

Comment Categories:

Tier 1: Key Decision Points – Discuss first

Tier 2: High Substance Edits – Discuss second

Tier 3: Moderate Substance Edits – Discuss third

Tier 4: Noncontroversial or Low Substance Edits – Will expose and only discuss upon comment

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

Table of Contents

Valuation Manual Section II. Reserve Requirements	4
Subsection 2: Annuity Products	4
Subsection 3: Deposit-Type Contracts	6
Subsection 6: Riders and Supplemental Benefits	7
VM-01: Definitions for Terms in Requirements	9
VM-22	11
Section 1: Background	11
A. Purpose	11
B. Principles	11
C. Risks Reflected and Risks Not Reflected	13
D. Materiality	15
Section 2: Scope and Effective Date	15
A. Scope	15
B. Effective Date & Transition	15
Section 3: Reserve Methodology	16
A. Aggregate Reserve	16
B. Impact of Reinsurance Ceded	16
C. The Additional Standard Projection Amount	16
D. The SR	16
E. The DR	16
F. Aggregation of Contracts for the DR and SR	16
G. Stochastic Exclusion Test	18
H. Allocation of the Aggregate Reserve to Contracts	18
I. Prudent Estimate Assumptions	18
J. Approximations, Simplifications, and Modeling Efficiency Techniques	19
Section 4: Determination of SR	21
A. Projection of Accumulated Deficiencies	21

B. Determination of Scenario Reserve	25
C. Projection Scenarios	27
D. Projection of Assets	28
E. Projection of Annuitization Benefits	31
F. Frequency of Projection.....	32
G. Compliance with ASOPs	32
Section 5: Reinsurance	33
A. Treatment of Reinsurance in the Aggregate Reserve	33
Section 6: Standard Projection Amount	36
Section 7: Exclusion Testing	37
A. Stochastic Exclusion Test Requirement Overview	37
B. Requirement to Pass the Stochastic Exclusion Tests.....	39
C. Stochastic Exclusion Ratio Test	40
D. Stochastic Exclusion Demonstration Test	42
E. Deterministic Certification Option	44
Section 8: To Be Determined (Scenario Generation for VM-21)	44
Section 9: Modeling Hedges under a Non-Index Credit Future Hedging Strategy.....	45
A. Initial Considerations.....	45
B. Modeling Approaches.....	45
C. Calculation of SR (Reported)	46
D. Additional Considerations for CTE70 (best efforts)	50
E. Specific Considerations and Requirements	50
Section 10: Guidance and Requirements for Setting Contract Holder Behavior Prudent Estimate Assumptions	52
A. General.....	52
B. Aggregate vs. Individual Margins	52
C. Sensitivity Testing	53
D. Specific Considerations and Requirements	54
E. Dynamic Assumptions.....	55
F. Consistency with the CTE Level.....	56
G. Additional Considerations and Requirements for Assumptions Applicable to Guaranteed Living Benefits	57
H. Policy Loans	57
I. Non-Guaranteed Elements.....	58
Section 11: Guidance and Requirements for Setting Prudent Estimate Mortality Assumptions	60

A. Overview	60
B. Determination of Expected Mortality Curves	61
C. Adjustment for Credibility to Determine Prudent Estimate Mortality	64
D. Future Mortality Improvement	65
Section 12: Other Guidance and Requirements for Assumptions.....	66
Section 13: Allocation of Aggregate Reserves to the Contract Level.....	72
VM-V: Statutory Maximum Valuation Interest Rates for Formulaic Reserves.....	76
1. Income Annuities.....	76
A. Purpose and Scope.....	76
B. Definitions.....	77
C. Determination of the Statutory Maximum Valuation Interest Rate.....	79

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*, and therefore are applicable to VM-G.
- C. Minimum reserve requirements for non-variable annuity contracts issued prior to 1/1/2025 are those requirements as found in VM-A, VM-C, and VM-V 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 VM-V, Statutory Maximum Valuation Interest Rates for Formulaic Reserves.
- D. Minimum reserve requirements for non-variable annuity contracts issued on 1/1/2025 and later are those requirements as found in VM-22, with the exception of Guaranteed Investment Contracts, Synthetic Guaranteed Investment Contracts, and other Stable Value Contracts which shall follow the requirements found in VM-A, VM-C, and VM-V. The minimum reserve requirements of VM-22 are considered PBR requirements for purposes of the *Valuation Manual*, and therefore are applicable to VM-G.
- E. Annuity PBR Exemption
 - 1. A company meeting at least one of the conditions in Subsection 2.E.2 below may file a statement of exemption for annuity contracts or certificates, except for contracts or certificates in Subsection 2.E.4 below, issued directly or assumed during the current calendar year, that would otherwise be subject to VM-22. If a company has no business issued directly or assumed during the current calendar year that would otherwise be subject to VM-22, a statement of exemption is not required. For a filed statement of exemption, the statement must be filed with the domiciliary commissioner prior to July 1 of that year certifying that at least one of the two conditions in Subsection 2.E.2 was met, and the statement of exemption must also be included with the NAIC filing for the second quarter of that year.

The domiciliary commissioner may reject such statement prior to Sept. 1 and require the company to follow the requirements of VM-22 for the annuity contracts or certificates covered by the statement.

If a filed statement of exemption is not rejected by the domiciliary commissioner, the filing of subsequent statements of exemption is not required as long as the company continues to qualify for the exemption; rather, ongoing statements of exemption for each

new calendar year will be deemed to not be rejected, unless: 1) the company does not meet either condition in Subsection 2.E.2 below; 2) the contracts contain those in Subsection 2.E.4 below; or 3) the domiciliary commissioner contacts the company prior to Sept. 1 and notifies them that the statement of exemption is rejected. If any of these three events occur, then the statement of exemption for the current calendar year is rejected, and a new statement of exemption must be filed and not rejected in order for the company to exempt additional contracts or certificates. In the case of an ongoing statement of exemption, rather than include a statement of exemption with the NAIC filing for the second quarter of that year, the company should enter “SEE EXPLANATION” in response to the Annuity PBR Exemption supplemental interrogatory and provide as an explanation that the company is utilizing an ongoing statement of exemption.

2. Condition for Exemption:

- a. The company has less than \$1.0 billion of Exemption Reserves, and if the company is a member of an NAIC group that includes other life insurance companies, the group has combined exempted prior year reserves of less than \$2 billion; or
- b. The only new contract or certificates that would otherwise be subject to VM-22 being issued or assumed by the company are due to election of contract benefits or features from existing contracts or certificates valued under VM-A and VM-C and the company was exempted from, or otherwise not subject to, the requirements of VM-22 in the prior year.

3. Exemption reserves are determined as follows:

- a. The amount reported in the prior calendar year life/health annual statement, Analysis of Increase in Reserves During the Year-Individual Annuities, Column 2 (“Fixed Annuities”), line 15; plus
- b. The amount reported in the prior calendar year life/health annual statement, Analysis of Increase in Reserves During the Year-Individual Annuities, Column 3 (“Indexed Annuities”), line 15; plus
- c. The amount reported in the prior calendar year life/health annual statement, Analysis of Increase in Reserves During the Year-Individual Annuities, Column 6 (“Life Contingent Payout (Immediate and Annuityizations)”), line 15; plus
- d. The amount reported in the prior calendar year life/health annual statement, Analysis of Increase in Reserves During the Year-Individual Annuities, Column 7 (“Other Annuities”), line 15, except for business that already follows Actuarial Guidelines XLIII/VM-21 or categorized as Guaranteed Investment Contracts, Synthetic Guaranteed Investment Contracts, or other Stable Value Contracts.
- e. The amount reported in the prior calendar year life/health annual statement, Analysis of Increase in Reserves During the Year-Group Annuities, Column 2 (“Fixed Annuities”), line 15; plus
- f. The amount reported in the prior calendar year life/health annual statement, Analysis of Increase in Reserves During the Year-Group Annuities, Column 3 (“Indexed Annuities”), line 15; plus

- g. The amount reported in the prior calendar year life/health annual statement, Analysis of Increase in Reserves During the Year-Group Annuities, Column 6 (“Life Contingent Payout (Immediate and Annuityizations)”), line 15.
 - h. The amount reported in the prior calendar year life/health annual statement, Analysis of Increase in Reserves During the Year-Group Annuities, Column 7 (“Other Annuities”), line 15, except for business that already follows Actuarial Guidelines XLIII/VM-21, or categorized as Guaranteed Investment Contracts, Synthetic Guaranteed Investment Contracts, or other Stable Value Contracts.
 - i. Adding back in any reserves that were ceded in (a) through (f) above, in order to set the Exemption reserves on a gross of reinsurance basis
- 4. Contracts and Certificates Excluded from the Annuity PBR Exemption:
 - a. Contracts or certificates with guaranteed living benefits (GMIBs, GMABs, GMMBs, GLWBs).
 - b.
 - 5. Each exemption, or lack of an exemption, outlined in Subsection 2.E.1 to Subsection 2.E.4 above applies only to contracts or certificates issued or assumed in the current year, and it applies to all future valuation dates for those contracts or certificates. However, if contracts or certificates did not qualify for the Annuity PBR Exemption during the year of issue but would have qualified for the Annuity PBR Exemption if the current Valuation Manual requirements had been in effect during the year of issue, then the domiciliary commissioner may allow an exemption for such contracts or certificates. The minimum reserve requirements for the annuity contracts and certificates subject to the exemption are those pursuant to applicable methods required in VM-A and VM-C using the mortality tables as defined in VM-M, and valuation rates in VM-V as applicable.
- F. Upon determining whether annuities fall under the requirements in Paragraphs B, C, and D in this subsection, the below principles shall be followed:
- 1. Contracts that do not guarantee 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 shall follow the requirements in Paragraph B of this subsection.
 - 2. Contracts that do not credit a rate of interest under the contract prior to the application of any market value adjustments 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 shall follow the requirements in Paragraph B of this subsection.
 - 3. Contracts falling under the definition of Index-Linked Variable Annuities provided in VM-01 shall follow the requirements in Paragraph B of this subsection.

All annuity contracts that do not fall under F.1, F.2, or F.3 in this subsection shall follow the requirements in Paragraph C or D of this subsection, in accordance with the date on which the contract has been issued.

Subsection 3: Deposit-Type Contracts

This subsection establishes reserve requirements for all contracts classified as deposit-type contracts defined in SSAP No. 50 in the AP&P Manual.

Minimum reserve requirements for deposit-type contracts are those requirements as found in VM-A, VM-C, VM-V, and VM-22, as applicable.

Subsection 6: Riders and Supplemental Benefits

Guidance Note: Designs of 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, 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, VM-C, and/or VM-V, as applicable.
- C. ULSG and other secondary guarantee riders on a life insurance policy and any guaranteed minimum benefits on life insurance policies or annuity contracts 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, VM-C, and/or VM-V, as applicable.
- D. If a rider or supplemental benefit to a life insurance policy or annuity contract that is not addressed in Paragraphs B or C 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, VM-C, and/or VM-V, 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.
- E. If a term life insurance rider on the named insured[s] on the base life insurance policy does not meet the conditions of Paragraph D 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. For all other riders or supplemental benefits on life insurance policies or annuity contracts not addressed in Paragraphs B through E 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, VM-C, and/or VM-V, 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.

Any supplemental benefits and riders offered on life insurance policies or annuity contracts that would have a material impact on the reserve (for VM-20 and VM-22) or TAR (for VM-21) 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 (for VM-20 and VM-22) or reserves and TAR (for VM-21). The company must assume that policyholders' and contract holders' efficiency will increase over time unless the company has relevant and credible experience or clear evidence to the contrary. For example, policyholders with living benefits and annuitization in the same contract should generally be assumed to use the more valuable of the two benefits.

VM-01: Definitions for Terms in Requirements

- The term “Deferred Income Annuity” (DIA) means an annuity contract that guarantees a periodic payment for the life of the annuitant or a term certain and payments begin 13 months or later from the issue date if the contract holder and/or annuitant survives to a predetermined future age.
- The term Guaranteed Investment Contract (GIC) means an accumulation-based group annuity contract 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.
- The term “Guaranteed Minimum Accumulation Benefit” (GMAB) means a guaranteed benefit providing, or resulting in the provision, that an amount payable on the contractually determined maturity date of the benefit will be increased and/or will be at least a minimum amount. Only such guarantees having the potential to produce a contractual total amount payable on benefit maturity that exceeds the account value, or in the case of an annuity providing income payments, an amount payable on benefit maturity other than continuation of any guaranteed income payments, are included in this definition.
- 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:
 - Increased by an amount that may be either specified by or computed from other policy or contract values; and
 - Contains either:
 - 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.

The term “Guaranteed Minimum Income Benefit” (GMIB) means an option under which the contractholder has the right to apply a specified minimum amount that could be greater than the amount that would otherwise be available in the absence of such benefit to provide periodic income using a specified purchase basis.

- The term “Index-Linked Variable Annuity” (ILVA) means an annuity contract 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, in addition to 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.
- The term “Longevity Reinsurance” means an agreement or 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.

- 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 generally 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.
- The term “Pension Risk Transfer” (PRT) means an annuity, either 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).
- The term “Single Premium Immediate Annuity” (SPIA) means 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 13 months from the issue date.
- The term “Stable Value Contracts” means accumulation-based group contracts that provide limited investment guarantees, preserving principal while crediting steady, positive returns and protecting against losses or declines in yield. Underlying asset portfolios may 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.
- The term “Structured Settlement Contracts” are contracts that provide periodic benefits and 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. Structured Settlement Contracts consist of both annuity contracts and deposit-type contracts, in accordance with the NAIC Accounting Practices and Procedures Manual.
- The term “Synthetic Guaranteed Investment Contract” (SGIC) means 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 contract holder or plan trust.

- The term “Term Certain Payout Annuity” means an annuity contract that offers guaranteed periodic payments for a specified period of time, not contingent upon mortality or morbidity of the annuitant. Term Certain Payouts are treated as Deposit-Type Contracts.

VM-22

Section 1: Background

A. Purpose

These requirements establish the minimum reserve valuation standard for non-variable annuity contracts as defined in Section II of the Valuation Manual, Subsection 22025. For all contracts encompassed by the Scope, these requirements constitute the Commissioners Annuity Reserve Valuation Method (CARVM) and, for certain contracts and certificates, the Commissioners Reserve Valuation Method (CRVM).

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

Drafting Note: There is a guidance note in VM-21 that explains that the reserve projection requirements are generally consistent with RBC C-3 Phase II requirements. However, it was decided to exclude this guidance note from VM-22 for the time being, though this may be revisited depending on whether further updates are made to the C-3 Phase I capital framework.

B. Principles

The projection methodology used to calculate the SR 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 SR 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 SR 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 and prescribed guardrails) 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 SR 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 SR 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 SR, 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. More guidance and requirements for setting assumptions in general are provided in Section 12.

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 SR 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: A cash-flow scenario model cannot 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 SR. 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 SR 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 and Risks Not 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.
 - 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/fee payment risks.
 - iii. Utilization risk associated with guaranteed living benefits.
 - iv. Anticipated mortality trends based on observed patterns of mortality improvement or deterioration, where permitted.
 - v. Annuitization risks.

- vi. Additional premium dump-ins (high interest rate guarantees in low interest rate environments).
 - vii. Applicable expense risks, including fluctuation in 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. Categories and examples of risks not reflected in the reserve calculations include, but are not necessarily limited to:
 - a. Asset risks
 - i. Liquidity risks associated with a "run on the bank."
 - b. Liability risks
 - i. Reinsurer default, impairment or rating downgrade occurring after the valuation date.
 - ii. Catastrophic events (e.g., epidemics or terrorist events).
 - iii. Major breakthroughs in life extension technology that have not yet 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.
- viii. Operational.
- ix. Litigation.

D. Materiality

The company shall establish a standard containing the criteria for determining whether an assumption, risk factor, or other element of the principle-based valuation has a material impact on the size of the reserve. This standard shall be applied when identifying material risks.

Section 2: Scope and Effective Date

A. Scope

Non-variable annuity contracts specified in VM Section II, Subsection 2 “Annuity Products”, Paragraph D and applicable contracts in VM Section II, Subsection 3 “Deposit-Type Contracts” are subject to VM-22 requirements.

B. Effective Date & Transition

Effective Date

These requirements apply for valuation dates on or after January 1, 2025.

Transition

A company may elect to establish minimum reserves pursuant to applicable requirements in VM-A, VM-C, and VM-V for business otherwise subject to VM-22 PBR requirements and issued during the first three years following the effective date of VM-22. If a company during the three-year transition period elects to apply VM-22 PBR to a block of such business, then a company must continue to apply the requirements of VM-22 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 SR (following the requirements of Section 4) plus the additional standard projection amount (following the requirements of Section 6) plus the DR for those contracts satisfying the Deterministic Certification Option, 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, VM-C, and VM-V. Contracts valued under applicable requirements in VM-A and VM-C are ones that pass the exclusion test and elect to not model PBR SRs, 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. 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. 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 SR

1. The SR shall be determined based on asset and liability projections for the contracts falling within the scope of VM-22 requirements, excluding those contracts valued using the methodology pursuant to applicable requirements in VM-A, VM-C, and VM-V, over a broad range of stochastically generated projection scenarios described in Section 8 and using prudent estimate assumptions as required in Section 3.I herein.
2. The SR amount for any group of contracts shall be determined as CTE70 of the scenario reserves following the requirements of Section 4.

E. The DR

The DR for groups of contracts for which a company elects the Deterministic Certification Option in Section 7.E shall be determined as the DR following the requirements of Section 4.

F. Aggregation of Contracts for the DR and SR

1. Groups of contracts within different Reserving Categories may not be aggregated together in determining the SR or DR. For the purposes of VM-22, Reserving Categories are classified as the following:
 - a. The “Payout Annuity Reserving Category” includes 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 provided by variable annuities:
 - i. Single Premium Immediate Annuity contracts;
 - ii. Deferred Income Annuity contracts;
 - iii. Structured Settlement Contracts in payout or deferred status;
 - iv. Fixed income payment streams resulting from the exercise of settlement options or annuitizations of host contracts issued;
 - v. Supplementary contracts, excluding contracts with no scheduled payments (such as retained asset accounts and settlements at interest);
 - vi. Certificates, emanating from non- variable group annuity contracts specified in Model #820, Section 5.C.2, purchased for the purpose of providing certificate holders fixed income payment streams upon their retirement; and
 - vii. Pension Risk Transfer Annuities.
 - b. The term “Longevity Reinsurance Reserving Category” refers to include Longevity Reinsurance as defined under the definition provided in VM-01. of the Valuation Manual.
 - c. The “Accumulation Reserving Category” includes all annuities within scope of VM-22 that are not in the “Payout Reserving Category” or “Longevity Reinsurance Reserving Category”.
 - i. Note this category shall include fixed income payment streams attributable to guaranteed living benefits associated with deferred annuity contracts, once the contract funds are exhausted
2. For the purposes of calculating stochastic reserves, the stochastic exclusion test, and determining the final VM-22 reserves, 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.

3. The reserve may be determined in aggregate across various groups of contracts within each Reserving Category as a single model segment when determining the SR or DR.
4. To the extent that aggregation results in more than one model segment, the aggregate reserve shall equal the sum of the SR amounts computed for each model segment and DR amounts computed for each model segment for which the company elects to use the Deterministic Certification Option in Section 7.E.

G. Stochastic Exclusion Test

1. To the extent that certain groups of contracts pass the stochastic exclusion test in Section 7.B, these groups of contracts may be valued using the methodology and statutory maximum valuation rate pursuant to applicable requirements in VM-A, VM-C, and VM-V.
2. For dividend-paying contracts that pass the Stochastic Exclusion Test, a dividend liability shall be established following requirements in VM-A and VM-C, as described above, for the base contract.
3. The company may not group together contract types with significantly different risk profiles when performing the exclusion test.

H. 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 13, with the exception of contracts valued under VM-A, VM-C, or VM-V following Section 3.G which are to be calculated on a seriatim basis.

I. Prudent Estimate Assumptions

1. With respect to the SR in Section 3.D, 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 annually review and update the assumptions as appropriate in accordance with these requirements.

Drafting Note: Consider whether to provide specific requirements on the frequency of doing a full experience study, rather than only providing requirements on the frequency of conducting a review.

2. The qualified actuary, to whom responsibility for a given 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 the review indicate that previously anticipated experience for a given factor is inadequate, then the company shall set a new, adequate, anticipated experience assumption for the factor.
3. To determine the prudent estimate assumptions, the SR shall also follow the requirements in Sections 4 and general assumptions including Section 9 for hedging assumptions,

Section 10 for contract holder behavior assumptions, Section 11 for mortality assumptions, and Section 12 for general guidance and expense assumptions.

J. Approximations, Simplifications, and Modeling Efficiency Techniques

A company may use simplifications, approximations, and modeling efficiency techniques to calculate the SR and/or the additional standard projection amount required by this section if the company can demonstrate that the use of such techniques does not understate the reserve by a material amount, and the expected value of the reserve calculated using simplifications, approximations, and modeling efficiency techniques is not less than the expected value of the reserve calculated that does not use them.

Guidance Note:

Examples of modeling efficiency techniques include, but are not limited to:

1. Choosing a reduced set of scenarios from a larger set consistent with prescribed models and parameters.
2. Generating a smaller liability or asset model to represent the full seriatim model using grouping compression techniques or other similar simplifications.

There are multiple ways of providing the demonstration required by Section 3.J. The complexity of the demonstration depends upon the simplifications, approximations or modeling efficiency techniques used. Examples include, but are not limited to:

- Rounding at a transactional level in a direction that is clearly and consistently conservative or is clearly and consistently unbiased with an obviously immaterial impact on the result (e.g., rounding to the nearest dollar) would satisfy 3.J without needing a demonstration. However, rounding to too few significant digits relative to the quantity being rounded, even in an unbiased way, may be material and in that event, the company may need to provide a demonstration that the rounding would not produce a material understatement of the reserve.
- A brute force demonstration involves calculating the minimum reserve both with and without the simplification, approximation or modeling efficiency technique, and making a direct comparison between the resulting reserve. Regardless of the specific simplification, approximation or modeling efficiency technique used, brute force demonstrations always satisfy the requirements of Section 3.J.
- Choosing a reduced set of scenarios from a larger set consistent with prescribed models and parameters and providing a detailed demonstration of why it did not understate the reserve by a material amount and the expected value of the reserve would not be less than the expected value of the reserve that would otherwise be calculated. This demonstration may be a theoretical, statistical or mathematical argument establishing, to the satisfaction of the insurance commissioner, general bounds on the potential deviation in the reserve estimate rather than a brute force demonstration.

Drafting Note: Add back in the WDCM method example in the above guidance note if VM-22 uses this method for the SPA calculation.

Section 4: Determination of SR

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, 11, and 12 and asset assumptions defined in Sections 4 and 9. The company shall project cash flows including the following:

- a. Gross premium received by the company from the contract holder or the ceding company in the case of reinsurance (including any due premiums as of the projected start date). For purposes of Longevity Reinsurance, net premium shall be used in the projection and defined as the gross premium multiplied by a “K-factor,” where the K-factor is determined as:
 - i. The present value of the expected future benefits and expenses at contract inception or reinsurance effective date in the case of reinsurance using the prudent estimate assumptions determined at contract inception and an interest rate equal to the prescribed interest rate under VM-A and VM-C, divided by item ii immediately below.
 - ii. The present value of the expected future gross premiums at contract inception or reinsurance effective date in the case of reinsurance using the prudent estimate assumptions determined at contract inception or reinsurance effective date and an interest rate equal to the prescribed interest rate under VM-A and VM-C.
 - iii. The resulting amount is capped at 1, in other words the application of the K-factor shall not result in the net premium exceeding the gross premium.

Guidance Note: If due premiums are modeled, the final reported reserve needs to be adjusted by adding the due premium asset.

- b. Other revenues, including contractual fees and charges, and revenue-sharing income received by the company (net of applicable expenses). For purposes of Longevity Reinsurance, it is not expected that any such other revenues will apply. To the extent there are other revenues, they should be included with

item ii under a. immediately above so that the calculation of the K-factor includes all expected future revenues from the contract holder.

- c. All material benefits projected to be paid to contract holders—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.
- d. Non-Guaranteed Elements (NGE) cash flows as described in Section 10.I.
- e. Insurance company expenses (including overhead and maintenance expense), commissions and other acquisition expenses associated with business in force as of the valuation date,.
- f. Cash flows associated with any reinsurance, to the extent not already covered above (for example, for longevity reinsurance).
- g. Cash flows from hedging instruments as described in Section 4 and Section 9.
- h. 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.
- i. If modeled explicitly, cash flows related to policy loans as described in Section 10.H.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.c 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 for non-variable annuities may be grouped for modeling using an approach that recognizes the 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 strategy supporting the contracts:

- i. The company shall not consider the cash flows from any future hedge purchases or any rebalancing of existing hedge assets in its modeling, since they are not included in the company's investment strategy supporting the contracts.
- 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.

b. For a company that has one or more future hedging strategies supporting the contracts:

- i. For a hedging program with hedge payoffs that offset index credits associated with indexed interest strategies (index 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 index credits to contract holders.
 - b) Existing hedging instruments that are currently held by the company for offsetting the index credits in support of the contracts falling under the scope of these requirements shall be included in the starting assets.

- c) An Index Credit Hedge Margin for these hedge instruments shall be reflected in both the “best efforts” and the “adjusted” runs, as applicable, by reducing index credit hedge payoffs by a margin multiple that shall be justified by sufficient and credible company experience and be no less than 1.5% multiplicatively of the portion of index credit that is hedged. This margin is intended to cover sources of potential error due the hedging itself and the ability for the company to accurately model it. In the absence of sufficient and credible company experience, a margin of 20% shall be assumed. There is no cap on the index credit hedge margin if company experience indicates actual error is greater than these minimums.
- ii. For a company with any future hedging strategies that hedge any contractual obligation or risks other than index 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 SR.
 - 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 the future hedging strategies supporting the contracts. 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 SR as the weighted average of two CTE70 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 solely with index credits. These are discussed in greater detail in Section 9. The SR 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) The company is responsible for verifying compliance with all requirements in Section 9 for all hedging instruments included in the projections.

- d) The use of products not falling under the scope of VM-22 (e.g., variable annuities) as a hedge shall not be recognized in the determination of accumulated deficiencies.
- iii. If a company has a more comprehensive hedge strategy combining index credits with guaranteed benefits and/or other risks (e.g., full fair value or economic hedging), no portion of this hedge strategy is eligible for the treatment described in section 4.A.4.b.i.

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) by following the requirements set forth in VM-21 Sections 4.A.5.a through 4.a.5.f.

6. Length of Projections

Projections of accumulated deficiencies shall be run for as many future years as needed so that no obligations remain at the end of the 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. In the case where all assets supporting the liability are held at market value, the market value adjustment shall also be applied to the cash surrender value.

Guidance Note: Refer to NAIC Model #200 “Separate Accounts Funding Guaranteed Minimum Benefits under Group Contracts Model Regulation” and Model #255 “Modified Guaranteed Annuity Model Regulation” for assets held in separate accounts.

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 projection results contain any extremely negative or positive NAER due to the depletion of assets in the denominator, the NAER shall be reset to a more appropriate discount rate, which may be carried out by imposing upper/lower limits or by using another approach, subject to actuarial judgement, that is appropriately prudent for statutory valuation.

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 SR, 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 modeled company 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 aggregate reserve shall be the higher of that produced by the modeled company investment strategy and that produced by substituting an alternative investment strategy in which the fixed income reinvestment assets have the same weighted average life (WAL) as the reinvestment assets in the modeled company investment strategy and are all 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. 80% PBR credit rating 6 (A2/A)

- 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.3.a.iii and Section 4.D.3.a.v, 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 as noted in Section 4.a.ii above.
- b. Cash flows from index funds and general account equity assets—i.e., non-fixed income assets having substantial volatility of returns, such as common stocks and real estate— including starting and reinvestment assets, shall be reflected in the projection as follows:
 - 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.H.

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 purchase rates shall reflect the payout rate specified in the contract.

- 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.3.
- 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 shall assume the contract will stay in force, the projected periodic payments are paid, and the associated maintenance expenses are incurred.

F. Frequency of Projection

- 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.

G. Compliance with ASOPs

When determining a SR, 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

A. Treatment of Reinsurance 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 SR, DR, and/or the reserve amount valued using requirements in VM-A, VM-C, and VM-V, 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.

2. Reflection of Reinsurance Cash Flows in the DR or SR

- a. In order to determine the aggregate reserve post-reinsurance ceded, accumulated deficiencies, scenario reserves, and the resulting SR and DR 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. In this section, reinsurance includes retrocession, and assuming company includes retrocessionaire.
 - ii. 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.

- iii. 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.
 - iv. A company shall include the cash flows from a reinsurance agreement or amendment in calculating the SR 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 aggregate reserve by the absolute value of such reductions in surplus.
- b. In order to determine the SR and DR on a pre-reinsurance ceded basis, accumulated deficiencies, scenario reserves, and the resulting SR and DR 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 that do not include experience refunds, where allocated expenses are similar to the renewal expense allowance, a possible approach may be multiplying the quota share by the present value of future reinsurance cash flows pertaining to the reinsured block of business.

- 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.
- d. The company shall assume that the counterparties to a reinsurance agreement are knowledgeable about the contingencies involved in the agreement and likely to exercise the terms of the agreement to their respective advantage, taking into account the context of the agreement in the entire economic relationship between the parties. In setting assumptions for the NGE in reinsurance cash flows, the company shall include, but not be limited to, the following:
 - i. The usual and customary practices associated with such agreements.
 - ii. Past practices by the parties concerning the changing of terms, in an economic environment similar to that projected.
 - iii. Any limits placed upon either party's ability to exercise contractual options in the reinsurance agreement.
 - iv. The ability of the direct-writing company to modify the terms of its policies in response to changes in reinsurance terms.

- v. Actions that might be taken by a party if the counterparty is in financial difficulty.
- e. To the extent that a single deterministic valuation assumption for risk factors associated with certain provisions of reinsurance agreements will not adequately capture the risk, the company shall do one of the following:
 - i. Stochastically model the risk factors directly in the cash-flow model when calculating the SR.
 - ii. Perform a separate stochastic analysis outside the cash-flow model to quantify the impact on reinsurance cash flows to and from the company. The company shall use the results of this analysis to adjust prudent estimate assumptions or to determine an amount to adjust the SR to adequately make provision for the risks of the reinsurance features.

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, VM-C, and VM-V, as allowed in Section 3.G, 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.

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

4. Additional Standard Projection Amount

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

Section 6: Standard Projection Amount

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 SR calculation if the stochastic exclusion test (SET) is satisfied for each of the 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 for each group of contracts that passes the SET, the company shall choose whether or not to use the reserve methodology described in Section 4 for that group 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, VM-C, and VM-V for those groups of contracts.
 - c. A company may not exclude a group of contracts from the SR requirements if there are one or more future hedging strategies supporting the contracts, with the exception of hedging programs solely supporting index credits as described in Section 9.A.1.
 - d. A company not eligible for the Annuity PBR Exemption described in VM Section II 2.E may nevertheless elect to automatically exclude one or more groups of contracts from the stochastic reserve calculation without passing or performing the SET if all of the following are met for all contracts in the group or groups:
 - i. All of the contracts are either:
 - (a) Single Premium Immediate Annuities;
 - (b) Fixed payout annuities resulting from the exercise of settlement options or annuitizations of host contracts;
 - (c) Supplementary contracts (such as retained asset accounts and settlements at interest);
 - (d) Fixed income payment streams attributable to guaranteed living benefits associated with deferred annuity contracts once the underlying funds are exhausted;
 - (e) Structured Settlement Contracts; or
 - (f) Contracts classified as "Annuities Certain" or "Supplementary Contracts" as found in Exhibit 7 – Deposit-Type Contracts of the Annual Statement.

- ii. None of the contracts are pension risk transfer annuities (PRT) or are covered under a longevity reinsurance agreement;
- iii. Future scheduled payout benefit amounts meet one of the following conditions:
 - 1. Amounts are level;
 - 2. Amounts change due to specified adjustments as follows:
 - Fixed Cost of Living Adjustments
 - Joint and Survivor Benefits; or
 - 3. Amounts stay within 5% of the initial payout benefit amount over time;
- iv. There is either no or an immaterial level of policyholder options permitted within the contracts that are sensitive to changes in interest rates or economic conditions; and
- v. The company has less than [\$X] of Payout Annuity Exemption Reserves, and if the company is a member of an NAIC group that includes other life insurance companies, the group has combined Payout Annuity Exemption Reserves of less than [\$Y] billion.
 - 1. Payout Annuity Exemption Reserves are determined as follows:
 - The amount reported in the prior calendar year life/health annual statement, Analysis of Increase in Reserves During the Year- Individual Annuities, Column 6 (“Life Contingent Payout (Immediate and Annuitizations)”), line 15; plus
 - The amount reported in the prior calendar year life/health annual statement, Analysis of Increase in Reserves During the Year- Group Annuities, Column 6 (“Life Contingent Payout (Immediate and Annuitizations)”), line 15; plus
 - The sum of the amount reported in the prior calendar year life/health annual statement, Exhibit 7 – Deposit-Type Contracts, Column 3 (“Annuities Certain”), row 14 and Column 4 (“Supplemental Contracts”), row 14.
- vi. A company shall file a statement of exemption certifying compliance with conditions (i) through (v) above prior to July 1 of the associated valuation year. The domiciliary commissioner may reject such statement prior to Sept. 1.
- vii. If a group of contracts that satisfies the criteria of 7.A.1.d.i to 7.A.1.d.v above for the current valuation year had been valued using the DR or SR of VM-22 for the prior year-end, the company must continue to value the contracts under the DR or

SR requirements of VM-22 unless the domiciliary commissioner grants permission to value the contracts under VM-A, VM-C, and VM-V.

B. Requirement to Pass the Stochastic Exclusion Tests

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

1. Stochastic Exclusion Ratio Test (SERT)—Annually within 12 months before the valuation date 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 strategies, 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 interest rate risk, mortality and/or 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).

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, mortality and/or 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, for the group of contracts, reserves calculated using requirements under VM-A, VM-C, and VM-V are at least as great as the assets required to support the group of contracts and certificates using the company's cash-flow testing model under each of the 48 scenarios identified in Section 7.C.1 or alternatively each of the New York seven economic scenarios under each of the three mortality adjustment factors identified in Section 7.C.1.
- 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, mortality and/or longevity risk, or asset return volatility 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, mortality and/or longevity 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, the company's longevity risk, and the company's investment strategy.

C. Stochastic Exclusion Ratio Test

1. In order to exclude a group of contracts from the SR requirements under the stochastic exclusion ratio test (SERT), a company shall demonstrate that the ratio of $(b-a)/c$ is less than the lesser of $[x]\%$ and the percentage change that would trigger the company's materiality standard, where:
 - a. a = the adjusted scenario reserve described in Section 7.C.2.a below using the baseline economic scenario ("scenario 9), as described in Appendix 1.E of VM-20, and 100% as the adjustment factor for mortality.
 - b. b = the largest adjusted scenario reserve described in Section 7.C.2.a below under any of the 16 economic scenarios described in Appendix 1.E of VM-20 under $[95]\%$, 100%, and $[105]\%$ of anticipated experience mortality excluding margins. Because mortality variability may differ by company, if the magnitude of the company's margin for mortality exceeds 5%, then the company shall use the baseline mortality and the mortality augmented by plus and minus the company's margin for this exercise.
 - c. c = an amount calculated from the baseline economic scenario described in Appendix 1.E of VM-20, and 100% as the adjustment factor for mortality, 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 scenario reserve, minus the adjusted scenario reserve for the baseline economic scenario and 100% as the adjustment factor for mortality. This is not necessarily the same as the biggest difference from the adjusted scenario reserve for the baseline economic scenario and 100% as the adjustment factor for mortality, or the absolute value of the biggest difference from the adjusted scenario reserve for the baseline economic scenario and 100% as the adjustment factor for mortality, both of which could lead to an incorrect test result. There are 47 ($=16 \times 3 - 1$) combined economic and mortality scenarios that should be compared for the determination of b .

2. In calculating the ratio in Section 7.C.1 above:
 - a. The company shall calculate an adjusted scenario reserve for the group of contracts for each of the 16 economic scenarios using the three levels of mortality adjustment factors 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 Section 7.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 Section 7.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 available baseline economic scenario and the 15 other 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 conduct the stochastic exclusion ratio test on only a single basis, either pre-reinsurance-ceded or post-reinsurance-ceded.
- 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.

Guidance Note: Further description of non-proportional reinsurance is provided in Paragraph 16 of SSAP 61R.

- a. An example of an acceptable demonstration:
 - i. For convenience in notation • SERT = the ratio $(b-a)/c$ 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.”

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

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

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 48 combined economic and mortality 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 of Section 7.D.2.a or Section 7.D.2.b and did not pass; or (ii) the qualified actuary had actively undertaken to perform the certification method in Section 7.B.3 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 SR requirements using the Stochastic Exclusion Demonstration Test, 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 SR was calculated on a stand-alone basis for the group of contracts subject to the SR 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, VM-C, and VM-V. 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 SR requirements.
 - b. If, as of the end of any calendar year, the company determines the statutory reserve determined pursuant to the applicable requirements in VM-A, VM-C, and VM-V for the group of contracts no longer adequately provides for all material risks, the exclusion shall be discontinued, and the company fails the SET 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 Section 7.D.1 above:
 - a. Demonstrate that the statutory reserve calculated in accordance with VM-A, VM-C, and VM-V is greater than the SR calculated on a stand-alone basis.
 - b. Demonstrate that the statutory reserve calculated in accordance with VM-A, VM-C, and VM-V 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, VM-C, and VM-V is greater than the SR calculated on a stand-alone basis, but using a representative sample of contracts in the SR calculations.
 - d. Demonstrate that any risk characteristics that would otherwise cause the SR calculated on a stand-alone basis to exceed the statutory reserve calculated in accordance with VM-A, VM-C, and VM-V, are not present or have been substantially eliminated through actions such as hedging, investment strategy, reinsurance or passing the risk on to the contract holder by contract provision.

E. Deterministic Certification Option

1. Instead of a SR, the company may determine a Deterministic Reserve (DR) 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 contracts and certificates. 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 contracts and certificates 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, and the company must pass the SERT when considering only the 16 economic scenarios paired with the 100% mortality scenario.
 - d. The company must disclose a description of contracts and associated features in the certification.
2. The DR 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 DR equals the scenario reserve following the requirements for Section 4.

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

Section 9: Modeling Hedges under a Non-Index Credit Future Hedging Strategy

A. Initial Considerations

1. This section applies to modeling of hedges other than situations where the company only hedges index credits..
2. If the company is following one or more future hedging strategies supporting the contracts, in accordance with an investment policy adopted by the board of directors, or a committee of board members, 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 SR, 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. 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, including the hedging strategy, used to implement the investment policy.
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 SR otherwise calculated. Particular attention should be given to Section 1.B Principle 5 for the modeling of future hedging strategies.

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 SR 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 SR 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 SR 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.

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.

5. A safe harbor approach is permitted for reflection of future hedging strategies supporting the contracts 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 SR (Reported)

1. The company shall calculate CTE70 (best efforts)—the results obtained when the CTE70 is based on incorporating the future hedging strategies supporting the contracts (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 future hedging strategies supporting the contracts (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 future hedging strategies supporting the contracts except hedge purposes solely related to strategies to hedge index credits, therefore following the requirements of Section 4.A.4.a and 4.A.4.b.i.

However, for a company with a future hedging strategy supporting the contracts, existing hedging instruments, except hedging instruments solely related to strategies to hedge index credits, that are currently held by the company in support of the contracts falling under the scope of these requirements may be considered in one of two ways for the CTE70 (adjusted):

- 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.

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 SR is given by:

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

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 the available relevant period of data (but no less than 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. 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”), should 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 less than 12 months of experience and without robust mock testing, E should be 1.0. For a material change in strategy with less than 3 months of history, E should be 1.0. However, when a material change in hedging strategy with less than 3 months history is the introduction of hedging for a newly introduced product or newly acquired block of business and is supplemented by robust mock testing, E should instead be at least 0.3. Moreover, with prior approval from the domestic regulator, material changes in hedge strategy with less than 3 months history but with robust mock testing may have error factors less than 1.0, though still subject to the minimum error factor specified in Section 9.C.4 and with an appropriate prudent estimate to account for additional uncertainty in anticipated hedging experience beyond that of a robust hedging program already in existence. E may also be lower than 1.0 if the change in strategy is a minor refinement rather than a material change in strategy, though still subject to the minimum error factor specified in Section 9.C.4 and with an appropriate prudent estimate to account for any additional uncertainty associated with the refinement.

The following examples are provided as guidance for determining the E factor when there has been a change to the hedge program. These examples are not intended to be exhaustive, and a company must support the determination of whether a hedge methodology change is material based on a review of the company's specific change in methodology.

- The error factor should be temporarily 100% for substantial changes in hedge methodology (e.g., moving from a fair-value based strategy to a stop-loss strategy) without robust mock-testing.
 - An increase in the error factor may not always be needed for minor refinements to the hedge strategy (e.g., moving from swaps to Treasury futures).
8. The company shall set the value of E reflecting the extent to which the future hedging program is clearly defined. To support a value of E below 1.0, there should be very robust documentation outlining the future hedging strategies. To the extent that documentation outlining any of the future hedging strategies is incomplete, the value of E shall be increased. In particular, the value of E shall be 1.0 if documentation is materially incomplete for any of the individual CDHS attributes (a) through (j), as listed in VM-01.

Any increases required to the value of E to reflect that documentation is not available to support that the future hedging strategies are clearly defined shall be in addition to increases to the value of E to reflect a lack of historical experience or to reflect the back-testing results, subject to an overall ceiling of 1.0 for E.

<p>Guidance Note: Companies must use judgment both in determining an E factor and in applying this requirement in the case where there are multiple future hedging strategies,</p>

particularly where some may be CDHS and some may not be CDHS. In this case, the SR should be ensured to be no less than the CTE(70) reflecting the future hedging strategies that are CDHS and not reflecting those that are not CDHS. Companies with multiple future hedging strategies with very different levels of effectiveness or with multiple future hedging strategies that include both CDHS and non-CDHS should discuss with their domestic regulator.

D. Additional Considerations for CTE70 (best efforts)

If the company is following one or more future hedging strategies supporting the contracts, 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 SR 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.

E. 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 SR, 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 non-variable 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 non-variable annuity and other in-scope products account balances reach a predetermined level in relationship to the guarantees. Any 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 non-variable 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 SR, 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 SR 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.
7. The company may also consider historical experience for similar current or past hedging programs on similar products to support the error factor or Index Credit Hedge Margin determined for the projection.

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 reserves level. 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 and by Section 12.

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 or may not be significant drivers of behavior. Whether an option is ancillary to the primary product features depends on many considerations, such as:
 - a. The purpose for which the product was purchased.
 - b. Whether the option is elective or non-elective.
 - c. Whether the value of the option is 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 material behavior assumptions, if relevant to the risks in the product, and thus the approach will not understate the reserve.

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 company 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.
- Account transfers.
- Future deposits.
- Other behavior assumptions if relevant to the risks in the product.

Sensitivity testing of assumptions is required and shall be more appropriately reflective of the risk of adverse deviations from the baseline assumption. For example, a base lapse assumption plus or minus X% across all contracts may not achieve this objective. 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 (but no less than every 3 years) 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 for the benefit utilization.
 - h. Commutation of benefit (from periodic payment to lump sum or vice versa.)
2. 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.
3. 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, transaction fees or other contract charges.
 - l. Distribution channel.
4. Unless there is credible 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.
 5. 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.
 6. 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 SR. 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.
 7. 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 stochastically modeled.

2. The company should exercise care in using static assumptions when it would be more appropriate to use a dynamic model or other scenario-dependent formulation for behavior. With due allowance for appropriate simplifications, approximations and modeling efficiency techniques, the use of dynamic models is encouraged, but not mandatory. Static assumptions that 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 non-variable annuities, these “valuation” scenarios would typically display one or more of the following attributes:
 - a. Declining, increasing and/or volatile index values, where applicable.
 - b. Price gaps and/or liquidity constraints.
 - c. Volatile interest rates or persistently low interest rates.
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.A to Section 10.G above.
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 contract's utilization or to reflect average utilization over a model segment or sub-segments if the results are materially similar.
 - c. Model policy loan interest in a manner consistent with contract 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 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 negative 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 contract costs or values and are 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 non-variable annuities include but are not limited to the following: the credited rates on fixed accounts, 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.I.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 is not based on some aspect of the contract's experience.
6. 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.

Drafting Note: Comments are sought for any insight into whether authorization from the board or documentation should be considered in allowing exclusion of NGEs.

7. 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 SR.
 - b. If the contract holder dividends that give rise to the dividend liability are included in the cash-flow model, then the resulting SR should be reduced by the amount of the dividend liability.
- 8. 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 SR. The intent is for prudent estimate mortality assumptions to be based on facts, circumstances and appropriate actuarial practice.

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.

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 mortality (longevity) segment.

It may be necessary, because of a change in the mortality risk profile of the segment, to reclassify a business segment from a mortality (longevity) segment to a longevity (mortality) segment to the extent compliance with this section requires such a reclassification.

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. Little or 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:

[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, when little or no experience or information is available on a business segment, an established industry or national mortality table and mortality improvement scale 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 mortality 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 mortality (longevity) 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 including margins for uncertainty with the mortality assumptions 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 industry mortality assumption described in Section 11.B.3 used in the blending.

2. Adjustment of Industry Mortality for Improvement

For purposes of the adjustment for credibility, the industry mortality table for a mortality segment may be and the industry mortality table for a longevity 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 industry 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 mortality segments may be and the credibility adjusted table used for longevity 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 SR. If such an adjustment would reduce the SR, 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: Other Guidance and Requirements for Assumptions

A. Overview

This section provides guidance and requirements in general for setting prudent estimate assumptions when determining either the SR or DR. It also provides specific guidance and requirements for expense assumptions.

B. General Assumption Requirements

1. The company shall use prudent estimate assumptions for risk factors that are not stochastically modeled by applying margins to the anticipated experience assumptions if such risk factors have been categorized as material risks by following Section 1.B Principle 3 and requirements in Section 12.C.
2. The company shall establish the prudent estimate assumptions for risk factors 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.
3. The company shall model the following risk factors stochastically unless the company elects the stochastic exclusion test defined in Section 7:
 - a. Interest rate movements (i.e., Treasury interest rate curves).
 - b. Equity performance (e.g., Standard & Poor's 500 index [S&P 500] returns and returns of other equity investments).
4. If the company elects to stochastically model risk factors in addition to the economic scenarios, the requirements in this section for determining prudent estimate assumptions for these risk factors do not apply.

It is expected that companies will not stochastically model risk factors other than the economic scenarios, such as contract holder behavior or mortality, until VM-22 has more specific guidance and requirements available. Companies shall discuss with domiciliary regulators if they wish to stochastically model other risk factors.

5. The company shall use its own experience, if relevant and credible, to establish an anticipated experience assumption for any risk factor. To the extent that company experience is not available or credible, the company may use industry experience or other data to establish the anticipated experience assumption, making modifications as needed to reflect the circumstances of the company.
 - a. For risk factors (such as mortality) to which statistical credibility theory may be appropriately applied, the company shall establish anticipated experience assumptions for the risk factor by combining relevant company experience with industry experience data, tables or other applicable data in a manner that is consistent with credibility theory and accepted actuarial practice.

- b. For risk factors (such as utilization of guaranteed living benefits) that do not lend themselves to the use of statistical credibility theory, and for risk factors (such as some of the lapse assumptions) to which statistical credibility theory can be appropriately applied but cannot currently be applied due to lack of industry data, the company shall establish anticipated experience assumptions in a manner that is consistent with accepted actuarial practice and that reflects any available relevant company experience, any available relevant industry experience, or any other experience data that are available and relevant. Such techniques include:
 - i. Adopting standard assumptions published by professional, industry or regulatory organizations to the extent they reflect any available relevant company experience or reasonable expectations.
 - ii. Applying factors to relevant industry experience tables or other relevant data to reflect any available relevant company experience and differences in expected experience from that underlying the base tables or data due to differences between the risk characteristics of the company experience and the risk characteristics of the experience underlying the base tables or data.
 - iii. Blending any available relevant company experience with any available relevant industry experience and/or other applicable data using weightings established in a manner that is consistent with accepted actuarial practice and that reflects the risk characteristics of the underlying contracts and/or company practices.
 - c. For risk factors that have limited or no experience or other applicable data to draw upon, the assumptions shall be established using sound actuarial judgment and the most relevant data available, if such data exists.
 - d. For any assumption that is set in accordance with the requirements of Section 12.B.5.c, the qualified actuary to whom responsibility for this group of contracts is assigned shall use sensitivity testing and disclose the analysis performed to ensure that the assumption is set at the conservative end of the plausible range.
 - e. 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 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.
- 6. The company shall sensitivity test material risk factors that are not stochastically modeled and examine the impact on the stochastic reserve. The company shall update the sensitivity

tests periodically as appropriate. The company may update the tests less frequently, but no less than every 3 years, when the tests show less sensitivity of the stochastic 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:

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

Guidance Note: Sensitivity testing every risk factor on an annual basis is not required. For some risk factors, it may be reasonable, in lieu of sensitivity testing, to employ statistical measures for margins, such as adding one or more standard deviations to the anticipated experience assumption.

7. The company shall vary the prudent estimate assumptions from scenario to scenario within the stochastic reserve calculation in an appropriate manner to reflect the scenario-dependent risks.

C. Assumption Margins

The company shall include margins to provide for adverse deviations and estimation error in the prudent estimate assumptions for all risk factors that are not stochastically modeled or prescribed, subject to the following:

1. The level of margin applied to the anticipated experience assumptions may be determined in aggregate or independently as discussed in Section 1.B Principle 3. It is not permissible to set a margin less toward the conservative end of the spectrum to recognize, in whole or in part, implicit or prescribed margins that are present, or are believed to be present, in other risk factors.

Risks that are stochastically modeled (e.g., interest rates, equity returns) or have prescribed margins or guardrails (e.g., assets, revenue sharing) shall be considered material risks. Other risks generally considered to be material include, but are not limited to, mortality, contract holder behavior, maintenance and overhead expenses, inflation and implied volatility. In some cases, the list of material risks may also include acquisition expenses, partial withdrawals, policy loans, annuitizations, account transfers and deposits, and/or option elections that contain an element of anti-selection.

2. The greater the uncertainty in the anticipated experience assumption, the larger the required margin, with the margin added or subtracted as needed to produce a larger SR or DR than would otherwise result. For example, the company shall use a larger margin when:
 - a. The experience data have less relevance or lower credibility.
 - b. The experience data are of lower quality, such as incomplete, internally inconsistent or not current.

- c. There is doubt about the reliability of the anticipated experience assumption, such as, but not limited to, recent changes in circumstances or changes in company policies.
 - d. There are constraints in the modeling that limit an effective reflection of the risk factor.
- 3. In complying with the sensitivity testing requirements in Section 12.B.6 above, greater analysis and more detailed justification are needed to determine the level of uncertainty when establishing margins for risk factors that produce greater sensitivity on the stochastic reserve.
- 4. A margin is permitted but not required for assumptions that do not represent material risks.
- 5. A margin should reflect the magnitude of fluctuations in historical experience of the company for the risk factor, as appropriate.
- 6. The company shall apply the method used to determine the margin consistently on each valuation date but is permitted to change the method from the prior year if the rationale for the change and the impact on the stochastic reserve is disclosed.

D. Expense Assumptions

1. General Prudent Estimate Expense Assumption Requirements

In determining prudent estimate expense assumptions, the company:

- a. May spread certain information technology development costs and other capital expenditures over a reasonable number of years in accordance with accepted statutory accounting principles as defined in the Statements of Statutory Accounting Principles.

Guidance Note: Care should be taken with regard to the potential interaction with the inflation assumption below.

- b. Shall assume that the company is a going concern.
- c. Shall choose an appropriate expense basis that properly aligns the actual expense to the assumption. If values are not significant, they may be aggregated into a different base assumption.

Guidance Note: For example, death benefit expenses should be modeled with an expense assumption that is per death incurred.

- d. Shall reflect the impact of inflation.
- e. Shall not assume future expense improvements.

- f. Shall not include assumptions for federal income taxes (and expenses paid to provide fraternal benefits in lieu of federal income taxes) and foreign income taxes.
- g. Shall use assumptions that are consistent with other related assumptions.
- h. Shall use fully allocated expenses.

Guidance Note: Expense assumptions should reflect the direct costs associated with the block of contracts being modeled, as well as indirect costs and overhead costs that have been allocated to the modeled contracts.

- i. Shall allocate expenses using an allocation method that is consistent across company lines of business. Such allocation must be determined in a manner that is within the range of actuarial practice and methodology and consistent with applicable ASOPs. Allocations may not be done for the purpose of decreasing the stochastic reserve.
- j. Shall reflect expense efficiencies that are derived and realized from the combination of blocks of business due to a business acquisition or merger in the expense assumption only when any future costs associated with achieving the efficiencies are also recognized.

Guidance Note: For example, the combining of two similar blocks of business on the same administrative system may yield some expense savings on a per unit basis, but any future cost of the system conversion should also be considered in the final assumption. If all costs for the conversion are in the past, then there would be no future expenses to reflect in the valuation.

- k. Shall reflect the direct costs associated with the contracts being modeled, as well as an appropriate portion of indirect costs and overhead (i.e., expense assumptions representing fully allocated expenses should be used), including expenses categorized in the annual statement as “taxes, licenses and fees” (Exhibit 3 of the annual statement) in the expense assumption.
- l. Shall include acquisition expenses associated with business in force as of the valuation date and significant non-recurring expenses expected to be incurred after the valuation date in the expense assumption.
- m. For contracts sold under a new policy form or due to entry into a new product line, the company shall use expense factors that are consistent with the expense factors used to determine anticipated experience assumptions for contracts from an existing block of mature contracts taking into account:
 - i. Any differences in the expected long-term expense levels between the block of new contacts and the block of mature contracts.

- ii. That all expenses must be fully allocated as required under Section 12.D.1.h above.

2. Margins for Prudent Estimate Expense Assumptions

The company shall determine margins for expense assumptions following Section 12.C.

Section 13: 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; however, contracts for which the Deterministic Certification Option is elected in Section 7.E are subject to the allocation methodology described in this Section 13. Allocation calculations shall be done separately for the DR and SR, and for different reserving categories.

Under the allocation methodology described in this section, the reserve held for any contract will be no less than the cash surrender value provided under that contract, after consideration of any reinsurance. Additionally, the reserve held for a Payout Annuity contract (whether life-contingent or not) will be no less than the present value of the liability cash flows provided under the contract, after consideration of any reinsurance, discounted using the NAER described in Section 13.B.1 or 13.B.2, as applicable. The allocation methodology is a formulaic approach that is designed, generally, to allocate the excess aggregate reserves based on a measure of the risk and, therefore, to generally allocate a greater portion of the excess aggregate reserves to contracts that have greater risk. For example, an indexed annuity contract with a high benefit GLWB will typically have a larger allocated excess reserve than an otherwise identical indexed annuity contract with a low benefit GLWB or no GLWB.

- A. The contract-level reserve for each contract shall be the sum of the following:
 - 1. The contract's minimum allocation value (MAV), as defined in Section 13.C.
 - 2. The contract's allocated excess reserve (AER), as defined in Section 13.D.
 - B. Scenario actuarial present value (APV)
 - 1. For a group of contracts for which a company does not elect the Deterministic Certification Option in Section 7.E, the Scenario APV for each contract is equal to the discounted liability cash flows at the NAER, pursuant to requirements in Section 4, for the scenario that produces the aggregate scenario reserve for the group that is closest to, but not greater than the SR defined in Section 3.D.
- If the Direct Iteration Method is used to satisfy the requirements in Section 4.B.1, then the company shall:
- a. Determine a path of NAER for each model segment that reflects the net general account portfolio rate in each projection interval (i.e., monthly, quarterly, annually), which will depend primarily on:
 - i. Projected net investment earnings from the portfolio of starting assets.
 - ii. Pattern of projected asset cash flows from the starting assets and subsequent reinvestment assets.
 - iii. Pattern of net liability cash flows.
 - iv. Projected net investment earnings from reinvestment assets.
 - b. The company shall calculate the NAER as the ratio of net investment earnings

divided by invested assets subject to the requirements in i through iv below. All items reflected in the ratio are consistent with statutory asset valuation and accrual accounting, including reflection of due, accrued or unearned investment income where appropriate.

- i. The NAER for each projection interval is calculated in a manner that is consistent with the timing of cash flows and length of the projection interval of the related cash-flow model.
 - ii. Net investment earnings include:
 1. Gross investment income plus capital gains and losses, minus prescribed default costs, and minus investment expenses.
 2. Income from derivative asset programs, subject to the requirements in Sections 4 and 9 of VM-22.
 - iii. Invested assets are determined in a manner that is consistent with the timing of cash flows within the cash-flow model and the length of the projection interval of the cash-flow model.
 - iv. The annual statement value of derivative instruments or a reasonable approximation thereof is in invested assets.
2. For a group of contracts for which a company elects the Deterministic Certification Option defined in Section 7.E, the Scenario APV for each contract is equal to the discounted liability cash flows at the NAER in the single scenario used to calculate the reserve.
 3. For projecting future liability cash flows under either Section 13.B.1 or 13.B.2, as applicable, assume the same liability assumptions that were used to calculate the SR defined in Section 3.D.

C. Minimum allocation value (MAV)

1. For Payout Annuity contracts, the MAV is equal to the greater of:
 - a. The Scenario APV for the contract, or
 - b. The cash surrender value provided under the contract, if any.
2. For Account Value Based Annuity contracts, the MAV is equal to the cash surrender value provided under the contract, if any, otherwise zero.

D. Allocated excess reserve (AER)

1. For each contract in a group of contracts, the AER is determined by allocating the excess, if any, of the group's aggregate reserve over the group's aggregate

MAV to the contract in proportion to the excess of the Scenario APV over the MAV for such contract.

2. If the Scenario APV for any contract is less than the MAV, then the excess Scenario APV to be used for allocating the excess aggregate reserve to that contract shall be floored at zero.
3. If all contracts in the group have an excess Scenario APV that is floored at zero, then use the MAV to allocate any excess aggregate reserve over the aggregate MAV.
4. If a group's aggregate reserve is less than the group's aggregate MAV, that difference should be allocated to life contingent contracts in proportion to each life contingent contract's MAV to the sum of the life contingent contracts MAV.

E. As a hypothetical example, consider a company with the results of the following eight contracts in reserving categories:

Table 13.1.A: Hypothetical Sample Allocation of Aggregate Reserve: Group A, Account Value Based Annuity Contracts

					Excess (floored)		Excess of Aggregate Reserve over	Allocated Excess	Total
			Scenario	Minimum Allocation	of Scenario APV over MAV	Aggregate Reserve	Aggregate MAV	Reserve (7) = (4) x	Contract
		CSV	APV	Value (MAV)	(4) =	CTE 70	(6) = Max[(5 Total)	[(6 Total)/	Level
Contract	Example Product Type	(1)	(2)	(3) *	Max[(2)-(3),0]	(5)	-(3 Total),0]	(4 Total)]	Reserve
1	Individual annuity w/ no GLWB	95.0	91.0	95.0	-			-	95.0
2	Indexed annuity w/ low benefit GLWB	92.0	98.0	92.0	6.0			6.3	98.3
3	Indexed annuity w/ medium benefit GLWB	90.0	104.0	90.0	14.0			14.7	104.7
4	Indexed annuity w/ high benefit GLWB	88.0	111.0	88.0	23.0			24.1	112.1
Total		365.0	404.0	365.0	43.0	410.0	45.0	45.0	410.0
* MAV for Payout Annuity contracts equals Max[(1), (2)]. MAV for Account Value Based Annuity contracts equals (1) if any, otherwise zero.									

Table 13.1.B: Hypothetical Sample Allocation of Aggregate Reserve: Group B, Payout Annuity Contracts that do not have Cash Surrender Values

					Excess (floored) of Scenario		Excess of Aggregate Reserve over Aggregate MAV	Allocated Excess Reserve	Total Contract Level
			Scenario	Minimum Allocation Value (MAV)	APV over MAV (4) = Max[(2)-(3),0]	Aggregate Reserve CTE 70 (5)	(6) = Max[(5 Total) -(3 Total),0]	(7) = (3) x [(6 Total)/ (3 Total)] **	(8) = (3)+(7)
Contract	Example Product Type	CSV (1)	APV (2)	(3) *					
1	Fixed Life Contingent payout annuity	-	91.0	91.0	-			1.4	92.4
2	Fixed Life Contingent payout annuity	-	111.0	111.0	-			1.6	112.6
3	Fixed Non-life Contingent payout annuity	-	98.0	98.0	-			1.5	99.5
4	Fixed Non-life Contingent payout annuity	-	104.0	104.0	-			1.5	105.5
Total		-	404.0	404.0	-	410.0	6.0	6.0	410.0
* MAV for Payout Annuity contracts equals Max[(1), (2)]. MAV for Account Value Based Annuity contracts equals (1) if any, otherwise zero.									
** Because all contracts have an excess Scenario APV of 0, the AER is allocated in proportion to MAV.									

Guidance Note: The Scenario 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 Scenario APV in this section applies to the entire contract, irrespective of whether guaranteed benefits are attached, and uses company prudent estimate liability assumptions.

VM-V: Statutory Maximum Valuation Interest Rates for Formulaic Reserves

1. Income Annuities

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 and all contracts not passing the SET covered by Sections 1 through 13 of VM-22, are covered in VM-V:
 - 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 VM-V Section 1.A.2.d, Section 1.A.2.e, Section 1.A.2.f and Section 1.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 VM-V Section

1.A.2.d, Section 1.A.2.e, Section 1.A.2.f, Section 1.A.2.g or Section 1.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 VM-V Section 1 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 VM-V Section 1.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-V Section 1 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 1.C-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 1.C-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.A:

Table 1.C-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 (VM-V Section 1.C.1) and its Premium Determination Date (VM-V Section 1.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 VM-V Section 1.C.4);
- b. S is the spread rate for that Valuation Rate Bucket (defined in VM-V Section 1.C.5);
- c. D is the default cost rate for that Valuation Rate Bucket (defined in VM-V Section 1.C.6);
- and
- d. E is the spread deduction defined as 0.25%.

For non-jumbo contracts, the quarterly statutory maximum valuation interest rate is the quarterly valuation rate (I_q) rounded to the nearest one-fourth of one percent ($1/4$ of 1%).

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 VM-V Section 1.C.7) for the business day immediately preceding the premium determination date; and
- c. C_q is the average daily corporate rate (defined in VM-V Section 1.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 VM-V Section 1.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 VM-V Section 1.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 1.C-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 VM-V Section 1.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 1.C.7.a of VM-V 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/\[replace with series name from VM-V Section 1.C.7.a\]](https://research.stlouisfed.org/fred2/series/[replace with series name from VM-V Section 1.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 VM-V Section 1.C.9) for the same calendar year as the weight tables (i.e. Tables 1, 2, and 3) used in calculating I_q in VM-V Section 1.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 c 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 (VM-V Section 1.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