefore, superseded by these requirements for contracts, certificates and contract features in scope. Likewise, any valuation interest rate references in *Actuarial Guideline IX-C—Use of Substandard Annuity Mortality Tables in Valuing Impaired Lives Under Individual Single Premium Immediate Annuities* (AG-9-C) (see VM-C) are also superseded by these requirements.

B. Definitions

1. The term “reference period” means the length of time used in assigning the Valuation Rate Bucket for the purpose of determining the statutory maximum valuation interest rate and is determined as follows:
 - a. For contracts, certificates or contract features with life contingencies and substantially similar payments, the reference period is the length of time, rounded to the nearest year, from the premium determination date to the earlier of: i) the date of the last non-life-contingent payment under the contract, certificate or contract feature; and ii) the date of the first life-contingent payment under the contract, certificate or contract feature, or
 - b. For contracts, certificates or contract features with no life-contingent payments and substantially similar payments, the reference period is the length of time, rounded to the nearest year, from the premium determination date to the date of the last non-life-contingent payment under the contract, certificate or contract feature, or
 - c. For contracts, certificates or contract features where the payments are not substantially similar, the actuary should apply prudent judgment and select the Valuation Rate Bucket with Macaulay duration that is a best fit to the Macaulay duration of the payments in question.

Guidance Note: Contracts with installment refunds or similar features should consider the length of the installment period calculated from the premium determination date as the non-life contingent period for the purpose of determining the reference period.

Guidance Note: The determination in Section 13.B.1.c above shall be made based on the materiality of the payments that are not substantially similar relative to the life-contingent payments.

2. The term “jumbo contract” means a contract with an initial consideration equal to or greater than \$250 million. Considerations for contracts issued by an insurer to the same contract holder within 90 days shall be combined for purposes of determining whether the contracts meet this threshold.

Guidance Note: If multiple contracts meet this criterion in aggregate, then each contract is a jumbo contract.

3. The term “non-jumbo contract” means a contract that does not meet the definition of a jumbo

contract.

4. The term “premium determination date” means the date as of which the valuation interest rate for the contract, certificate or contract feature being valued is determined.
5. The term “initial age” means the age of the annuitant as of his or her age last birthday relative to the premium determination date. For joint life contracts, certificates or contract features, the “initial age” means the initial age of the younger annuitant. If a contract, certificate or contract feature for an annuitant is being valued on a standard mortality table as an impaired annuitant, “initial age” means the rated age. If a contract, certificate or contract feature is being valued on a substandard mortality basis, “initial age” means an equivalent rated age.
6. The term “Table X spreads” means the prescribed VM-22 Section 13 current market benchmark spreads for the quarter prior to the premium determination date, as published on the Industry tab of the NAIC website. The process used to determine Table X spreads is the same as that specified in VM-20 Appendix 2.D for Table F, except that JP Morgan and Bank of America bond spreads are averaged over the quarter rather than the last business day of the month.
7. The term “expected default cost” means a vector of annual default costs by weighted average life. This is calculated as a weighted average of the VM-20 Table A prescribed annual default costs published on the Industry tab of the NAIC website in effect for the quarter prior to the premium determination date, using the prescribed portfolio credit quality distribution as weights.
8. The term “expected spread” means a vector of spreads by weighted average life. This is calculated as a weighted average of the Table X spreads, using the prescribed portfolio credit quality distribution as weights.
9. The term “prescribed portfolio credit quality distribution” means the following credit rating distribution:
 - a. 5% Treasuries
 - b. 15% Aa bonds (5% Aa1, 5% Aa2, 5% Aa3)
 - c. 40% A bonds (13.33% A1, 13.33% A2, 13.33% A3)*
 - d. 40% Baa bonds (13.33% Baa1, 13.33% Baa2, 13.33% Baa3)*

*40%/3 is used unrounded in the calculations.

C. Determination of the Statutory Maximum Valuation Interest Rate

1. Valuation Rate Buckets
 - a. For the purpose of determining the statutory maximum valuation interest rate, the contract, certificate or contract feature being valued must be assigned to one of four Valuation Rate Buckets labeled A through D.
 - b. If the contract, certificate or contract feature has no life contingencies, the Valuation Rate Bucket is assigned based on the length of the reference period (RP), as follows:

Table 3-1: Assignment to Valuation Rate Bucket by Reference Period Only

RP ≤ 5 Years	5Y < RP ≤ 10Y	10Y < RP ≤ 15Y	RP > 15Y
A	B	C	D

- c. If the contract, certificate or contract feature has life contingencies, the Valuation Rate Bucket is assigned based on the length of the RP and the initial age of the annuitant, as follows:

Table 3-2: Assignment to Valuation Rate Bucket by Reference Period and Initial Age

Initial Age	RP ≤ 5Y	5Y < RP ≤ 10Y	10Y < RP ≤ 15Y	RP > 15Y
90+	A	B	C	D
80–89	B	B	C	D
70–79	C	C	C	D
< 70	D	D	D	D

2. Premium Determination Dates

- a. The following table specifies the decision rules for setting the premium determination date for each of the contracts, certificates and contract features listed in Section 1:

Table 3-3: Premium Determination Dates

Section	Item Description	Premium determination date
A.2.a	Immediate annuity	Date consideration is determined and committed to by contract holder
A.2.b	Deferred income annuity	Date consideration is determined and committed to by contract holder
A.2.c	Structured settlements	Date consideration is determined and committed to by contract holder
A.2.d and A.2.e	Fixed payout annuities resulting from settlement options or annuitizations from host contracts	Date consideration for benefit is determined and committed to by contract holder
A.2.f	Supplementary contracts	Date of issue of supplementary contract
A.2.g	Fixed income payment streams from CDAs, AV becomes 0	Date on which AV becomes 0
A.2.h	Fixed income payment streams from guaranteed living benefits, AV becomes 0	Date on which AV becomes 0

A.2.i	Group annuity and related certificates	Date consideration is determined and committed to by contract holder
-------	--	--

Guidance Note: For the purposes of the items in the table above, the phrase “date consideration is determined and committed to by the contract holder” should be interpreted by the company in a manner that is consistent with its standard practices. For some products, that interpretation may be the issue date or the date the premium is paid.

b. Immaterial Change in Consideration

If the premium determination date is based on the consideration, and if the consideration changes by an immaterial amount (defined as a change in present value of less than 10% and less than \$1 million) subsequent to the original premium determination date, such as due to a data correction, then the original premium determination date shall be retained. In the case of a group annuity contract where a single premium is intended to cover multiple certificates, certificates added to the contract after the premium determination date that do not trigger the company’s right to reprice the contract shall be treated as if they were included in the contract as of the premium determination date.

3. Statutory Maximum Valuation Interest Rate

- a. For a given contract, certificate or contract feature, the statutory maximum valuation interest rate is determined based on its assigned Valuation Rate Bucket (Section 13.C.1) and its Premium Determination Date (Section 13.C.2) and whether the contract associated with it is a jumbo contract or a non-jumbo contract.
- b. Statutory maximum valuation interest rates for jumbo contracts are determined and published daily by the NAIC on the Industry tab of the NAIC website. For a given premium determination date, the statutory maximum valuation interest rate is the daily statutory maximum valuation interest rate published for that premium determination date.
- c. Statutory maximum valuation interest rates for non-jumbo contracts are determined and published quarterly by the NAIC on the Industry tab of the NAIC website by the third business day of the quarter. For a given premium determination date, the statutory maximum valuation interest rate is the quarterly statutory maximum valuation interest rate published for the quarter in which the premium determination date falls.
- d. Quarterly Valuation Rate:

For each Valuation Rate Bucket, the quarterly valuation rate is defined as follows:

$$I_q = R + S - D - E$$

Where:

- a. R is the reference rate for that Valuation Rate Bucket (defined in Section 13.C.4);
- b. S is the spread rate for that Valuation Rate Bucket (defined in Section 13.C.5);
- c. D is the default cost rate for that Valuation Rate Bucket (defined in Section 13.C.6);

and

d. E is the spread deduction defined as 0.25%.

e. Daily Valuation Rate:

For each Valuation Rate Bucket, the daily valuation rate is defined as follows:

$$I_d = I_q + C_{d-1} - C_q$$

Where:

- a. I_q is the quarterly valuation rate for the calendar quarter preceding the business day immediately preceding the premium determination date;
- b. C_{d-1} is the daily corporate rate (defined in Section 13.C.7) for the business day immediately preceding the premium determination date; and
- c. C_q is the average daily corporate rate (defined in Section 13.C.8) corresponding to the same period used to develop I_q .

For jumbo contracts, the daily statutory maximum valuation interest rate is the daily valuation rate (I_d) rounded to the nearest one-hundredth of one percent (1/100 of 1%).

4. Reference Rate

Reference rates are updated quarterly as described below:

- a. The “quarterly Treasury rate” is the average of the daily Treasury rates for a given maturity over the calendar quarter prior to the premium determination date. The quarterly Treasury rate is downloaded from <https://fred.stlouisfed.org>, and is rounded to two decimal places.
- b. Download the quarterly Treasury rates for two-year, five-year, 10-year and 30-year U.S. Treasuries.
- c. The reference rate for each Valuation Rate Bucket is calculated as the weighted average of the quarterly Treasury rates using Table 1 weights (defined in Section 13.C.9) effective for the calendar year in which the premium determination date falls.

5. Spread

The spreads for each Valuation Rate Bucket are updated quarterly as described below:

- a. Use the Table X spreads from the NAIC website for WALs two, five, 10 and 30 years only to calculate the expected spread.
- b. Calculate the spread for each Valuation Rate Bucket, which is a weighted average of the expected spreads for WALs two, five, 10 and 30 using Table 2 weights (defined in Section 3.I) effective for the calendar year in which the premium determination date falls.

6. Default costs for each Valuation Rate Bucket are updated annually as described below:

- a. Use the VM-20 prescribed annual default cost table (Table A) in effect for the quarter prior to the premium determination date for WAL two, WAL five and WAL 10 years only to calculate the expected default cost. Table A is updated and published annually on

the Industry tab of the NAIC website during the second calendar quarter and is used for premium determination dates starting in the third calendar quarter.

- b. Calculate the default cost for each Valuation Rate Bucket, which is a weighted average of the expected default costs for WAL two, WAL five and WAL 10, using Table 3 weights (defined in Section 13.C.9) effective for the calendar year in which the premium determination date falls.

7. Daily Corporate Rate

Daily corporate rates for each valuation rate bucket are updated daily as described below:

- a. Each day, download the Bank of America Merrill Lynch U.S. corporate effective yields as of the previous business day's close for each index series shown in the sample below from the St. Louis Federal Reserve website: <https://research.stlouisfed.org/fred2/categories/32348>. To access a specific series, search the St. Louis Federal Reserve website for the series name by inputting the name into the search box in the upper right corner, or input the following web address: [https://research.stlouisfed.org/fred2/series/\[replace with series name from the table below\]](https://research.stlouisfed.org/fred2/series/[replace with series name from the table below]).

Table 3-4: Index Series Names

Maturity	Series Name
1Y – 3Y	BAMLC1A0C13YEY
3Y – 5Y	BAMLC2A0C35YEY
5Y – 7Y	BAMLC3A0C57YEY
7Y – 10Y	BAMLC4A0C710YEY
10Y – 15Y	BAMLC7A0C1015YEY
15Y+	BAMLC8A0C15PYEY

- b. Calculate the daily corporate rate for each valuation rate bucket, which is a weighted average of the Bank of America Merrill Lynch U.S. corporate effective yields, using Table 4 weights (defined in Section 13.C.9) effective for the calendar year in which the business date immediately preceding the premium determination date falls.

8. Average Daily Corporate Rate

Average daily corporate rates are updated quarterly as described below:

- a. Download the quarterly average Bank of America Merrill Lynch U.S. corporate effective yields for each index series shown in Section 3.G.1 from the St. Louis Federal Reserve website: <https://research.stlouisfed.org/fred2/categories/32348>. To access a specific series, search the St. Louis Federal Reserve website for the series name by inputting the name into the search box in the upper right corner, or input the following web address: [https://research.stlouisfed.org/fred2/series/\[replace with series name from Section 13.C.7.a\]](https://research.stlouisfed.org/fred2/series/[replace with series name from Section 13.C.7.a]).

- b. Calculate the average daily corporate rate for each valuation rate bucket, which is a weighted average of the quarterly average Bank of America Merrill Lynch U.S. corporate effective yields, using Table 4 weights (defined in Section 13.C.9) for the same calendar year as the weight tables (i.e. Tables 1, 2, and 3) used in calculating I_q in Section 13.C.3.e.

9. Weight Tables 1 through 4

The system for calculating the statutory maximum valuation interest rates relies on a set of four tables of weights that are based on duration and asset/liability cash-flow matching analysis for representative annuities within each valuation rate bucket. A given set of weight tables is applicable to the calculations for every day of the calendar year.

In the fourth quarter of each calendar year, the weights used within each valuation rate bucket for determining the applicable valuation interest rates for the following calendar year will be updated using the process described below. In each of the four tables of weights, the weights in a given row (valuation rate bucket) must add to exactly 100%.

Weight Table 1

The process for determining Table 1 weights is described below:

- a. Each valuation rate bucket has a set of representative annuity forms. These annuity forms are as follows:
 - i. Bucket A:
 - a) Single Life Annuity age 91 with 0 and five-year certain periods.
 - b) Five-year certain only.
 - ii. Bucket B:
 - a) Single Life Annuity age 80 and 85 with 0, five-year and 10-year certain periods.
 - b) 10-year certain only.
 - iii. Bucket C:
 - a) Single Life Annuity age 70 with 0 and 15-year certain periods.
 - b) Single Life Annuity age 75 with 0, 10-year and 15-year certain periods.
 - c) 15-year certain only.
 - iv. Bucket D:
 - a) Single Life Annuity age 55, 60 and 65 with 0 and 15-year certain periods.
 - b) 25-year certain only.
- b. Annual cash flows are projected assuming annuity payments are made at the end of each year. These cash flows are averaged for each valuation rate bucket across the annuity forms for that bucket using the statutory valuation mortality table in effect for the following calendar year for individual annuities for males (ANB).

- c. The average daily rates in the third quarter for the two-year, five-year, 10-year and 30-year U.S. Treasuries are downloaded from <https://fred.stlouisfed.org> as input to calculate the present values in Step d.
- d. The average cash flows are summed into four time period groups: years 1–3, years 4–7, years 8–15 and years 16–30. (**Note:** The present value of cash flows beyond year 30 are discounted to the end of year 30 and included in the years 16–30 group. This present value is based on the lower of 3% and the 30-year Treasury rate input in Step c.)
- e. The present value of each summed cash-flow group in Step d is then calculated by using the Step 3 U.S. Treasury rates for the midpoint of that group (and using the linearly interpolated U.S. Treasury rate when necessary).
- f. The duration-weighted present value of the cash flows is determined by multiplying the present value of the cash-flow groups by the midpoint of the time period for each applicable group.
- g. Weightings for each cash-flow time period group within a valuation rate bucket are calculated by dividing the duration weighted present value of the cash flow by the sum of the duration weighted present value of cash flow for each valuation rate bucket.

Weight Tables 2 through 4

Weight Tables 2 through 4 are determined using the following process:

- i. Table 2 is identical to Table 1.
- ii. Table 3 is based on the same set of underlying weights as Table 1, but the 10-year and 30-year columns are combined since VM-20 default rates are only published for maturities of up to 10 years.
- iii. Table 4 is derived from Table 1 as follows:
 - a) Column 1 of Table 4 is identical to column 1 of Table 1.
 - b) Column 2 of Table 4 is 50% of column 2 of Table 1.
 - c) Column 3 of Table 4 is identical to column 2 of Table 4.
 - d) Column 4 of Table 4 is 50% of column 3 of Table 1.
 - e) Column 5 of Table 4 is identical to column 4 of Table 4.
 - f) Column 6 of Table 4 is identical to column 4 of Table 1.

10. Group Annuity Contracts

For a group annuity purchased under a retirement or deferred compensation plan (Section 13.A.2.i), the following apply:

- a. The statutory maximum valuation interest rate shall be determined separately for each certificate, considering its premium determination date, the certificate holder's initial age, the reference period corresponding to its form of payout and whether the contract is a jumbo contract or a non-jumbo contract.

Guidance Note: Under some group annuity contracts, certificates may be purchased on different dates.

- b. In the case of a certificate whose form of payout has not been elected by the beneficiary at its premium determination date, the statutory maximum valuation interest rate shall be based on the reference period corresponding to the normal form of payout as defined in the contract or as is evidenced by the underlying pension plan documents or census file. If the normal form of payout cannot be determined, the maximum valuation interest rate shall be based on the reference period corresponding to the annuity form available to the certificate holder that produces the most conservative rate.

Guidance Note: The statutory maximum valuation interest rate will not change when the form of payout is elected.

This page intentionally left blank

Valuation Manual Section II. Reserve Requirements

Subsection 2: Annuity Products

- A. This subsection establishes reserve requirements for all contracts classified as annuity contracts as defined in SSAP No. 50 in the AP&P Manual.
- B. Minimum reserve requirements for variable annuity (VA) contracts and similar business, specified in VM-21, Requirements for Principle-Based Reserves for Variable Annuities, shall be those provided by VM-21. The minimum reserve requirements of VM-21 are considered PBR requirements for purposes of the *Valuation Manual*.
- C. Minimum reserve requirements for fixed annuity contracts issued prior to 1/1/2024 are those requirements as found in VM-A and VM-C as applicable, with the exception of the minimum requirements for the valuation interest rate for single premium immediate annuity contracts, and other similar contracts, issued after Dec. 31, 2017, including those fixed payout annuities emanating from host contracts issued on or after Jan. 1, 2017, and on or before Dec. 31, 2017. The maximum valuation interest rate requirements for those contracts and fixed payout annuities are defined in Section 13 of VM-22, Statutory Maximum Valuation Interest Rates for Income Annuity Formulaic Reserves.
- D. Minimum reserve requirements for fixed annuity contracts issued on 1/1/2024 and later are those requirements as found in Sections 1 through 12 of VM-22.
- E. The below principles may serve as key considerations for assessing whether VM-21 or VM-22 requirements apply:
 - 1. Index-linked or modified guaranteed annuity contracts or riders that satisfy both of the following conditions may be a key consideration for application of VM-22 requirements:
 - a. Guarantees the principal amount of purchase payments, net of any partial withdrawals, and interest credited thereto, less any deduction (without regard to its timing) for sales, administrative or other expenses or charges.
 - b. Credits a rate of interest under the contract that is at least equal to the minimum rate required to be credited by the standard nonforfeiture law in the jurisdiction in which the contract is issued.

Guidance Note: Paragraph E.1.b is intended to apply prior to the application of any market value adjustments for modified guaranteed annuities where the underlying assets are held in a separate account. If meeting Paragraph E.1.b prior to the application of any market value adjustments and Paragraph E.1.a above, it may be appropriate to value such contracts under VM-22 requirements.

- 2. Index-linked or modified guaranteed annuity contracts that do not satisfy either of the two conditions listed above in Paragraph E.1.i and E.1.ii may be a key consideration for application of VM-21 requirements.

Subsection 6: Riders and Supplemental Benefits

Guidance Note: Policies or contracts with riders and supplemental benefits which are created to simply disguise benefits subject to the Valuation Manual section describing the reserve methodology for the base product to which they are attached, or exploit a perceived loophole, must be reserved in a manner similar to more typical designs with similar riders.

- A. If a rider or supplemental benefit is attached to a health insurance product, deposit-type contract, or credit life or disability product, it may be valued with the base contract unless it is required to be separated by regulation or other requirements.
- B. For supplemental benefits on life insurance policies or annuity contracts, including Guaranteed Insurability, Accidental Death or Disability Benefits, Convertibility, Nursing Home Benefits or Disability Waiver of Premium Benefits, the supplemental benefit may be valued with the base policy or contract and follow the reserve requirements for the base policy or contract under VM-20, VM-21, VM-22, VM-A, and/or VM-C, as applicable.
- C. ULSG and other secondary guarantee riders on a life insurance policy shall be valued with the base policy and follow the reserve requirements for ULSG policies under VM-20, VM-A and/or VM-C, as applicable.
- D. Any guaranteed minimum benefits on life insurance policies or annuity contracts not subject to Paragraph C above including, but not limited to, Guaranteed Minimum Accumulation Benefits, Guaranteed Minimum Death Benefits, Guaranteed Minimum Income Benefits, Guaranteed Minimum Withdrawal Benefits, Guaranteed Lifetime Income Benefits, Guaranteed Lifetime Withdrawal Benefits, Guaranteed Payout Annuity Floors, Waiver of Surrender Charges, Return of Premium, Systematic Withdrawal Benefits under Required Minimum Distributions, and all similar guaranteed benefits shall be valued with the base policy or contract and follow the reserve requirements for the base policy or contract under VM-20, VM-21, VM-22, and VM-A and/or VM-C, as applicable.
- E. If a rider or supplemental benefit to a life insurance policy or annuity contract that is not addressed in Paragraphs B, C, or D above possesses any of the following attributes, the rider or supplemental benefit shall be valued with the base policy or contract and follow the reserve requirements for the base policy or contract under VM-20, VM-21, VM-22, and VM-A and/or VM-C, as applicable.
 - 1. The rider or supplemental benefit does not have a separately identified premium or charge.
 - 2. After issuance, the rider or supplemental benefit premium, charge, value or benefits are determined by referencing the base policy or contract features or performance.
 - 3. After issuance, the base policy or contract value or benefits are determined by referencing the rider or supplemental benefit features or performance. The deduction of rider or benefit premium or charge from the contract value is not sufficient for a determination by reference.
- F. If a term life insurance rider on the named insured[s] on the base life insurance policy does not meet the conditions of Paragraph E above, and either (1) guarantees level or near level premiums until a specified duration followed by a material premium increase; or (2) for a rider for which level or near level premiums are expected for a period followed by a material premium increase, the rider is separated from the base policy and follows the reserve requirements for term policies under VM20, VM-A and/or VM-C, as applicable.

- G. For all other riders or supplemental benefits on life insurance policies or annuity contracts not addressed in Paragraphs B through F above, the riders or supplemental benefits may be valued with the base policy or contract and follow the reserve requirements for the base policy or contract under VM-20, VM-21, VM-22, VM-A and/or VM-C, as applicable. For a given rider, the election to include riders or supplemental benefits with the base policy or contract shall be determined at the policy form level, not on a policy-by-policy basis, and shall be treated consistently from year-to-year, unless otherwise approved by the domiciliary commissioner.
- H. Any supplemental benefits and riders offered on life insurance policies or annuity contracts that would have a material impact on the reserve if elected later in the contract life, such as joint income benefits, nursing home benefits, or withdrawal provisions on annuity contracts, shall be considered when determining reserves using the following principles:
1. Policyholders with living benefits and annuitization in the same contract will generally use the more valuable of the two benefits.
 2. When advantageous, policyholders will commence living benefit payouts if not started yet.