AMERICAN ACADEMY *of* ACTUARIES

Report of the American Academy of Actuaries'
Variable Annuity Reserve Work Group

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

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Variable Annuity Reserve Work Group

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American Academy of Actuaries
Variable Annuity Reserve Work Group

I. Background

The Variable Annuity Reserve Work Group (VARWG) was formed in January 2003 as a work group of the American Academy of Actuaries' Life Practice Council (LPC), drawing resources from the Life Capital Adequacy Subcommittee and the Life Valuation Subcommittee. Its charge is to examine issues surrounding the development of a reserve methodology for variable annuity products that uses the principles of the proposed Risk-Based Capital (RBC) C-3 Phase II approach. The VARWG is continuing to examine the effectiveness of such a methodology, and is identifying and commenting on regulatory and practicality issues. The work group is also working with the NAIC's Life and Health Actuarial Task Force (LHATF) to develop the methodology and make recommendations on strategies to address any issues that have been identified or that may arise.

The reserve methodology being developed, if adopted, could be applicable to all variable annuity products. Such a methodology could replace, where appropriate the application of Actuarial Guideline XXXIII to variable annuity contracts and totally replace Actuarial Guidelines XXXIV and XXXIX[1].

This report summarizes the work of the VARWG since the September 2003 NAIC meeting and requests comments and input from LHATF on the content of this report and the general direction of these initiatives.

The VARWG is asking LHATF to expose the proposed Actuarial Guideline in this report in order to receive feedback and comments on its content.

[1] For purposes of this paragraph, it is important to note that no proposal has been made by the VARWG as to whether the reserve methodology discussed in this report, if adopted, would apply to inforce contracts.

II. September NAIC Meeting

At the September NAIC meeting, the VARWG asked LHATF for specific direction on the following issues:

1. The regulatory form that the new reserve methodology should take (i.e., should the new method be promulgated as an actuarial guideline, a model regulation, or a revision to the model Standard Valuation Law).
2. Whether it is desired that the new reserve methodology apply to all or some inforce contracts.
3. The level at which reserves calculated using this methodology should be set.
4. Whether the timeline proposed by the VARWG for adoption of a new reserve requirement should be followed.
5. Issues raised by the joint LHATF/Life Risk-Based Capital Working Group (LRBCWG) subgroup examining the regulatory oversight/review process that may affect the work products of the VARWG.

After discussing these issues, LHATF asked the VARWG to do the following:

1. Develop its recommendations in the form of an actuarial guideline.
2. Move forward on the basis of including all inforce business in the actuarial guideline.
3. Pick a Conditional Tail Expectation (CTE) level for insertion into the proposed guideline that it recommends for exposure by LHATF (note that although the VARWG picked CTE (65), we are not making a recommendation that this be the reserve standard).

It was recognized that this did not necessarily reflect consensus by LHATF on these issues (in fact, several members of LHATF expressed views that varied from these, particularly on items 1. and 2. above). The intent was to move forward incorporating this direction and to seek comment from members of LHATF and other interested parties.

III. Update of Key Issues

A. Proposed Actuarial Guideline

Appendix A contains the recommended reserve methodology developed in the form requested by LHATF -- an Actuarial Guideline that applies to both new and inforce business.

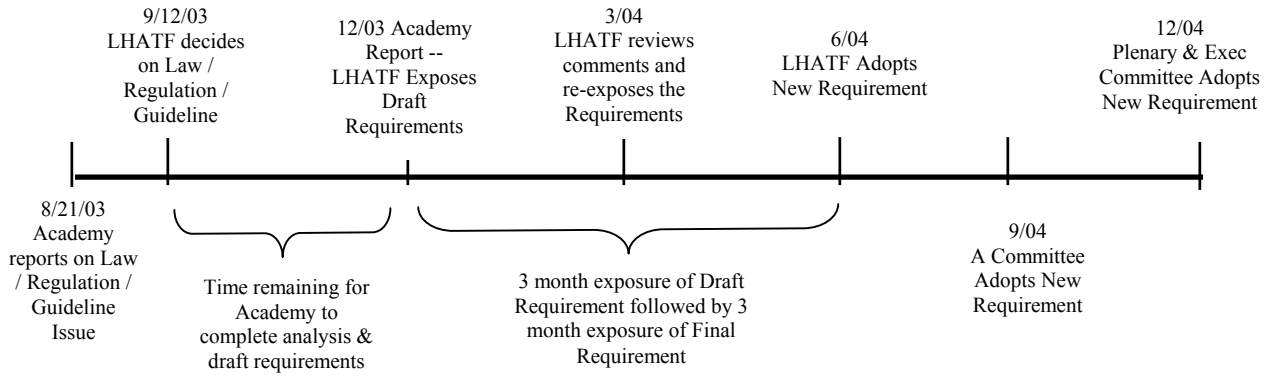
The VARWG would like to point out there are several key issues that need to be resolved or finalized before the recommended reserve methodology can be adopted. Most of these issues have been discussed in prior VARWG reports and/or LHATF discussions.

1. The regulatory form of the recommended reserve methodology needs to be finalized (currently it is an Actuarial Guideline).
2. A final decision is needed as to whether the proposed methodology applies to inforce contracts (currently it does). Note that this issue is linked to the regulatory form issue in item 1.
3. A final decision is needed on the CTE level (currently it is CTE (65)).
4. The Alternative Factor Method needs to be finalized.
5. The issue of whether a minimum reserve floor (other than the PV of Annuitization Benefits) is necessary, and if so, the form of that floor needs to be resolved.
6. An acceptable method to approximate the reserve using results from a prior period is needed (the "timing issue").
7. An acceptable method to allocate the resulting reserve to the contract level is needed (the "allocation method").
8. The effective date of the requirement needs to be determined.
9. The issue of whether a phase-in of the new requirements is necessary needs to be resolved.
10. The question of whether a method is needed to dampen volatility needs to be answered.

B. Timeline

The timeline shown below was discussed during the September 2003 LHATF meeting. This timeline would allow a standard to be adopted by the NAIC by the end of 2004[2]. It also provides for at least six months of exposure and comment.

In order to stay on this timeline, the VARWG is asking LHATF to expose the proposed Actuarial Guideline in this report for comment as soon as possible.



[2] Note that this does not necessarily mean that a new reserve standard will be in effect for year-end 2004. For example, if the standard is adopted as an actuarial guideline, it is possible that the effective date might be later than 12/31/2004. Also, if the standard were adopted as either a model regulation or a revision to the model SVL, the standard would have to be adopted by individual states before it would be effective.

IV. Next Steps

The following are the areas on which the VARWG expects to focus going forward:

A. Finalize the proposed methodology, based on input and direction from LHATF.

B. Work with LHATF to respond to comments from exposure.

C. Continue to analyze the impact of the reserve methodology on representative products.

D. When and where appropriate, identify the need for professional and practical guidance and begin the process to help develop the guidance.

The VARWG plans to continue to update LHATF on its progress at future NAIC meetings and on interim conference calls.

Proposed Actuarial Guideline VACARVM
CARVM for Variable Annuities Redefined
December 2003 Report

I) Background

The purpose of this Actuarial Guideline ("Guideline") is to interpret the standards for the valuation of reserves for variable annuity and other contracts involving certain guaranteed benefits similar to those offered with variable annuities. The Guideline codifies the basic interpretation of the Commissioners Annuity Reserve Valuation Method (CARVM) by clarifying the assumptions and methodologies that will comply with the intent of the Standard Valuation Law (SVL). It also applies similar assumptions and methodologies to contracts that contain characteristics similar to those described in the scope, but that are not directly subject to CARVM.

For many years regulators and the industry have struggled with the issue of applying a uniform reserve standard to these contracts and in particular some of the guaranteed benefits referenced above. Formulaic approaches must make assumptions about product design, contractholder behavior and economic relationships and conditions. The economic volatility seen over the last few decades, combined with an increase in the complexity of these products, have made attempts to use formulas for measuring economic-related risk less successful. Actuarial Guideline XXXIX and recent revisions to Actuarial Guideline XXXIV contain what many believe are temporary solutions to address these issues, and many believe more permanent solutions are needed.

The NAIC is currently considering a similar approach to calculate risk-based capital (RBC) for similar contracts (i.e., the C-3 Phase II project). The methodology in the Guideline is based on that approach, and the intent of the Guideline is to, where possible, facilitate a framework whereby companies may determine both reserve and RBC in a consistent calculation.

In developing the Guideline, two regulatory sources were looked to for guidance. First, the SVL requires that CARVM be based on the greatest present value of future guaranteed benefits. Second, the NAIC Model Variable Annuity Regulation (VAR) states that the "reserve liability for variable annuities shall be established pursuant to the requirements of the Standard Valuation Law in accordance with actuarial procedures that recognize the variable nature of the benefits provided and any mortality guarantees."

The Guideline requires that reserves for contracts falling within the scope be based on a projection of the assets and estimated liabilities supporting these contracts over a broad range of stochastically generated projection scenarios and using prudent best estimate assumptions. Within each scenario, the greatest of the present values of accumulated losses is determined. The assumed fund performance for the scenarios must meet the mandated calibration standards contained in the Guideline. The reserve is based on a Conditional Tail Expectation measure of the results for each scenario.

Conditional Tail Expectation (CTE) is a statistical risk measure that provides enhanced information about the tail of a distribution above that provided by the traditional use of percentiles. Instead of only identifying a value at a particular percentile and thus ignoring the possibility of extremely large values in the tail, CTE provides the average over all values in the tail beyond the CTE percentile. Thus for losses that approximate a normal distribution, CTE (65) will approximate the 82.5^{th} percentile. But for distributions with "fat tails" from low probability, high impact events, such as those covered by the Guideline, the use of CTE will provide a more revealing (and conservative) measure than use of a single percentile requirement.

For certain products (e.g., variable annuities with Guaranteed Minimum Death Benefits only), a company can use an Alternative Factor Method in place of the modeling approach outlines above. In addition, the Guideline contains a minimum floor based on the present value of annuitization benefits.[1]

The methodology prescribed in the Guideline is applied to a company's entire portfolio of variable annuities (whether or not they contain guaranteed benefits), as well as other affected products that contain guaranteed benefits. Current guaranteed benefits include Guaranteed Minimum Death Benefits, Guaranteed Minimum Accumulation Benefits, Guaranteed Minimum Income Benefits, Guaranteed Minimum Withdrawal Benefits, and Guaranteed Payout Annuity Floors. It is also expected that the methodology in the Guideline can be applied to future variations on these designs and to new guarantee designs.

Since statutory reporting requires companies to report reserve prior to reinsurance, the Guideline clarifies standards for adjusting the various components of the reserve so that the reserve may be reported both prior to and net of reinsurance.

The Guideline also provides an approach to allocate the total reported reserve between the General and Separate Accounts.

Actuarial certification of the work done to calculate reserves is required by the Guideline. Essentially, the actuary should certify that the work has been done in a way that meets all applicable Actuarial Standards of Practice.

[1] Drafting Note: This may be subject to change.

II) Scope

A) The Guideline applies to contracts, whether directly written or assumed through reinsurance, falling into any of the following categories[2]:

1) Variable deferred annuity contracts subject to the Commissioner's Annuity Reserve Valuation Method (CARVM), whether or not such contracts contain Guaranteed Minimum Death Benefits (GMDBs), or Variable Annuity Guaranteed Living Benefits (VAGLBs);

2) Variable immediate annuity contracts, whether or not such contracts contain GMDBs or VAGLBs;

3) Group annuity contracts that are not subject to CARVM, but contain GMDBs, VAGLBs, or any combination thereof; and

4) All other products that contain guarantees similar in nature to GMDBs or VAGLBs, even if the insurer does not offer the mutual funds or variable funds to which these guarantees relate.

B) Separate account products that guarantee an index and do not offer GMDBs or VAGLBs are excluded from the scope of the Guideline.

III) Definitions

A) Definitions of Benefit Guarantees

1) Guaranteed Minimum Death Benefit (GMDB) is a guaranteed benefit providing, or resulting in, an amount payable on the death of a contractholder, annuitant, participant, or insured that 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 death that exceeds the account value, or in the case of an annuity providing income payments, an amount payable on death other than continuation of any guaranteed income payments, are included in this definition. GMDBs that are based on a portion of the excess of the account value over the net of premiums paid less partial withdrawals made (e.g., an Earnings Enhanced Death Benefit) are also included in this definition.

[2] Drafting Note: If it is deemed not feasible to have application of a guideline to products that fall outside the current scope of SVL Section 5a, final form of the reserve requirements may need to be a regulation or else application to A)3) and A)4) will have to be provided for outside this Actuarial Guideline.

2) Variable Annuity Guaranteed Living Benefit (VAGLB) is a guaranteed benefit providing, or resulting in, one or more guaranteed benefit amounts payable or accruing to a living contractholder or living annuitant, under contractually specified conditions (e.g., at the end of a specified waiting period, upon annuitization, or upon withdrawal of premium over a period of time), that will increase contractual benefits should the contract value referenced by the guarantee (e.g., account value) fall below a given level or fail to achieve certain performance levels. Only such guarantees having the potential to provide benefits with a present value as of the benefit commencement date that exceeds the contract value referenced by the guarantee are included in this definition.

3) Guaranteed Minimum Income Benefit (GMIB) is a VAGLB design for which the benefit is contingent on annuitization of a variable deferred annuity contract. The benefit is typically expressed as a contractholder option, on one or more option dates, to have a minimum amount applied to provide periodic income using a specified purchase basis.

4) Guaranteed Payout Annuity Floor (GPAF) is a VAGLB design guaranteeing that one or more of the periodic payments under a variable immediate annuity will not be less than a minimum amount.

B) Definitions of Reserve Methodology Terminology

1) Scenario. A scenario consists of a set of asset growth rates and investment returns from which assets and liabilities supporting a set of contracts may be determined for each year of a projection.

2) Scenario Greatest Present Value. For a given scenario, the Scenario Greatest Present Value is the sum of:

   a) The greatest of the present values, as of the projection start date, of the projected Accumulated Deficiencies for the scenario; and

   b) The Starting Asset Amount, as defined below.

3) Conditional Tail Expectation Amount. The Conditional Tail Expectation Amount is equal to the numerical average of the 35 percent largest values of the Scenario Greatest Present Values.[3]

[3] Drafting Note: Assumes a CTE (65) standard.

4) Working Reserve. The Working Reserve is the assumed reserve used in the projections of Accumulated Deficiencies supporting the calculation of the Scenario Greatest Present Values. At any point in the projections the Working Reserve shall equal the cash surrender value.

   For a variable payout annuity without a cash surrender value, the Working Reserve shall equal the present value, at the maximum valuation interest rate and the valuation mortality table specified for such a product by the Standard Valuation Law, of future income payments projected using a return based on the valuation interest rate less appropriate asset based charges.

   For contracts not covered above, the actuary shall determine the Working Reserve in a manner that is consistent with the above requirements.

5) Accumulated Deficiency. Accumulated Deficiency is an amount measured as of the end of a projection year and equals the projected Working Reserve less the amount of projected assets, both as of the end of the projection year. Accumulated Deficiencies may be positive or negative.[4]

6) Starting Asset Amount. The Starting Asset Amount equals the value of the assets at the start of the projection, as defined in section A1.4)A) of Appendix 1.

7) Prudent Best Estimate. The assumptions to be used for projections are to be the actuary's "prudent best estimate". This means that they are to be set at the conservative side of the actuary's confidence interval as to the true underlying probabilities for the parameter(s) in question, based on the availability of relevant experience and its degree of credibility.

   A "prudent best estimate" assumption would normally be developed by applying a margin for estimation error to the "best estimate" assumption. "Best estimate" would typically be the actuary's most reasonable estimate of future experience for a risk factor given all available relevant information pertaining to the contingencies being valued. Recognizing that assumptions are simply assertions of future unknown experience, the margin for error should be directly related to uncertainty in the underlying risk factor. The greater the uncertainty, the larger the margin. Margins should be determined in such a manner as to generally serve to increase the Aggregate Reserve that would otherwise be held in its absence (i.e., using only the best estimate assumption).

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

8) Gross Wealth Ratio. The gross wealth ratio is the cumulative return for the indicated time period and percentile (e.g., 1.0 indicates that the index is at its original level).

[4] Note that a positive Accumulated Deficiency means that there is a cumulative loss and a negative Accumulated Deficiency means that there is a cumulative gain.

9) Clearly Defined Hedging Strategy[5]. A Clearly Defined Hedging Strategy, at a minimum, identifies the risks being hedged, the risks not being hedged, the financial instruments that will be used to hedge the risks, the metric(s) for identifying an effective hedge, the criteria that must be met for a hedge to be considered effective, the frequency of measuring the effectiveness of the hedge, the conditions under which hedging will not occur, and the person or persons responsible for implementing the hedging strategy.

IV) Definition of General Reserve Methodology

A) General Description. The Aggregate Reserve for contracts falling within the scope of the Guideline shall equal the greater of:

1) The Present Value of Annuitization Benefits[6] available on the valuation date; and

2) The Conditional Tail Expectation Amount.

At the option of the company, the Aggregate Reserve may be determined by applying the Guideline to all contracts falling within the scope of the Guideline or to sub-groupings of contracts, with the total reserve held equal to the sum of the reserves computed for each such sub-group.

B) Impact of Reinsurance. Where reinsurance is in effect for all or a portion of the contracts, both components in the above general description (and thus the Aggregate Reserve) are determined net of reinsurance. An Aggregate Reserve before reinsurance shall also be calculated if needed for regulatory reporting or other purposes, using methods described in Appendix 2.

C) Present Value of Annuitization Benefits. For contracts where no annuity income is currently payable, the Present Value of Annuitization Benefits shall equal the sum of amounts for each contract equal to greatest present value, over all payment options available as of the valuation date, of income payments resulting from an election by the contract owner to annuitize the contract as of the valuation date or the first such election date following the valuation date. For purposes of this subsection C), present values shall be calculated using valuation mortality and interest permitted in calculating reserves for such income elections as of the valuation date.

For contracts where annuity income is currently payable, the Present Value of Annuitization Benefits shall be determined using valuation mortality and interest permitted in the year of annuitization.

In the case of a partial annuitization, the contract shall be viewed as a combination of a contract on which no annuity income is currently payable and another contract in which annuity income is currently payable.

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[5] Drafting Note: Definition subject to coordination with RBC.

[6] Drafting Note: This "minimum floor" is subject to change based on discussions taking place within the VARWG and based on recommendations from LHATF.

Future income payments for the variable portion of any annuitization shall ignore any floor guarantees, such as GPAFs, and shall assume that the future income payments shall be projected assuming that the credited investment performance equals the statutory interest rate less asset-based charges.[7]

D) The Conditional Tail Expectation Amount. The Conditional Tail Expectation Amount shall be determined based on a projection of the contracts falling within the scope of the Guideline, and the assets supporting these contracts, over a broad range of stochastically generated projection scenarios and using prudent best estimate assumptions.

In performing the projections, the contracts may be grouped as described in section A1.1)B) in Appendix 1. The stochastically generated projection scenarios shall meet the Scenario Calibration Criteria described in Appendix 4.

The Conditional Tail Expectation Amount shall be determined using the following steps:

1) For each scenario, projected aggregate Accumulated Deficiencies are determined at the start of the projection (i.e., "time 0") and at the end of each projection year as the sum of the Accumulated Deficiencies for each contract grouping.

2) The Scenario Greatest Present Value is determined for each scenario based on the sum of the aggregate Accumulated Deficiencies[8] and aggregate Starting Asset Amounts for the contracts for which the Aggregate Reserve is being computed.

3) The Scenario Greatest Present Values for all scenarios are then ranked from smallest to largest and the Conditional Tail Expectation Amount is the average of the largest 35 percent of these ranked values.

The projections shall be performed in accordance with Appendix 1. The actuary shall document the assumptions used for the projections and summarize the results obtained as described in Appendix 2.

E) Timing of the Determination of the Aggregate Reserve. Approximations to the Conditional Tail Expectation Amount determined using the methods described in subsection D) above, which allow the use of a calculation from a prior period, and which maintain consistency with the characteristics of the business being valued on the valuation date, may be used.[9]

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[7] This treatment is for purposes of the determination of the Present Value of Annuitization Benefits. In the case of a variable payout annuity, the risk associated with fund performance, including any floor guarantees (e.g., GPAF) will be reflected in the determination of the Conditional Tail Expectation Amount.

[8] The Scenario Greatest Present Value is therefore based on the greatest projected Accumulated Deficiency, in aggregate, for all contracts for which the Aggregate Reserve is computed hereunder, rather than based on the sum of the greatest projected Accumulated Deficiency for each grouping of contracts.

[9] Drafting note: More work is needed to determine acceptable methods to accomplish this.

F) Alternative Factor Method. For variable deferred annuity contracts that contain GMDBs only (i.e., no VAGLBs), the Conditional Tail Expectation Amount may be determined using the Alternative Factor Method described in Appendix 3 rather than using the approach described in subsection D) above. However, in the event the approach described in subsection D) has been used in prior valuations the Alternative Factor Method may not be used.

G) Allocation of Results to Contracts. The Aggregate Reserves shall be allocated to the contracts falling within the scope of the Guideline using the method outlined in Appendix 5 (still to be completed).

V) Effective Date

The Guideline affects all contracts issued on or after January 1, 1981. Where the application of the Guideline produces higher reserves than the company had otherwise established by their previously used interpretation, such company shall comply with the Guideline effective December 31, 200x. However, such company may request a grade-in period, of not to exceed y years, from the domiciliary Commissioner upon satisfactory demonstration of the previous interpretation and that such delay of implementation will not cause a hazardous financial condition or potential harm to its policyholders.[10]

[10] Drafting note: This section was taken directly from AG 34, and is subject to LHATF discussion and comments. No recommendation as to the content of this section is being made by the VARWG.

APPENDIX 1 - Determination of Conditional Tail Expectation Amount Based on Projections

A1.1) Projection of Accumulated Deficiencies

A) General Description of Projection. The projection of Accumulated Deficiencies shall reflect the dynamics of the expected cash flows for the entire group of contracts, reflecting all product features (including the guarantees provided under the contracts). Projected Federal Income Tax, insurance company expenses (including overhead), fund expenses, contractual fees and charges, hedges, reinsurance, revenue sharing income received by the company and any other items that materially affect the result are to be reflected on a realistic basis using assumptions that dynamically change within scenarios to reflect the increased or decreased likelihood of certain contractholder behavior based on scenario results. Cash flows from any fixed account options shall also be included. Where estimates are used, such estimates shall be on a prudent best estimate basis.

B) Grouping of Variable Funds and Subaccounts. The portion of the Starting Asset Amount held in the Separate Account represented by the variable funds and the corresponding account values may be grouped for modeling using an approach that recognizes the investment guidelines and objectives of the funds. In assigning each variable fund and the variable subaccounts to a grouping for projection purposes the fundamental characteristics of the fund shall be reflected and the parameters shall have the appropriate relationship to the required calibration points of the S&P 500. The grouping shall reflect characteristics of the efficient frontier (i.e., returns generally cannot be increased without assuming additional risk).

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

C) Grouping of Contracts. Projections may be performed for each contract in force on the date of valuation or by grouping contracts into representative cells of model plans using all characteristics and criteria having a material impact on the size of the reserve. Grouping shall be the responsibility of the actuary but may not be done in a manner that intentionally understates the resulting reserve.

D) Modeling of Hedges. If the insurer is following a Clearly Defined Hedging Strategy, the projections shall take into account the impact of hedge positions currently held, as well as the appropriate costs and benefits of hedge positions expected to be held in the future. This recognizes that a hedging strategy may not require hedge positions to be held at a particular point in time; however, allowance for the impact of hedge positions not currently held is only permitted if the insurer is following a Clearly Defined Hedging Strategy approved by the Board of Directors, or a committee authorized by the Board of Directors. To the degree the hedge position introduces basis, gap, price, or assumption risk, a suitable reduction for effectiveness of hedges shall be made. The actuary is responsible for verifying compliance with a Clearly Defined Hedging Strategy.

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

The use of products not falling under the scope of the Guideline (e.g., equity indexed annuities) as a hedge shall not be recognized in the determination of Accumulated Deficiencies.[11]

E) Length of Projections. Projections of Accumulated Deficiencies shall run for as many future years as needed to ensure that no materially greater reserve value would result from longer projection periods.

F) AVR/IMR. The AVR and the IMR shall be handled consistently with the treatment in the company's cashflow testing.

A1.2) Determination of Scenario Greatest Present Values

A) Scenario Greatest Present Values. For a given scenario, the Scenario Greatest Present Value is the sum of:

1) The greatest present value, as of the projection start date, of the projected Accumulated Deficiencies defined in section III)B)5); and

2) The Starting Asset Amount.

B) Discount Rates. In determining the Scenario Greatest Present Values, Accumulated Deficiencies shall be discounted using the same interest rates used to project General Account Assets, as determined in section A1.4)D). Note that the interest rates used do not include a reduction for Federal Income Taxes.[12]

[11] Drafting Note: Subject to coordination with RBC.

[12] Drafting Note: The VARWG needs to further analyze the impact of Federal Income Tax on both the projection and discounting of Accumulated Deficiencies.

A1.3) Projection Scenarios

A) Minimum Required Scenarios. The number of scenarios for which projected greatest present values of Accumulated Deficiencies shall be computed shall be the responsibility of the actuary and shall be considered to be sufficient if any resulting understatement in total reserves, as compared with that resulting from running additional scenarios, is not material.

B) Scenario Calibration Criteria. Returns for the groupings of variable funds shall be determined on a stochastic basis such that the resulting distribution of the Gross Wealth Ratios of the scenarios meet the Scenario Calibration Criteria specified in Appendix 4.

A1.4) Projection Assets

A) Starting Asset Amount. For the projections of Accumulated Deficiencies, the value of assets at the start of the projection shall be set equal to the approximate value of statutory reserves at the start of the projection. 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) all of the Separate Account assets supporting the contracts;

2) an amount of assets held in the General Account equal to the Working Reserve as of the start of the projections less the amount in 1), above.

In many instances the initial general account assets may be negative, resulting in a projected interest expense. General Account assets chosen for use as described above shall be selected on a consistent basis from one reserve valuation hereunder to the next.

If specific "hedge assets", such as equity put options, are being held for the benefit of these products, these shall be reflected in the model in full and included with other general account assets.

B) 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.

C) Separate Account Assets. For purposes of determining the Starting Asset Amounts in subsection A) and the valuation of projected assets in subsection B), assets held in a Separate Account shall be summarized into asset categories as described in section A1.3)B).

D) General Account Assets. General Account assets shall be projected 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 at interest rates, which, at the option of the actuary, are one of the following:

1) The forward interest rates implied by the swap curve in effect as of the valuation date,

2) The 200 interest rate scenarios available as prescribed for Phase I, C-3 Risk Based Capital calculation, coupled with the Separate Account return scenarios by mating them up with the first 200 such scenarios and repeating this process until all Separate Account return scenarios have been mated with a Phase I scenario, or

3) Interest rates developed for this purpose from a stochastic model that integrates the development of interest rates and the Separate Account returns described in section A1.3).

The actuary may switch from 1) to 2) or from 2) to 3) from valuation date to the next, but may not switch in the other direction without regulatory approval.

A1.5) Projection of Annuitization Benefits (including GMIBs)

A) Assumed Annuitization Purchase Rates at Election. For purposes of projecting annuitization benefits (including annuitizations stemming from the election of a GMIB), 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 A1.4)D). However, where the interest rates used to project General Account Assets are based upon the forward interest rates implied by the swap curve in effect as of the valuation date (i.e., the option described in section A1.4)D)1) is used), the interest rates shall be reduced by .30 percent per annum for purposes of determining the annuitization purchase rates.

B) Projected Election of Guaranteed Minimum Income Benefit and other Annuitization Options. For contracts projected to elect annuitization options (including annuitizations stemming from the election of a GMIB), the projections may assume one of the following at the actuary's option:

1) The contract is treated as if surrendered at an amount equal to the reserve that would be required at such time for the payout annuity benefits, or

2) The contract is assumed to stay inforce, the projected periodic payments are paid, and the Working Reserve is equal to one of the following:

   a) The statutory reserve required for the payout annuity, if it is a fixed payout annuity, or

   b) If it is a variable payout annuity, the Working Reserve for a variable payout annuity as defined in section III)B)4).

If the projected payout annuity is a variable payout annuity containing a floor guarantee (such as a GPAF) under a specified contractual option, only option 2) above shall be used.

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

A1.6) Relationship to Risk Based Capital Requirements

A) The Guideline anticipates that the projections described herein may be used for the determination of Risk Based Capital (the "RBC requirements") for some or all of the contracts falling within the scope of the Guideline. There are two major differences between the requirements of the Guideline and the RBC requirements as of the time the Guideline was drafted. First, the Conditional Tail Expectation level is different (CTE (65) for the Guideline and CTE (90) for the RBC requirements). Second, the interest rates used to discount the Scenario Greatest Present Value (i.e., the interest rates determined in section A1.4)D)) contain no reduction for Federal Income Tax, while the interest rates used in the RBC requirement do contain such a reduction.

B) To further aid the understanding of the Guideline and any instructions relating to the RBC requirement, it is important to note the equivalence in meaning between the following terms:

1) The Scenario Greatest Present Value for a scenario referenced in the Guideline is similar to the Total Asset Requirement for a scenario referenced in the RBC requirement.

2) The amount that is added to the Starting Asset Amount in section III)B)1) of the Guideline is similar to the Additional Asset Requirement referenced in the RBC requirement.

3) The Conditional Tail Expectation Amount referenced in the Guideline is similar to the Total Asset Requirement referenced in the RBC requirement.

A1.7) Compliance with Actuarial Standards of Practice (ASOPs)

When determining the Conditional Tail Expectation Amount Based on Projections, the analysis shall conform to the Actuarial Standards of Practice as promulgated from time to time by the Actuarial Standards Board.

APPENDIX 2 - Reinsurance and Statutory Reporting Issues

A2.1) Treatment of Reinsurance in the Aggregate Reserve

A) Aggregate Reserve Net of and Prior to Reinsurance. As noted in section IV)B), the Aggregate Reserve is determined net of reinsurance. Therefore, it is necessary to determine the components needed to determine the Aggregate Reserve (i.e., the Present Value of Annuitization Benefits, and either the Conditional Tail Expectation Amount based on projections or the Conditional Tail Expectation Amount based on the Alternative Factor Method) on a net of reinsurance basis. In addition, as noted in section IV)B), it may be necessary to determine the Aggregate Reserve determined on a "direct" basis, or prior to reflection of reinsurance. Where this is needed, each of these components shall be determined prior to reinsurance. Section A2.1)B) through D) below discuss methods necessary to determine these components on both a "net of reinsurance" and a "prior to reinsurance" basis. Note that due allowance for reasonable approximations may be used where appropriate.

B) Conditional Tail Expectation Amount Based on Projections. In order to determine the Aggregate Reserve net of reinsurance, Accumulated Deficiencies, Scenario Greatest Present Values, and the resulting Conditional Tail Expectation Amount shall be determined reflecting the effects of reinsurance within the projections. This involves including, where appropriate, all anticipated reinsurance premiums or other costs and all reinsurance recoveries, where both premiums and recoveries are determined by recognizing any limitations in the reinsurance treaties, such as caps on recoveries or floors on premiums.

In order to determine the Conditional Tail Expectation Amount prior to reinsurance, Accumulated Deficiencies, Scenario Greatest Present Values, and the resulting Conditional Tail Expectation Amount shall be determined ignoring the effects of reinsurance within the projections. One acceptable approach involves a projection based on the same Starting Asset Amount as for the Aggregate Reserve net of reinsurance and by ignoring, where appropriate, all anticipated reinsurance premiums or other costs and all reinsurance recoveries in the projections.

C) Conditional Tail Expectation Amount Based on the Alternative Factor Method. If a company chooses to use the Alternative Factor Method, as allowed in section IV)E), it is important to note that the reserve factors in Appendix 3 are on a prior to reinsurance basis. Therefore, where reinsurance is used, the Alternative Factors must be modified to reflect the reinsurance costs and reinsurance recoveries under the reinsurance treaties in the determination of the Aggregate Reserve net of reinsurance. In addition, the Alternative Factors, unadjusted for reinsurance, shall be applied to the contracts falling under the scope of the Guideline to determine the Aggregate Reserve prior to reinsurance.

D) Present Value of Annuitization Benefits. Where reinsurance is used, the Present Value of Annuitization Benefits must also be modified to reflect the reinsurance costs and reinsurance recoveries under the reinsurance treaties in the determination of the Aggregate Reserve net of reinsurance.

A2.2) Reserve for Separate Account Statement

The Aggregate Reserve shall be allocated first as an amount equal to an estimate of the aggregate cash surrender values of the variable portion of all such contracts and held as a reserve in the Separate Account(s) statement. Any remaining reserve shall then be held in the General Account in support of any fixed account options and any guarantees.

Alternatively, if an Aggregate Reserve ignoring any fixed subaccounts, GMDBs or VAGLBs can be determined using reasonable methods and/or approximations, then such a reserve may be held in the Separate Account statement, with any remaining reserve held in the General Account in support of all fixed subaccounts and contractual guarantees.

A2.3) Actuarial Certification and Memorandum

A) Actuarial Certification. Actuarial Certification of the work done to determine the Aggregate Reserve shall be required. The actuary shall certify that the work performed has been done in a way that complies with all appropriate Actuarial Standards of Practice. The scope of this certification does not include an opinion on the adequacy of the Aggregate Reserve[13], the company's surplus or the company's future financial condition. The actuary shall also note any material change in the model or assumptions from that used previously and the estimated impact of such changes.

B) Required Memorandum. An actuarial memorandum shall be constructed documenting the methodology and assumptions upon which the Aggregate Reserve is determined. The memorandum shall also include sensitivity tests that the actuary feels appropriate, given the composition of the company's block of business (i.e., identifying the key assumptions that, if changed, produce the largest changes in the Aggregate Reserve). This memorandum shall have the same confidential status as the actuarial memorandum supporting the actuarial opinion[14] and shall be available to regulators upon request.

C) Conditional Tail Expectation Amount Based on the Alternative Factor Method. Where the Alternative Factor Method is used, there is no need to discuss the underlying assumptions and model in the required memorandum. Certification that expense, revenue, fund mapping, and product parameters have been properly reflected, however, shall be required.[15]

D) Material Changes. If there is a material change in results due to a change in assumptions from the previous year, the memorandum shall include a discussion of such change and an estimate of the impact it has on the results.

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[13] The adequacy of the Aggregate Reserve is addressed in the company's Actuarial Opinion as required by the NAIC Model Actuarial Opinion and Memorandum Regulation.

[14] Drafting Note: Is additional action needed to assure this, or does mention in an Actuarial Guideline suffice? Also, should there be coordination between the RBC memorandum, this memorandum and the memorandum supporting the Actuarial Opinion?

[15] Drafting Note: This needs to be revisited once the Alternative Factor Method is finalized.

APPENDIX 3 - Alternative Factor Method

For variable deferred annuity contracts that contain GMDBs only (i.e., no VAGLBs), the Conditional Tail Expectation Amount may be determined by using the tables below[16] rather than by using the approach described in section IV)D) (i.e., based on projections), provided the approach described in section IV)D) has not been used in prior valuations.

[16] Drafting Note: The Alternative Factor tables need to be provided.

APPENDIX 4 - Scenarios Calibration Criteria

A4.1) General

This Appendix outlines the requirements for the stochastic models used to simulate fund performance. Specifically, it sets certain standards that must be satisfied and offers guidance to the actuary in the development and validation of the scenario models. Background material and analysis is presented to support the recommendation. The Appendix focuses on the S&P500 as a proxy for returns on a broadly diversified U.S. equity fund, but there is also advice on how the techniques and requirements would apply to other types of funds.

The calibration points given in this Appendix are applicable to gross returns. To determine net returns the actuary shall reflect applicable fees and contractholder charges in the development of projected account values.

State dependent models are not prohibited, but must be justified by the historic data and meet the calibration criteria. To the degree that the model uses mean-reversion or path-dependent dynamics, this must be well supported by research and clearly documented.

A4.2) Gross Wealth Ratios

Gross Wealth Ratios derived from the stochastic return scenarios for use with a Separate Account variable fund category for diversified U.S. equities must satisfy calibration criteria consistent with that for the S&P 500 shown in the following table. Under these calibration criteria, Gross Wealth Ratios for quantiles less than 50 percent may not exceed the value from the table corresponding to the quantile, while at quantiles greater than 50 percent, Gross Wealth Ratios may not be less than the corresponding value for the quantile from the table. Gross Wealth Ratios must be tested at projection durations 1, 5 and 10 from the start of projections.

S&P500 Total Return Wealth Factors at the Calibration Points

Calibration Point	One Year	Five Year	Ten Year
0.5%	0.65	0.54	0.60
1.0%	0.69	0.62	0.72
2.5%	0.76	0.75	0.93
5.0%	0.83	0.87	1.13
10.0%	0.90	1.03	1.41
90.0%	1.34	2.67	5.55
95.0%	1.41	3.01	6.57
97.5%	1.47	3.31	7.55
99.0%	1.54	3.71	8.91
99.5%	1.59	4.00	10.00

The scenarios need not strictly satisfy all calibration points, but the actuary should be satisfied that any differences are not material to the resulting capital requirements. In particular, the actuary should be mindful of which tail most affects the business being valued. If capital is less dependent on the right (left) tail for all products under consideration (e.g., a return of premium guarantee would primarily depend on the left tail, an enhanced death benefit equal to a percentage of the gain would be most sensitive to the right tail, etc.), it is not necessary to meet the right (left) calibration points.

A4.3) Other Funds

Calibration of other markets (funds) is left to the judgment of the actuary, but the scenarios so generated must be consistent with the calibration points in the table in section A4.2). This does not imply a strict functional relationship between the model parameters for various markets/funds, but it would generally be inappropriate to assume that a market or fund consistently "outperforms" (lower risk, higher expected return relative to the efficient frontier) over the long term.

The actuary shall document the actual 1-, 5- and 10-year wealth factors of the scenarios at the frequencies given in table in section A4.2). The annualized mean and standard deviation of the wealth factors for the 1-, 5- and 10-year holding periods must also be provided. For equity funds, the actuary shall explain the reasonableness of any significant differences from the S&P500 calibration points.

When parameters are fit to historic data without consideration of the economic setting in which the historic data emerged, the market price of risk may not be consistent with a reasonable long-term model of market equilibrium. One possibility for establishing 'consistent' parameters (or scenarios) across all funds would be to assume that the market price of risk is constant (or nearly constant) and governed by a linear relationship. That is, higher expected returns can only be garnered by assuming greater risk. Here, we use the standard deviation of log returns as the risk measure.

Specifically, two return distributions X and Y would satisfy the following relationship:

$$\text{Market Price of Risk} = \left(\frac{\mu_X - r}{\sigma_X} \right) = \left(\frac{\mu_Y - r}{\sigma_Y} \right)$$

where μ and σ are respectively the (unconditional or long-run) expected returns and volatilities and r is the expected risk-free rate over a suitably long holding period commensurate with the projection horizon. One approach to establish consistent scenarios would set the model parameters to maintain a near-constant market price of risk.

A closely related method would assume some form of 'mean-variance' efficiency to establish consistent model parameters. Using the historic data, the mean-variance (alternatively, 'drift-volatility') frontier could be a constructed from a plot of (mean , variance) pairs from a collection of world market indices. The frontier could be assumed to follow some functional form[17], with the coefficients determined by standard curve fitting or regression techniques. Recognizing the uncertainty in the data, a 'corridor' could be established for the frontier. Model parameters would then be adjusted to move the proxy market (fund) inside the corridor.

Clearly, there are many other techniques that could be used to establishing consistency between the scenarios. While appealing, the above approaches do have drawbacks[18] and the actuary should be careful not to be overly optimistic in constructing the model parameters or the scenarios.

Funds can be grouped and projected as a single fund if such grouping is not anticipated to materially reduce capital requirements. However, care should be taken to avoid exaggerating the benefits of diversification. The actuary must document the development of the investment return scenarios and be able to justify the mapping of the company's variable accounts to the proxy funds used in the modeling.

A4.4) Correlation of Fund Returns

In constructing the scenarios for the proxy funds, the company may require parameter estimates for a number of different market indices. When more than one index is projected, it is generally necessary to allow for correlations in the simulations. It is not necessary to assume that all markets are perfectly positively correlated, but an assumption of independence (zero correlation) between the equity markets would inappropriately exaggerate the benefits of diversification. An examination of the historic data suggests that correlations are not stationary and that they tend to increase during times of high volatility or negative returns. As such, the actuary should take care not to underestimate the correlations in those scenarios used for the capital calculations.

If the projections include the simulation of interest rates (other than for discounting surplus strain) as well as equity returns, the processes may be independent provided that the actuary can demonstrate that this assumption (i.e., zero correlation) does not materially underestimate the resulting capital.

[17] Quadratic polynomials and logarithmic functions tend to work well.

[18] For example, mean-variance measures ignore the asymmetric and fat-tailed profile of most equity market returns.