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

# 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:
   1. 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:
2. Single Premium Immediate Annuity contracts;
3. Deferred Income Annuity contracts;
4. Structured Settlement Contracts in payout or deferred status;
5. Fixed income payment streams resulting from the exercise of settlement options or annuitizations of host contracts issued;
6. Supplementary contracts, excluding contracts with no scheduled payments (such as retained asset accounts and settlements at interest);
7. 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
8. Pension Risk Transfer Annuities.
   1. The term “Longevity Reinsurance Reserving Category” refers to include Longevity Reinsurance as defined under the definition provided in VM-01. of the Valuation Manual.
   2. 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”.
      1. 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.

1. 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.
2. 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.
3. ~~The reserve for each longevity reinsurance contract within the “Longevity Reinsurance Reserving Category” shall be floored at zero.~~

{The reserve for each longevity reinsurance contract within the “Longevity Reinsurance Reserving Category” shall be floored at 2% of the scheduled longevity benefits payable by the benefit provider within the next 12 months from the date of valuation. For the deals structured on a net basis, where the reinsurer covers only the benefits exceeding a predetermined reference benefit schedule, the floor will still be calculated based on the scheduled longevity benefits payable by the benefit provider withing the next 12 months from the date of valuation.}

## 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.

## 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.

1. 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.
2. 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.

## 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.
* Calculate the minimum reserve by flooring the reserve amount at 2% of the scheduled longevity benefits payable by the benefit provider within next 12 months from the date of valuation. For the deals structured on a net basis, where the reinsurer covers only the benefits exceeding a predetermined reference benefit schedule, the floor will still be calculated based on the scheduled longevity benefits payable by the benefit provider within the next 12 months from the valuation date. This flooring results in satisfying 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

## 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:

1. 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:~~
   1. ~~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.~~
   2. ~~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.~~
   3. ~~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.

1. 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.~~
2. 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.
3. Non-Guaranteed Elements (NGE) cash flows as described in Section 10.I.
4. Insurance company expenses (including overhead and maintenance expense), commissions and other acquisition expenses associated with business inforce as of the valuation date,.
5. Cash flows associated with any reinsurance, to the extent not already covered above (for example, for longevity reinsurance).
6. Cash flows from hedging instruments as described in Section 4 and Section 9.
7. 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.
8. 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).

1. 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.

1. 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 CTE values; first, a CTE70 (“best efforts”) representing the company’s projection of all of the hedge cash flows, including future hedge purchases, and a second CTE70 (“adjusted”) which shall use only hedge assets held by the company on the valuation date and only future hedge purchases associated 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) 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.

1. 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.

1. 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.

1. 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.

## Determination of Scenario Reserve

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

* 1. 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.

* + 1. 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.

* + 1. Determination of NAER on Additional Invested Asset Portfolio

1. 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.

1. To determine the NAER on additional invested assets for a given scenario:
2. Project the additional invested asset portfolio as of the valuation date to the end of the projection period,
3. Investing any cash in the portfolio and reinvesting all investment proceeds using the company’s investment policy.
4. Excluding any liability cash flows.
5. Incorporating the appropriate returns, defaults and investment expenses for the given scenario.
6. 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.
7. 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.
8. 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.

* + 1. 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.

## Projection of Assets

1. Starting Asset Amount
   1. 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:
      1. Any hedge instruments held in support of the contracts being valued; and
      2. 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).
   2. 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.

1. General Account Assets
   1. 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:
      1. 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;
      2. 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;
      3. 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;
      4. 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;
      5. 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.
   2. 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:
      1. 5% Treasury
      2. 15% PBR credit rating 3 (Aa2/AA)
      3. 80% PBR credit rating 6 (A2/A)
   3. 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.

1. Cash Flows from Invested Assets
   1. Cash flows from general account fixed income assets, including starting and reinvestment assets, shall be reflected in the projection as follows:
      1. Model gross investment income and principal repayments in accordance with the contractual provisions of each asset and in a manner consistent with each scenario.
      2. Reflect asset default costs as prescribed in VM-20 Section 9.F and anticipated investment expenses through deductions to the gross investment income.
      3. Model the proceeds arising from modeled asset sales and determine the portion representing any realized capital gains and losses.
      4. Reflect any uncertainty in the timing and amounts of asset cash flows related to the paths of interest rates, equity returns or other economic values directly in the projection of asset cash flows. Asset defaults are not subject to this requirement, since asset default assumptions must be determined by the prescribed method as noted in Section 4.a.ii above.
   2. 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:
      1. Determine the grouping for asset categories and the allocation of specific assets to each category in a manner that is consistent with that used for index crediting strategies, as discussed in Section 4.A.2.
      2. Project the gross investment return including realized and unrealized capital gains in a manner that is consistent with the stochastically generated scenarios.
      3. Model the timing of an asset sale in a manner that is consistent with the investment policy of the company for that type of asset. Reflect expenses through a deduction to the gross investment return using prudent estimate assumptions.
   3. Cash flows for each projection interval for policy loan assets shall follow the requirements in Section 10.H.
2. Projection of Annuitization Benefits
   * + 1. Assumed Annuitization Purchase Rates
3. 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.
4. 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.
   * + 1. Projected Election of GMIBs, GMWBs and Other Annuitization Options
5. 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.

## 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.

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## 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.