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Interim Report of the VAGLB Work Group

To the

NAIC's Life and Health Actuarial (Technical) Task Force (LHATF)

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This report was prepared by the Academy's Variable Annuities with Guaranteed Living Benefits (VAGLB) Work Group of the Committee on State Life Insurance Issues.

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Part 1- Reserve Calculation for Variable Annuities with Guaranteed Living Benefits

I. Background

Principles: *The reserve methodology outlined in this report is a recommended approach for reserving for guaranteed living benefits included in variable annuity contracts. The methodology is consistent with CARVM, as described in the NAIC Model SVL, and the principles of the Variable Annuity Model Regulation (reserves "shall be established pursuant to the requirements of the SVL in accordance with actuarial procedures that recognize the variable nature of the benefits provided and any mortality guarantees"). It is also consistent with the general principles of Actuarial Guideline 34, with appropriate modifications to reflect the unique nature of VAGLBs.*

This report recommends that all reserve calculations for Variable Annuity Guaranteed Living Benefits (VAGLBs) be performed following the requirements defined in this report, but with reliance on the guidance provided under AG 33, where appropriate.

Like the methodology in AG 34, this reserve methodology does not address how reserves for base variable annuities should be calculated. Rather, it only addresses the calculation of reserves for VAGLBs to be held in the General Account.

Part 3 of this report includes a discussion of issues involving reserves for Guaranteed Pay-out Annuity Floors (GPAFs). While some progress has been made, more work is needed before a VAGLB work group recommendation can be made on whether the Guideline should include or exclude GPAFs.

II. Scope

Principles: *This section and the definition of VAGLBs in Section III are similar to these provided in AG 34, which applies to MGDBs that have the potential to exceed the AV. The phrase "potential to exceed the AV" was modified for VAGLBs to "potential to provide benefits whose present value as of the benefit commencement date may exceed the variable account value." The perspective is on a guarantee of benefits which may require, based on valuation assumptions, an amount greater than the value of contract's account value at the time benefits are paid or commence. For example, if a guaranteed minimum period income provided under a VAGLB has a present value at the time of benefit commencement that is greater than the account value in the separate account, then an amount from the general account will be needed to make up the shortfall, and the shortfall is the focus of the reserves specified in this report.*

1. These reserve requirements apply to variable deferred annuity contracts that provide one or more guaranteed living benefits (defined in Section III below as VAGLBs – Variable Annuity Guaranteed Living Benefits). These reserve requirements do not apply to those Group Annuity contracts not subject to CARVM. Currently offered VAGLBs falling under the scope of the reserve recommendations included in this report include, but are not limited to, provisions commonly referred to as Guaranteed Minimum Accumulation Benefits (GMABs), Guaranteed Minimum Income Benefits (GMIBs), and Guaranteed Minimum Withdrawal Benefits (GMWBs). (As mentioned, a recommendation regarding Guaranteed Payout Annuity Floors will be made in the future).

The actuary should exercise judgment, however, in determining the applicability of these recommended reserve requirements. For example, it may be inappropriate to utilize the methodology presented in this report for a contract with an VAGLB where the associated net amount at risk (NAR) decreases when the underlying funds experience a drop in market value or a period of underperformance.

III. Definitions

1. **Variable Annuity Guaranteed Living Benefit** (VAGLB) is a guaranteed benefit included in a variable annuity contract providing that: 1) one or more benefit amounts available to a living contractholder, under specified conditions (e.g., upon annuitization), will be enhanced should it fall below a given level, regardless of the performance beyond the valuation date of the underlying variable annuity funds; 2) and only such guaranteed benefits having the potential to provide benefits whose present value as of the benefit commencement date may exceed the variable account value are included in this definition.
2. **Path Dependent** refers to VAGLB designs for which the guaranteed amount available to the contractholder depends on the value of the underlying variable funds or economic indices.
3. **Guaranteed Minimum Accumulation Benefit** (GMAB) is a VAGLB design for which the benefit is contingent on the contractholder keeping a deferred variable annuity contract in force up to a benefit date (i.e. to the end of a waiting period). On the benefit date, if the account value is less than the guaranteed amount, the account value (or a specified portion) is typically increased to the guaranteed amount. There may be one or more benefit dates at which the benefit is available.
4. **Guaranteed Minimum Income Benefit** (GMIB) is a VAGLB design for which the benefit is contingent on annuitization of a deferred variable annuity contract. The benefit is typically expressed as a contractholder option to receive a guaranteed amount of periodic income benefit on one or more option dates.
5. **Guaranteed Minimum Withdrawal Benefit** (GMWB) is a VAGLB design for which the benefit is contingent on one or more withdrawals from a deferred variable annuity contract. The benefit is typically expressed as a guaranteed minimum amount that is available to be withdrawn over a term specified in the contract.
6. **Projected Account Value** is the account value on the valuation date projected into the future, based on a set of net assumed returns earned on the variable assets supporting the contract.
7. **Net Assumed Returns** are equal to Gross Assumed Returns, less appropriate asset based charges. Gross Assumed Returns are based on either "Representative Scenarios" or the "Keel Method Scenario".
8. **Representative Scenarios** are sets of future Gross Assumed Returns for each asset class earned on the variable assets supporting the contract, which are determined by the Valuation Actuary to represent, in VAGLB reserve calculations, stochastically determined paths of underlying fund performance, as defined in Section V below.
9. **Keel Method Scenario** is an optional, standardized single set of future Gross Assumed Returns for each asset class earned on the variable assets supporting the contract, which are based on the "Keel Method" defined in Section VI below. Under certain "safe

harbor" criteria, the Keel Method Scenario may be used as a simplified alternative to VAGLB reserves based upon Representative Scenarios.

10. **Projected Living Benefit Amount** is a projection of the value of a benefit provided under the contract that is, or could be, enhanced by the presence of a VAGLB, based on the Projected Account Value. The projection should reflect any extensions and/or limitations, including waiting periods, contractually allowed for, or imposed on, the VAGLB. Contractholder options to reset or terminate the VAGLB should be reflected in reserve calculations in a manner consistent with that for any other Elective Benefit.

11. **Projected Net Amount(s) at Risk** for a VAGLB are equal to (i) minus (ii), where both values are determined as of the time the VAGLB is assumed to be paid or commenced, where both values are projected using Representative Scenarios, and where (i) is the present value, using valuation mortality, interest, and any applicable incidence rates, of the Projected Living Benefit Amount(s) corresponding to the VAGLB, and, (ii) is the Projected Account Value. The Projected Net Amount(s) at Risk may be positive or negative.

    Principle*: Since VAGLBs may provide a benefit that is less than the account value, the net amount at risk could be negative. Further analysis will be completed in the future to assure that no conflicts result from the use of such negative amounts.*

    Example #1: *Under a return of premium GMAB, the Projected Net Amount at Risk for surrender after the end of the waiting period is the excess, if any, of: (i) the premiums (reduced for withdrawals) accumulated at the Net Assumed Returns for the period beyond the end of the waiting period over, (ii) the Projected Account Value (reduced for the same withdrawals).*

    Example #2: *Under a 3% Roll-up GMIB that guarantees a 10-year certain annuity at a specified rate, the Projected Net Amounts at Risk at the end of the waiting period and beyond (as may be allowed under the contract) is: i) the present value of the income payments available by applying the specified annuitization rate to the premium (less withdrawals) accumulated at 3%; less ii) the Projected Account Value (reflecting the same withdrawals).*

12. **Projected Base Account Value** is the account value on the valuation date, projected using a return based on valuation rate less appropriate asset based charges.

13. **Base Benefit Streams** are streams of projected benefit amounts available under the contract (including any ancillary benefits, riders or non-VAGLB guarantees), reflecting the Projected Base Account Value, and ignoring any VAGLBs.

14. **Integrated Benefit Streams** are streams of projected benefit amounts available under the contract, reflecting the benefits included in the Base Benefit Streams along with any VAGLBs in the contract.

15. **Calculation Periods** are the periods for which the Integrated Benefit Streams are projected in the Integrated Reserve calculation, consisting of successive periods, beginning with the remainder of the contract year following the valuation date and ending with the period from the valuation date to the maturity date of the contract.

IV. Overview of VAGLB Reserve Methodology

Principles: *The reserve methodology is based on the integrated CARVM reserve structure similar to the structure used in AG 34 and AG 33, where the reserve for VAGLBs is the "solved for" reserve equal to the difference between:*

- *The integrated CARVM reserve for the entire contract, including the VAGLBs; and*
- *The reserve that would be held in the absence of the VAGLBs.*

VAGLB costs are projected within CARVM integrated benefit streams using the Representative Scenarios.

Integrated Benefit Streams reflecting VAGLBs should include projected Net Amounts at Risk corresponding to those VAGLBs, together with benefits derived from the Projected Base Account Value.

1. Valuation of reserves for contracts that include VAGLBs involve two integrated CARVM reserve calculations: one that includes VAGLBs and one that does not.

   The reserve that includes VAGLBs is called the Integrated Reserve and it represents the total reserve held by the company in support of the entire variable annuity contract. The reserve that does not include VAGLBs is called the Separate Account Reserve.

   The reserve held for the VAGLB, which must be held in the General Account, equals the excess of the Integrated Reserve over the Separate Account Reserve, but is not less than zero.

2. The Integrated Reserve is a CARVM reserve determined considering all contract benefits, including VAGLBs. It equals the greatest present value of future Integrated Benefit Streams which include VAGLBs available under the terms of the contract. Contractholder options to reset or terminate the VAGLB should be reflected in the calculation of the Integrated Reserve like any other Elective Benefit.

3. Net Assumed Returns are determined as follows:

   - The Net Assumed Returns equal the Gross Assumed Returns from the Representative Scenarios less all asset based charges, and vary by standardized asset classes.

     VAGLB standardized asset classes, described in Appendix II, are consistent with the 5 asset classes required in AG 34. LHATF may want to consider expanding this to the 11 classes described in an earlier report. There is a possibility of contractholder antiselection generated by minimum guarantees, leading to skewing of variable fund distribution towards the riskier end of the spectrum.

   - Amounts allocated to any fixed account options should use a Net Assumed Return equal to the guaranteed rate(s).

   - In projecting the account value on the valuation date, the portion of the account value allocated to each asset class may be projected separately using the net assumed returns for each asset class, and the results added together. Alternatively, the valuation actuary may choose to average the Net Assumed Returns (weighted by the percentage of assets in each asset class) and project the entire account value. This will produce results similar to what would be obtained if one assumes that the contractholder continually rebalances the account value among the asset classes to maintain the same proportional distribution at future intervals as exists on the valuation date.

4. Integrated Benefit Streams that include VAGLBs are integrated with other contract benefits by combining two separate benefit streams, X and Y, described below. These Integrated Benefit Streams are determined over all Calculation Periods, and are discounted using valuation interest and mortality.

   - X is the stream of Projected Net Amount(s) at Risk assumed to be paid to those expected to receive VAGLBs during the Calculation Period.
   - Y is the Base Benefit Stream provided during the Calculation Period for the corresponding benefit stream structure in X.

5. In theory, in order to determine an appropriate Integrated CARVM Reserve including VAGLBs, such reserves would be generated for each of a large number of stochastically determined return scenarios ("Benchmark Scenarios"). The resulting reserves ("Benchmark Reserves") would then be ranked, and the reserve held would be the reserve at the desired percentile (e.g., $83^{1}/_{3}{}^{rd}$ percentile).

   While this approach has theoretical merit, it is impractical to apply such a stochastic approach to each inforce contract. Thus, the following two simplified methodologies have been developed, which reduce the required number of return scenarios to be used:

   - VAGLB reserves are determined as the weighted average of a small number of "Representative Scenarios", as described in Section V below.
   - VAGLB reserves are determined based on a single pre-defined return scenario, based on the so-called "Keel Method", as described in Section VI below.

V. VAGLB Reserves Based Upon Representative Scenarios

Principles: *To use this approach, the Valuation Actuary must determine a small number of "Representative Scenarios" (e.g., 1-10) with appropriate weightings for each representative scenario, such that when the VAGLB reserves for each Representative Scenario are weighted together, the resulting weighted reserve is a reasonable approximation for the VAGLB reserve generated by the $83^{1}/_{3}{}^{rd}$ percentile (or other percentile determined by LHATF) ranking of the reserves based on stochastically determined Benchmark Scenarios.*

1. For Representative Scenarios to be used, the valuation actuary must:

   i. Annually certify with the annual statutory financial statement filed with the appropriate regulatory official in each state that the Representative Scenarios are appropriate, based on the comparison in (iii) below (a sample certification is shown in Appendix IV - Proposed Certification),

   ii. Maintain documentation on file for the work performed to meet the requirements of this Section, including but not limited to: (1) a description of the Representative Scenarios used; (2) the methodology by which the Representative Scenarios were determined or redetermined; and (3) a comparison of VAGLB reserves resulting from the Representative Scenarios with the VAGLB reserves resulting from the Benchmark Scenarios.

   iii. Monitor all pertinent emerging factors over time to ensure that the requirements of this Section continue to be met.

2. For a block of business, VAGLB reserves shall be considered appropriate, if (a) is not materially less than (b), where (a) and (b) are described below.

(a) equals the VAGLB reserve for the block based on the weighted average of the VAGLB reserves determined for each Representative Scenario; and

(b) equals the VAGLB reserve for the block based on the $83^{1}/_{3}{}^{rd}$ percentile (or the percentile determined by LHATF) of the Benchmark Reserves ranked from smallest to largest.

For the purposes of this Section, VAGLB reserves shall mean "solved for" VAGLB Reserves calculated as the excess, if any, of the CARVM reserve including the effect on benefits of VAGLBs, over the CARVM reserve ignoring the VAGLBs. Benchmark Reserves shall mean the VAGLB reserves generated from Benchmark Scenarios.

3. In practice, the appropriateness of VAGLB reserves based upon the Representative Scenarios will be established by modeling key assumption points that represent the total block of VAGLB business. The valuation actuary should consider a sufficient number of combinations of the key assumptions to understand the risks involved.

   Such key assumptions might include, but not necessarily be limited to, the following:

   - Distribution of business by demographics and risk profile,
   - Contract duration,
   - Distribution of the variable account value by asset class, and
   - Account value on the valuation date relative to the VAGLB benefit guarantee (i.e., whether the VAGLB benefit would be "in the money" or "out of the money" as of the valuation date).

4. For each combination of the key assumptions,

   - The VAGLB reserves resulting from the Benchmark Scenarios are ranked from smallest to largest.
   - The VAGLB reserve resulting from the Representative Scenarios is compared to the ranked Benchmark Reserves to determine its percentile ranking.

5. For a combination of key assumptions, the Representative Scenarios are considered appropriate if the percentile rank is at least equal to the $83^{1}/_{3}{}^{rd}$ percentile (or that determined by LHATF) of the VAGLB reserves from the Benchmark Scenarios.

   Note: *The above percentile needs to be determined. The percentile shown here was considered consistent with that used in the development of AG 34*

6. To the extent that actual experience varies from such modeled key assumptions, the Representative Scenarios may need to be redetermined.

7. It is expected that an Actuarial Practice Note, outlining VAGLB modeling approaches and methodologies to determine Representative Scenarios, will likely be necessary in the future.

8. Methodology and assumptions for the comparison between Representative Scenarios VAGLB Reserves and Benchmark Scenarios VAGLB Reserves:

   - Benchmark Scenarios must be determined using a Lognormal distribution, based on the mean returns and standard deviations for the 5 standardized asset classes shown in Appendix I – Keel Method Scenarios and Mean Annual Returns and Volatilities.
   - The valuation actuary is responsible for determining the number of Benchmark Scenarios to be used that reflects the risk profile of the underlying VAGLB. In most

cases, a minimum of 1,000 scenarios is needed to achieve representative scenarios at the $83^{1}/_{3}^{rd}$ percentile.

9. The Valuation Actuary shall maintain documentation supporting the work performed in determining the appropriateness of reserves calculated using Representative Scenarios. Such documentation should include the methodology employed and the calculations performed.

VI. VAGLB Reserves Based Upon Keel Method Scenario

Principles: *The intent is to allow the use of Keel Method without following the requirements of Section V, only for the VAGLB designs that the VAGLB Work Group tested and found to be appropriate during the development of the Keel Method. The criteria below are meant to apply to only certain GMAB, GMIB, and GMWB designs, and exclude path dependent designs such as ratchets.*

1. This section provides for the use of the Keel Method Scenario. If the criteria described in this section are met, then the certifications and other requirements set forth in Section V are not required, unless the Valuation Actuary is aware of any reason that the Keel Method may not be appropriate.

2. Under certain criteria, the Valuation Actuary may be able to use the Keel Method gross assumed return scenarios for each asset class as Representative Scenarios without following the requirements of Section V. For purposes of this reserve methodology, this approach is referred to as the "safe harbor". The intent is to permit use of the safe harbor only for:

   - Those VAGLB designs that were thoroughly analyzed as part of the development of the Keel Method, and
   - Those VAGLB designs which contain guaranteed benefit(s), occurring after the valuation date, which are not path dependent (i.e., guaranteed benefit(s) for which the dollar amount can be determined without reference to future unknown events such as economic factors or separate account asset performance). Ratchet-type designs are not intended to be included in this category.

3. For a contract to qualify for the safe harbor, the following requirements must be satisfied on a contract level basis:

   - Only VAGLB designs which are either GMABs, GMIBs, or GMWBs may be included in the contract;
   - As of the valuation date, the exact dollar amount of the VAGLB guaranteed benefit(s) must be known and its determination must not be path dependent. In addition, the guaranteed benefit amount must be either stated in the contract or computed as total net premiums paid accumulated at interest (which may be zero).

     For purposes of this criterion, net premium is defined as gross premiums less any loading, fees, charges, or credits which are not path dependent and are specified in the contract for the determination of guaranteed benefits. In addition, factors used in determining the net premium and the interest rates applied to the net premium in the determination of the guaranteed benefit amount(s) may vary either by contract duration or for different subaccounts.

In the case of GMIBs, the guaranteed minimum income amount may be derived by applying annuitization rates guaranteed in the contract to the amount(s) described above.

- VAGLBs may be available on more than one date.
- Contracts with a GMIB must require that any election of the guarantee apply to the entire contract and that the guaranteed minimum income benefit shall commence on the same date for the entire contract (e.g., a GMIB cannot allow partial exercise of the GMIB benefit).
- The contract may not provide that all or a portion of the contract account value existing on a particular date after issue be treated as "new premium" for purposes of the GMAB or GMIB benefit (one example of this is what is commonly referred to as a reset option).

4. For purposes of determining whether a contract meets the above criteria:

   i. The impact on VAGLB guaranteed benefit amount(s) of any contractholder bonus arrangements must be considered (e.g., such arrangements must not result in the guaranteed benefits being path dependent),

   ii. The impact on VAGLB guaranteed benefit amount(s) of transfers between variable subaccounts, partial withdrawals (including the effect of market value adjustments and surrender charges), and additional premium payments, do not need to be considered, and

   iii. The possibility of future market value adjustments to account values, and contractholder options to cancel a VAGLB benefit (and thereby avoid future charges), need not be considered.

5. Appendix III shows examples of how various VAGLB designs fit the safe harbor criteria.

6. Since the use of Keel Method Scenario is optional, the Valuation Actuary may alternatively elect to meet the Representative Scenario requirements in Section V, even for certain VAGLBs which meet the safe harbor requirements of the Keel Method. This may be appropriate in certain situations where the Keel Method Scenario produces either inadequate or excessive reserves. For example, Keel Method Reserves for certain GMWBs or other interim benefits, may meet the safe harbor requirements, but may result in excessive reserves. It should be noted that further VAGLB work group analysis is required on interim benefits before these conclusions should be finalized.

7. Similarly, some VAGLB designs may not meet the criteria required to use the Keel Method Scenario, but may be able to demonstrate that the use of the Keel Method Scenario meets the requirements of Section V. In this case, the Keel Method Scenarios may be used, but all requirements (including the actuarial certification) must be met.

VII. **Valuation Interest Rates**

In determining the valuation interest rates used in the calculation of Integrated Reserves, the valuation actuary needs to consider the characteristics of the components of the Integrated Benefit Steam as described in Section IV:

1. For the portion of the Integrated Benefit Stream represented by benefit stream Y, the valuation interest rates are those otherwise applicable to variable deferred annuities in the absence of the guarantee.

2. For the portion of the Integrated Benefit Stream represented by benefit stream X, valuation interest rates are determined consistent with the requirements of Actuarial Guideline XXXIII.

   For this purpose, the characteristics of the actual benefit streams represented by the Net Amounts at Risk should be considered.

   Example #1*: Non-elective Benefits having Net Amounts at Risk in X would likely require Plan Type A and a guarantee duration reflecting the period of time from issue to the first time benefits may be paid.*

   Example #2: *Annuitization streams that are part of the VAGLB would typically have a Plan Type A (if the payment stream is a period certain less than five years, a Plan Type C may be more appropriate) with a guarantee duration equal to the number of years from the valuation date to the time when benefits are assumed to commence.*

   Example #3: *The treatment is not as clear however, with other VAGLB designs, such as a ratchet-type GMAB (e.g., maximum anniversary value). In such cases, actuarial judgement is required.*

VIII. Reserves for Contracts with VAGLBs and Other Guaranteed Benefits

Principles*: Some contracts with VAGLBs may also have other guaranteed benefits. For example, many contracts with VAGLB contracts also contain MGDBs. Contracts with more than one type of guaranteed benefit require actuarial judgement, particularly when there are different regulatory requirements that apply to each guarantee. In these cases, attempts should be made where possible to use a "holistic approach", i.e., to calculate Integrated CARVM reserves for the entire contract including all guarantees.*

1. For VAGLB contracts with other types of guaranteed benefits:

   - The Valuation Actuary must use judgement to determine how to apply different requirements that apply to each type of guaranteed benefit in determining reserves.
   - Where possible, the valuation actuary should determine “solved for” reserves for all guaranteed benefits, as the difference between (a) and (b), where,

     (a) equals the integrated benefit reserve for the entire contract including all guaranteed benefits; and

     (b) equals the reserve held in the absence of all guaranteed benefits
   - Actuarial judgement may also be needed, if it is necessary for some reason (e.g., reinsurance) to split up the solved for guaranteed benefit reserve into reserve components for each guaranteed benefit.

2. For contracts with both VAGLBs and MGDBs:

   - Valuation of reserves for contracts that include both VAGLBs and MGDBs involve two integrated CARVM reserve calculations: one that includes both VAGLBs and MGDBs, and one that does not include either.
   - The reserve that includes VAGLBs and MGDBs is called the Integrated Reserve and it represents the total reserve held by the company in support of the entire variable annuity contract. The reserve that does not include either VAGLBs or MGDBs is called the Separate Account Reserve.

- The reserve held for the VAGLBs and the MGDBs, which must be held in the General Account, equals the excess of the Integrated Reserve over the Separate Account Reserve, but is not less than zero.
- The Integrated Reserve is a CARVM reserve determined considering all contract benefits, including a VAGLB stream (subject to the VAGLB guideline) and an MGDB stream (subject to AG 34). It equals the greatest present value of future Integrated Benefit Streams available under the terms of the contract.

IX. Effective Date

Principle: *As stated above, this report is in a format that, if the content is acceptable to LHATF, can become the framework for an Actuarial Guideline which should affect all contracts issued on or after January 1, 1981. A December 31, 2001 effective date is suggested. In addition, LHATF should consider a provision, similar to the ones found in AG 33 and 34, stating that where the application of this Guideline produces higher reserves than the company had otherwise established by their previously used interpretation, such company may request a grade in period, of not to exceed three (3) 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.*

Part 2 – VAGLB Reinsurance

I. Variable Annuity Guaranteed Benefit Reinsurance Designs

Reinsurance contracts are structured to pass elements of risk in the underlying reinsured policies or contracts. Because of the design complexity of insurance products, and the diverse needs and requirements of ceding companies, it is difficult to define a standard reinsurance design. This is especially true for guarantees on variable annuities, where both retail and reinsurance product design is still emerging.

Variable annuity products with guarantees differ from most other products in that the basic reserve for variable benefits is held in the separate account, supported by separate account assets, while the reserve for guaranteed benefits is held in the general account, supported by general account assets. Furthermore, the risks associated with the guarantees are dependent on the performance of the separate account assets. This creates the opportunity for new kinds of reinsurance approaches not contemplated with other products.

Through reinsurance, the ceding company can shift its reliance on internal risk management to reliance on the overall solvency of a reinsurer, thus reducing its exposure to the risks associated with the guaranteed benefits. The reinsurer can take advantage of its role in the secondary market to consolidate risks from different companies, repackage that risk, and redistribute it. This can create not only critical mass, but also an improved overall risk profile.

In some cases, reinsurance benefits are defined in such a way as to simplify administration of the treaty. For example, a reinsurer may sometimes pay the account value or the cash surrender value on annuitization when the ceding company's goal is transfer of risks during the accumulation period.

Settlement and measurement of a GMAB benefit is generally based on the excess, if any, of the guaranteed amount over the actual account value at the benefit date. For the GMIB, both of these issues require clarification in the treaty. GMIB reinsurance benefits are generally settled on a lump sum basis at time of annuitization. There are several ways to define the reinsured benefit. In one approach, the "current" purchase rates used to calculate the value of the variable benefit are defined in such a way that the ceding company cannot manipulate the reinsured benefits by arbitrarily changing the annuity purchase rates. The definition may be based on specific annuity purchase rates included in the treaty, or by defining the current purchase rates (for reinsurance benefit purposes) as a function of an external index such as the yield on specified Treasury securities. An alternative approach is for the reinsurer to participate in the current rates, but to avoid manipulation by requiring consultation on the current purchase rate declaration, and/or requiring the ceding company to retain a reasonable portion of the risk. This practice does not limit the reinsurer's exposure to the survivorship, persistency or financial risk of the GMIB.

1. Coinsurance and Modified Coinsurance

   Straight coinsurance would rarely be used for a variable annuity product, since the reinsurer cannot easily set up a separate account corresponding to that of the ceding company. However, modified coinsurance may be used with variable annuities.

   Generally speaking, straight modco reinsurance of variable annuities uses the actual separate account return as the modco interest amount. By so doing, the ceding company passes the quota share of M&E through to the reinsurer. In either case, reinsured benefits

are typically defined to match the ceding company's liabilities, and expense allowances, including any initial ceding commission, are subject to negotiation. For a product with a VAGLB, this will require that the VAGLB benefit also be reinsured, and conversely, in order to use straight coinsurance or modco to transfer VAGLB risk, all other material risks must be transferred.

As noted above, reinsurers may wish to limit the risks they assume associated with the VAGLB. However, the overall characteristics of the reinsurance arrangement are unchanged, in that the reinsurer closely follows the experience of the underlying contracts for all benefits.

2. Risk Premium Reinsurance of Guaranteed Benefits

   For most applications, the variable annuity product can be split into its two components - the variable benefits supported by the separate accounts and the guaranteed benefits supported by fees assessed against the account value. Under risk premium reinsurance, the base variable portion of the annuity is retained by the ceding company and all or a portion of the guaranteed benefits is reinsured.

   Under the risk premium reinsurance approach, the reinsured benefit is typically equal to the excess, if any, of the guaranteed benefit over benefit payable in the absence of the guarantee. This approach allows the ceding company to retain most of the fee-based profits of a typical variable annuity, while divesting of the risk and profits derived from the guaranteed benefit.

   Premiums may be a function of the actual amount at risk, past claim experience, the current account value, the current guaranteed benefit, or some combination of these. Often, premiums for a death benefit will be calculated by age, sex, and possibly actual amount at risk, but capped at some percentage of current account value.

   The risk premium reinsurance approach might be especially helpful to a company that fully understands and is comfortable with the management of a basic variable annuity, but is not prepared to manage the financial risks associated with guaranteed benefits. In addition, the ceding company can easily split out the risk it wants to reinsure and the premium it will pay for that risk. This simplifies the analysis of the reinsurance deal, and it also simplifies the administration and accounting for the reinsurance treaty. The motivation for entering into such an arrangement is very similar to that of a ceding company that uses YRT reinsurance to transfer the mortality risk of a whole life policy.

3. Non-Proportional Reinsurance Features

   Non-proportional features may be added to an otherwise proportional reinsurance treaty to reapportion risk between the reinsurer and the ceding company. A non-proportional feature is one which limits the aggregate amount of benefits payable by the reinsurer during a certain time period, typically through either an aggregate deductible (retained by the ceding company) or an aggregate cap (upper limit on claims). Such deductible or cap may be expressed either as a fixed amount or indexed to the aggregate exposure.

   Non-proportional features do *not* include new business limits, ceding company individual contract retentions or individual contract reinsurance coverage limits. Such features help control the reinsurer's overall exposure distribution but they do not alter the reinsurer's proportional participation in the exposures reinsured.

II. Risk Transfer

1. Coinsurance and Modified Coinsurance

   In order for a coinsurance or modco agreement to qualify for reinsurance accounting and proportional reserve credit under the *Life and Health Reinsurance Agreements Model Regulation*, the treaty must "…transfer all of the significant risk inherent in the business being reinsured…" to the reinsurer. For reinsurance of a variable annuity with guaranteed benefits, this means that the mortality, financial, and persistency risks associated with the guaranteed death benefit and guaranteed living benefits must be fully transferred to the reinsurer, as well as any lapse risk which may be present in the base contract.

2. Risk Premium Reinsurance of Guaranteed Benefits

   Use of reinsurance accounting treatment for risk premium reinsurance, as described above, requires further explanation. There is a clear risk transfer component anticipated in most VA guarantee reinsurance arrangements. In a typical treaty, the reinsurer will be responsible for most of the management of the financial, mortality, and other risks associated with the guarantees. The reinsurer will have a contractual obligation to meet, and they will use prudent risk and investment management to meet that obligation. If their efforts fall short, the reinsurer will suffer a loss.

   In most risk premium reinsurance coverage of the Guaranteed Minimum Death Benefit, the mortality risk transferred, but the reinsurance premiums are capped at some percentage of the account value, thus limiting the ceding company's exposure to financial risk. This form of reinsurance is analogous to traditional YRT, where the mortality risk is reinsured separately from the other risks in the policy. Likewise, reinsurance of other benefits, such as the GMAB or GMIB, transfers such risks as survivorship, persistency, interest rate risk, and annuitization election rate risk in an analogous fashion. If there is no cap on premium rates, or if premiums are proportional to the actual current financial exposure, without limit, then the ceding company will not have effectively transferred all material risks. As long as the reinsurer guarantees a reasonable maximum premium, the ceding company has effectively transferred the risk.

   Life and Health Reinsurance Agreements Model Regulation

   The Life and Health Reinsurance Agreements Model Regulation requires the transfer of "all significant risks inherent in the business being reinsured" in order to get proportional reserve credit. The purpose of the Model Regulation is to disallow "reinsurance accounting" treatment (i.e., proportional reserve credit) when the whole policy appears to have been reinsured, but in fact some of the risks have not been fully transferred to the reinsurer. However, as stated in Section 3, the Model Regulation does not apply to Yearly Renewable Term reinsurance because, as noted in the Examiner's Handbook, YRT reinsurance is considered proportional reinsurance with respect to the mortality risk. There appear to be two potential methods of interpreting the risk transfer requirements of the Model Regulation as it pertains to VAGLB reinsurance.

   The first, narrow interpretation, would not classify risk premium VAGLB reinsurance as YRT or any other form of reinsurance excluded from the risk transfer provisions of the Model Reg. This would force VAGLB reinsurance treaties to either transfer substantially all of the underlying variable annuity risks, as well as the VAGLB risk, or to forgo the benefits of reinsurance accounting. If this interpretation is applied, it seems likely that reinsurance of VAGLBs would be severely curtailed. VAGLB reserve credit would be available only to direct writers that are willing to part with the risks of the underlying

variable annuity through coinsurance or modco, in which case the reinsurer would require substantial participation in overall profits. Only ceding company not requiring reinsurance accounting treatment or proportional VAGLB reserve credit would then use risk premium reinsurance.

The second, broader, interpretation would recognize that risk premium reinsurance transfers one or more significant risks on a proportional basis and would therefore allow risk premium reinsurance of VAGLBs to be treated like YRT. Under a classical YRT reinsurance agreement, only the mortality benefit is reinsured, and the ceding company takes a reserve credit that recognizes the mortality risk transferred as well as the expected reinsurance premiums. This reserve credit is calculated consistently with the entire direct policy reserve but is not proportional to it.

Just as classical YRT reinsurance transfers mortality risk in return for a premium which is designed to cover only the mortality risk, risk premium reinsurance of VAGLBs transfers all of the risks directly associated with the VAGLB in return for a premium which is specifically calculated to cover only those risks. If other general account guarantees are also reinsured (under the same treaty or a different one), then the only significant risk left with the ceding company is a potential lapse risk (depending on the commission and surrender charge structure). This is analogous to the lapse risk retained by the ceding company under a classical YRT reinsurance treaty.

3. Non-Proportional Modifications

Non-proportional features must be analyzed carefully to understand the risks to which each party is exposed. There is not a clear dividing line between proportional and non-proportional reinsurance coverages. In practice, the analysis of risk transfer and the correct reserve treatment typically depend on the materiality of the non-proportional features. Taken to the extreme, such features may change the entire nature of the treaty. For example, if the ceding company retains responsibility for an annual aggregate deductible amount that far exceeds any reasonable expected claim amount, then the entire treaty is effectively a stop loss agreement. On the other hand, if the deductible is set at a very low level, then the proportional nature of the risk transfer is modified but not eliminated.

As stated in Section 3, the Model Regulation does not apply to "certain non-proportional reinsurance such as stop loss or catastrophe reinsurance", because, by definition, risks are not transferred proportionally, and, therefore, full proportional reserve credit is clearly not warranted.

III. Treatment of Reserves

Because of the design complexity of VAGLBs, and the diverse needs and requirements of ceding companies, the VAGLB Work Group believes that detailed reinsurance reserving requirements are not appropriate. However, we make the following general recommendations:

1. Coinsurance and Modified Coinsurance

As long as the agreement transfers all significant risks, coinsurance and modified coinsurance of variable annuities with the associated VAGLBs should be valued using proportional reserve credit rules. Under coinsurance, the ceding company's reserves would be reduced by the quota share percentage, and the reinsurer would establish reserves for the quota share coinsured, according to its own reserve requirements.

Reserves for coinsured business are calculated in the same manner as for business directly written by the assuming reinsurer.

Under modco reinsurance, reserves would not be altered for either the ceding company or the reinsurer. In particular, the ceding company would not set up any additional liability under a modco agreement.

2. Risk Premium Reinsurance

   - Ceding company: Under risk premium reinsurance, the ceding company typically will calculate a CARVM reserve, ignoring reinsurance. The ceding company then will calculate the CARVM reserve, treating reinsurance premiums as additional benefits and reducing guaranteed benefits by reinsurance recoveries. The second reserve calculation is subtracted from the first, and the result is deemed to be the reserve credit for the guaranteed benefits ceded. The ceding company gets credit for this reserve on its books. To the extent that required reinsurance premiums exceed expected reinsurance benefits, the ceding company's reserve may increase. Whether positive or negative, the resulting reserve credit is referred to as "proportional" below.

   - Consistent with the proportional approach, the reinsurer will typically calculate a CARVM-type reserve, as described below, for the benefits it has assumed, while also considering the reinsurance premium flow. In most cases, then, the sum of the reinsurer's reserve for assumed benefits and the ceding company's reserve credit will be at least as great as the reserve the ceding company would have held without reinsurance. The resulting reserve is referred to as "proportional" below.

   The approaches described above for the ceding company and the reinsurer are consistent with the treatment of MGDB reinsurance required by Actuarial Guideline 34, which explicitly requires the ceding company to reduce the MGDB benefits by the reinsurance benefits, and treat reinsurance premiums as an additional benefit. Risk premium reinsurance of variable annuity guarantees could be similarly treated as a form of YRT reinsurance coverage. Thus, the risk transfer characteristics and resulting reserve treatment would be similar to classical YRT.

   Reserves for assumed risk premium reinsurance would use a CARVM-type reserve method as suggested above. Because the risk profile of the reinsurer's expected cash flows is different from that of the direct writer, parallel reserve calculations may be inappropriate. It requires analysis to determine how CARVM is appropriately applied to value only one of the many possible benefit streams within the annuity contract. Four theoretically possible methods are as follows:

   - Mirror Reserving Method

     Under this approach, the ceding company would calculate its reinsurance reserve credit as described above, as the difference between CARVM reserves calculated with and without reinsurance. The reserve held by the assuming company would then be set equal to the reserve credit taken by the ceding company, subject to a floor of zero.

   - Dependent path method

     The dependent path method requires the reinsurer to use the same benefit stream and fund return assumptions for reserve calculations as used by the ceding company in its determination of the reserve before reinsurance. This method is consistent with the CARVM principle that reserves must be held to reflect the utilization of benefits that

produces the greatest present value from the perspective ceding company. Under this approach such utilization would be captured in the reserve held by the ceding company, and the effects of this same utilization pattern would also be reflected in the reserve held by the assuming company.

- Independent Path Method

  This method, similar to the method used in AG 34, would require the reinsurer to determine Representative Scenarios in a manner consistent with the requirements of this report and to consider benefits over the range of possible contractholder behavior. The reserve held would the greatest present value along any of the paths. Therefore, the benefit stream used to determine the reserve for the assuming company is independent of the integrated benefit stream used to determine the reserve held by the ceding company (gross of reinsurance). This approach is consistent with the CARVM principle that the company should have a sufficient reserve regardless of the choices made by the contractholder. Our analysis suggests that, while the independent path approach produces a reasonable approximation for MGDB reserves, its application to VAGLB may produce excessive reserves.

- Benefit Incidence Method

  Under this approach, the independent path method would be modified to reflect estimated utilization for reinsured elective VAGLB benefits. This is a greatest present value approach reflecting the concept that the ceding company can't select against the reinsurer, and that the utilization of the reinsurance benefit is non-elective.

These four methods can be compared along two dimensions. From the standpoint of consistency between reserves held by the assuming and ceding company, the mirror reserving method is the most consistent and the independent path and benefit incidence methods are the least consistent. From the standpoint of aligning of the reserve held by the assuming company with the risks it has assumed, the independent path and benefit incidence methods are the most closely aligned, while the mirror reserve method is the least aligned. These characteristics are summarized in the table below. The table also includes a comparison of the advantages and disadvantages of each of these four methods.

Comparison of Reinsurer Reserve Methods for VAGLBs				
Method	**Consistency with Ceding Company Calculations**	**Alignment with Reinsurer's Assumed Risks**	**Other Advantages**	**Other Disadvantages**
Mirror reserve	Greatest	Least	Minimizes resources needed to calculate reinsurer's reserves. Assures aggregate industry reserves are at least equal to CARVM reserves of the direct writer Less chance of manipulation	Fails to recognize differing risk profiles of ceding company and reinsurer.
Dependent path	Moderate	Moderate	Limits resources needed to calculate reinsurer's reserves. Assures consistent reserve calculation between ceding assuming companies. Less chance of manipulation	May result in low (or even zero) reserve for reinsurer when most expensive benefit stream to ceding company is less expensive to the reinsurer.
Independent path	Least	Greatest	Produces safest reserve level. Less chance of manipulation Consistent with method used in AG 34.	Requires substantial resources for reinsurer's reserve calculation. Will produce redundant reserves unless greatest present value benefit streams of ceding company and reinsurer coincide.
Benefit incidence	Least	Greatest	Produces reserve on basis most likely to conform to actual experience.	Susceptible to manipulation.

As shown in the above table, each of the methods has advantages and disadvantages. Because the dependent path method is reasonably consistent with the direct writer's approach and since virtually all reinsurers are subject to asset adequacy analysis, the VAGLB Work Group believes this approach provides a reasonable balance and recommends this approach be required.

3. Non-Proportional Features

In determining its reinsurance reserve credit, the ceding company must consider any non-proportional features of the reinsurance treaty. Although there do not appear to be any well-known standardized formulas for evaluating non-proportional features, such a calculation can be done via cash flow projections that recognize any non-proportional features. As noted in paragraph 5.2 of Actuarial Standard of Practice No. 11, "… the principal responsibility of the ceding company and the assuming company is to establish *net* statement liabilities for their respective obligations". As suggested in paragraph 5.7, cash flow testing of net statement liabilities is indicated wherever there are "material reinsurance transactions with partial or non-proportional benefit reimbursements or with treaty structures that do not parallel the original insurance."

Likewise, the reinsurer, in calculating its assumed reserve, may consider any significant non-proportional elements, based on a realistic assessment of the financial impact of such elements.

The calculation methods and assumptions used by the ceding company and reinsurer should be consistent with each other. For example, if there is an annual cap on reinsured benefits, then the ceding company should weigh the likelihood that this cap may be exceeded and increase its retained reserve accordingly. As the cap approaches zero, the ceding company's reserve credit, and the reinsurer's reserve, should converge to zero. Alternatively, aggregate deductibles, below which the ceding company retains the risk, will reduce the reinsurer's reserve and the ceding company's reserve credit to something less than the proportional level. As the deductible tends to zero, the ceding company's reserve credit and the reinsurer's reserve should approach the proportional levels.

Part 3 - Guaranteed Payout Annuity Floors

1. General Description of Variable Immediate Annuities

   Variable Immediate Annuities (VIA) are emerging as a stand-alone product, although they have existed as settlement options from a deferred variable annuity for many years. Relative to deferred variable annuities, this market is quite small - to date there is only about $2 Billion of VIA reserves inforce. Currently, there are over a dozen such products on the market with several others under development. As the demographic trend of more retirees relying on defined contribution retirement plans become ever more visible, it is expected that these products have the potential to grow rapidly in sales and diversity.

   Under most variable payout products, the income is dependent on Variable Separate Account investment performance. Income payments are structured such that, if the investment performance (after all charges) equals the Assumed Investment Return (AIR), income payments remain constant. If the earnings exceed the AIR, payments increase while, if less, payments decrease. Also, a few emerging designs (both standalone and settlement options) that adjust income payments for actual investment performance in a nontraditional manner.

   The income options offered typically include both life contingent and non-life contingent options. Many products offer a combination of fixed and variable payments and some permit transfers from the variable component to the fixed component. On non-life contingent options, the SEC mandates complete liquidity on the variable part since there can be neither investment nor mortality anti-selection. Some products offer liquidity on life contingent options; others do not. A few products are structured as front-end loaded products, while others have back-end loads.

2. Guaranteed Payout Annuity Floor

   Guaranteed Payout Annuity Floors (GPAFs) are VAGLB designs, which guarantees that one or more of the periodic payments under a variable immediate annuity will never be less than a minimum amount.

   GPAFs are relatively new to the market place, with a small number of products currently available with approximately $50 million of reserves inforce. Appendix VI summarizes most of the GPAFs currently offered in the marketplace. Currently, products with a GPAF usually have a conservative AIR, generally set the floor at a percentage of the initial payment (so that the floor does not change with time or future investment performance) and usually only allow the use of an S&P Index fund. The GPAF is usually an option available at issue, but some products automatically include the GPAF in the design. There is typically a separate charge for the benefit. More companies are considering more complex GPAF designs such as a Ratchet or Roll-up designs.

   It should be noted that there are variable deferred products on the market that have Guaranteed Minimum Income Benefits which use variable annuitization rather than fixed annuity payment options. These variable income plans may have a GPAF as either an optional or mandatory feature of the variable annuitization.

3. Reserving Practices - Base VIAs and GPAFs

   In order to get a sense of current reserving methodologies used for both regular VIAs and VIAs with GPAFs, a small informal survey of U.S. companies was completed. While the survey was small, (i.e., 5 companies) the results appear to be supported by prior studies in this area.

Regarding regular VIAs, the study revealed wide diversity in practice. In general, there appear to be two different approaches currently used in practice for regular VIAs:

(1) CARVM reserves are equal to the present value of future income, discounted at the statutory valuation rate and projected at the statutory valuation rate less annuity charges. This approach, used by a minority of companies studied, is comparable to the CARVM approach used for most deferred variable annuities.

(2) CARVM reserves are equal to the present value of current income projected and discounted at the AIR. This approach usually results in a reserve equal to the full account value. This approach appears to be used by the majority of companies studied, although some of these companies are exploring other approaches.

Regarding reserves for the GPAF benefit, two approaches appear to be used:

(1) Three companies hold an "add-on" GPAF reserve in addition to the reserve for the base VIA. Two of these companies hold the greater of a retrospective approach (accumulating GPAF charges) and a prospective approach (using Black-Scholes models, or a modified drop/return similar to the AG 34 returns). The third company, which has reinsured its GPAF benefit, holds an add-on reserve equal to the reserve held by the reinsurer.

(2) One company uses an integrated CARVM approach, based on drops/returns similar to AG 34.

4. Modeling Results

A life contingent product with no liquidity was tested for the GPAF benefit. As a starting point, we used an “economic reserve” (defined as the present value of the GPAF benefits less the present value of the GPAF charges). The economic reserve was developed using both the Keel Method and stochastic investment returns. Although more testing is needed (e.g., different income plans), these economic reserves all have the potential to become fairly significant. Thus, our conclusion is that the GPAF benefit is a potentially significant risk that needs very careful consideration and should not be ignored.

5. Conclusions

The GPAF benefit can generate significant reserves, especially under adverse return scenarios, and such vary dramatically with market returns. Variable immediate annuities are complicated, and are getting even more complicated as new designs come to market. There are currently inconsistencies in the application of CARVM for variable immediate annuity products. It appears that some companies have adopted a conservative interpretation of CARVM, due to the potential risks and the lack of regulatory guidance.

For these reasons, there appears to be no clear answer on how VIA reserves should be determined. Thus, VAGLB Work Group needs to complete more analysis on both general VIAs and VIAs with VPAFs before a final recommendation can be made to LHATF regarding an appropriate reserve methodology.

Appendix I – Keel Method Scenarios and Mean Annual Returns and Volatilities

Keel Method returns are determined using the following formula:

$$Index_t = Index_{t-s} \times e^{ms+Ns\sqrt{s}}$$

Where:
- $Index_t$ = the index at time t
- μ = Mean Return net of charges (Mean Fund Performance (Gross) – Fund Management charges – M&E – other charges)
- σ = Fund Return Volatility
- s = period in years between t-s and t
- N = 16.67^{th} percentile of the Cumulative Normal distribution, equals –.9674

The following are values for adjusted mean returns and fund volatility:

	Equity	Bond	Balanced	Money Market	Specialty
Mean Fund Performance (Gross)* =	13.18%	9.14%	11.03%	7.54%	11.95%
- Actual Fund Management Charges =	0.70%	0.55%	0.60%	0.20%	1.00%
- M&E Charge =	1.35%	1.35%	1.35%	1.35%	1.35%
- Charge for GMIB, GMDB, etc. =	0.40%	0.40%	0.40%	0.40%	0.40%
Mean Return net of charges (μ) =	10.73%	6.84%	8.68%	5.59%	9.20%
Fund Return Volatility (σ) =	12.70%	7.05%	9.48%	2.70%	13.03%
Keel Percentile =	83.33%				

*Sample returns adjusted for lognormal distribution and grossed up for representative fund management and M&E charges.

The following example demonstrates the calculation of the cumulative Keel Method returns for projection years 1 through 20. (Assume that M&E equals 135 bps, charges equal 40 bps, and fund management charges are 70 bps for equity, 55 bps for bonds, 60 bps for balanced, 20 bps for money market, and 100 bps for specialty)

Cumulative Returns

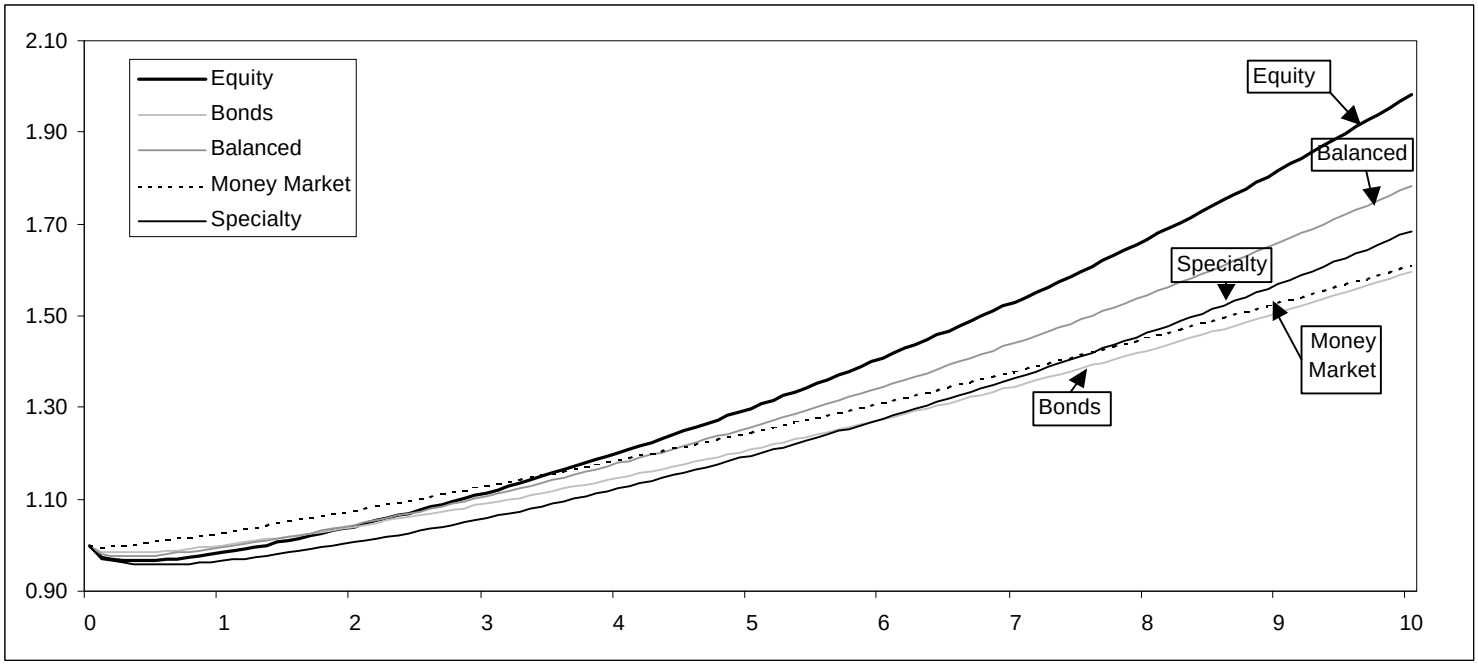
Year	Equity	Bond	Balanced	Money Market	Specialty
1	-1.54%	0.02%	-0.49%	3.02%	-3.35%
2	4.17%	4.12%	4.49%	7.77%	0.57%
3	11.53%	9.10%	10.69%	13.03%	5.94%
4	20.14%	14.71%	17.80%	18.69%	12.29%
5	29.92%	20.86%	25.73%	24.74%	19.50%
6	40.90%	27.55%	34.47%	31.18%	27.54%
7	53.12%	34.76%	44.04%	38.01%	36.41%
8	66.68%	42.52%	54.50%	45.25%	46.15%
9	81.69%	50.83%	65.88%	52.92%	56.81%
10	98.27%	59.73%	78.24%	61.03%	68.43%

Annual returns corresponding to the cumulative returns are shown in the following table:

Annual Returns

Year	Equity	Bond	Balanced	Money Market	Specialty
1	-1.54%	0.02%	-0.49%	3.02%	-3.35%
2	5.80%	4.10%	5.00%	4.61%	4.06%
3	7.06%	4.78%	5.93%	4.87%	5.33%
4	7.72%	5.14%	6.42%	5.01%	6.00%
5	8.14%	5.37%	6.73%	5.10%	6.42%
6	8.45%	5.53%	6.95%	5.16%	6.73%
7	8.67%	5.66%	7.12%	5.21%	6.96%
8	8.86%	5.75%	7.26%	5.25%	7.14%
9	9.00%	5.83%	7.37%	5.28%	7.29%
10	9.13%	5.90%	7.46%	5.30%	7.42%

The following graph demonstrates the different shapes of the Keel based on the mean return and volatilities shown above (the M&E charge of 135 bps and the 40 bps GMIB charge are also included):



Appendix II – Description of Asset Classes

Equity Class

Although equity funds have a broad range of investment objectives, all invest primarily in publicly traded securities, such as common stocks, preferred stocks and convertible securities. The choice of securities purchased by the portfolio manager will be guided by the fund objective (such as Growth of Capital or Income, or Approximating an Index), the capitalization of the companies issuing the stock (e.g., small, medium or large) or the target region (domestic U.S., Pacific Rim, Latin America, etc.). Although some equity funds maintain a general strategy, allowing a portfolio manager great latitude in purchase, other equity funds have become quite specific in their investment objectives. All equity funds, however are somewhere on the high end of the risk/return scale.

Bond Class

Investment objective is usually to provide a high level of income consistent with moderate fluctuations in principal value. The objective is accomplished through investments in fixed income securities, such as U.S. government securities, foreign government securities, or publicly traded debt securities issued by U.S. or foreign corporations. Since most bonds are assigned ratings by private Rating Agencies, the specific objectives of the funds are often described by the funds' tolerance for instruments at the various rating levels. Funds that focus predominantly on safety will tend to use more U.S. Government securities, while a fund that focuses predominantly on income may tend to use more lower investment grade instruments. All bond funds, however, are somewhere in the midrange of the risk/return scale.

Balanced Class

Investment objective is to seek a maximum total return over time, consistent with an emphasis on both capital appreciation and income. Typically, these funds will contain 50%-75% stocks, with the remaining assets invested in bonds and cash equivalents. However, balanced funds grant the portfolio manager the latitude to shift the asset allocation depending on a current analysis of market trends. Beside the term "Balanced", common terms for this fund type include "Total Return", "Adviser's" and "Asset Allocation".

Money Market Class

Investment objective is to achieve maximum current income consistent with liquidity and preservation of capital. These funds typically aim to maintain a stable net asset value of $1 per share. The assets contained in this fund typically have a stated maturity of less than thirteen months with an average maturity of less than 90 days. Common assets held include U.S. Government obligations, certificates of deposit, time deposits and commercial paper.

Specialty Class

Investment objective is to seek a maximum total return with an emphasis on long term capital appreciation, and sometimes current income. Typically, this fund type will invest most of its assets in common stocks or debt instruments of companies that operate within a specified industry. Commonly, specialty funds invest in utilities, natural resources and real estate, although there is a broad range of possible industries to choose from. The key difference between a specialty fund and an equity or bond fund is the targeted approach to investing. In a specialty fund, no effort is made to diversify outside the target industry.

Appendix III – Criteria Application to Various Example VAGLB Designs

Characteristics designated as "acceptable" do not automatically qualify the benefit design as meeting the safe harbor, since there are other requirements that must be met.

1. A GMAB or GMIB with a guarantee of net premiums accumulated at an interest rate of 6% for the first 5 contract years and 4% thereafter would be acceptable.
2. A GMAB or GMIB with a guarantee of net premiums accumulated at a rate annually declared by the insurer, with a guarantee that the declared rate will never be below 4% each year, would be acceptable.
3. A GMAB or GMIB with a guarantee of net premiums accumulated at a rate equal to the average LIBOR for the year, but never less than 2%, would not meet the safe harbor criteria, since this would make the benefit path dependent.
4. Likewise, a guarantee of net premiums accumulated at the 5-year Treasury rate as of a certain date each year would not meet the safe harbor criteria, since this would make the benefit path dependent.
5. A guarantee of net premiums accumulated at rates annually declared by the insurer, but not less than 3%, however, would be acceptable even if the insurer declares current (non-guaranteed) rates that are actually equal to the 5-year Treasury rates. This is because the 5-year Treasury rates are not guaranteed until the company declares them.
6. A GMAB or GMIB with a guarantee of 125% of net premiums accumulated at 5% would be acceptable.
7. A GMAB or GMIB incorporating a ratchet, (i.e., a maximum anniversary value), design (i.e., benefits defined in terms of account values following the valuation date but prior to an election date) creates future path dependency and would fail to meet the safe harbor criteria.
8. A GMAB or GMIB based on the greater of a ratchet and net premiums accumulated at 3% would also fail to meet the safe harbor criteria, because the benefit is path dependent.
9. A 10 year GMAB roll-up benefit and a 20 year GMIB roll-up benefit in the same contract would meet the safe harbor criteria.
10. A 10 yr. GMAB roll-up benefit and a 20 year GMIB ratchet benefit in the same contract would disqualify the contract from meeting the safe harbor since at least part of the benefit is path dependent.
11. A GMAB or GMIB that treats each net premium like a single premium having its own set of benefit dates would fail to meet the safe harbor criteria. For example, if there were a 10 year waiting period for each premium payment, so that two premium payments result in two separate waiting periods, the benefit design would fail to meet the safe harbor criteria.
12. A contract offering a bonus benefit of 2% of premium at the end of year 7, which would be added to both the GMAB/GMIB and the account value, would qualify for the safe harbor.
13. For a contract that offers a bonus benefit equal to 2% of account value at the end of year 7, a GMAB or GMIB benefit also included in the contract would not qualify for the safe harbor if the VAGLB guaranteed amount is increased by all, or a portion of, the bonus, since this would make the benefit path dependent.

Appendix IV - **Proposed Certification**

CERTIFICATION OF REPRESENTATIVE SCENARIOS
COMPLIANCE WITH SECTION VI REQUIREMENTS

I, (state name and professional designation) am the appointed actuary for (company name). This certification, made under the requirements of Actuarial Guideline ___ and using terms defined therein, covers reserves meeting all of the following:

1. Which are held in the General Account covering guarantees expressed under Variable Annuity Guaranteed Living Benefits;

2. Computed using Net Amounts at Risk based on Representative Scenarios other than the Keel Method Scenarios, and described in the attachment to this certification.

I have performed or reviewed a comparison of the VAGLB reserves resulting from the Representative Scenarios to the VAGLB reserves resulting from Benchmark Scenarios. The documentation for the comparison is on file and available to the Commissioner upon request. The key assumptions used in the comparison are, in my judgment, representative of the Company's variable annuity business for which the Representative Scenarios are used, or to be used. Any adjustments to the Representative Scenarios have been made, as I deemed necessary. I certify that the resulting VAGLB reserves meet the requirements of section VI of Actuarial Guideline __ in the aggregate for the business issued or reinsured by (company name) and reported in the statutory financial statement as of (the date of valuation).

_____

(Name of actuary)

_____

(Signature of actuary)

_____

(Date of Certification)

Appendix V - Numerical Example of VAGLB Reserve Calculation

The following example will help to illustrate how the Keel method would be applied. The example uses the following assumptions:

- VA with a 6% Roll-up GMIB and a 10-year waiting period,
- Guaranteed annuitization factors based on 70% of the Annuity 2000 table and 3.0% interest,
- 135 bps base VA M&E charge and 40 bps charge for the GMIB,
- Surrender charge pattern is 7, 6, 5, 4, 3, 2, 1% of premium with no free partial withdrawals,
- The death benefit equals the account value at time of death (i.e., waiver of surrender charge),
- Male, age 65 policyholder,
- Single premium of $50,000 at issue (t=0),
- Valuation date is t=5 (i.e., the 5th anniversary), at which time the account value equals $50,000,
- The account value is allocated to the following funds:

Fund	Allocation	AV (t=5)	Fund Management Charges
Equity (total)	50%	$25,000	0.70%
Bond (total)	10%	5,000	0.55%
Balanced	10%	5,000	0.60%
Money market	10%	5,000	0.20%
Specialty	20%	10,000	1.00%

The first step in the reserve calculation is to calculate the Keel Method returns so that the net amount of risk for benefit stream X (as described in Section IV) can be calculated. This is done using the following formula:

$$Index_t = Index_{t-s} \times e^{ms+Ns\sqrt{s}}$$

Where:
- $Index_t$ = the index at time t
- μ = Mean Return net of charges (Mean Fund Performance (Gross) – Fund Management charges – M&E – other charges)
- σ = Fund Return Volatility
- s = period in years between t-s and t

N = 16.67th percentile (1 – 83.33rd percentile) of the Cumulative Normal distribution, which equals –.9674

With multiple asset classes, the amount in each asset class is projected separately and then summed. Projections are made to each future anniversary. The following example demonstrates the Keel Method values for projection years 1 through 5.

	Equity	Bond	Balanced	Money Market	Specialty
Mean Fund Performance (Gross)* =	13.18%	9.14%	11.03%	7.54%	11.95%
- Actual Fund Management Charges =	0.70%	0.55%	0.60%	0.20%	1.00%
- M&E Charge =	1.35%	1.35%	1.35%	1.35%	1.35%
- Charge for GMIB, GMDB, etc. =	0.40%	0.40%	0.40%	0.40%	0.40%
Mean Return net of charges (μ) =	10.73%	6.84%	8.68%	5.59%	9.20%
Fund Return Volatility (σ) =	12.70%	7.05%	9.48%	2.70%	13.03%
Keel Percentile =	83.33%				

*Sample returns adjusted for lognormal distribution and grossed up for representative fund management and M&E charges.

Year	5	6	7	8	9	10
Equity	25,000	24,614	26,042	27,882	30,035	32,481
Bond	5,000	5,001	5,206	5,455	5,735	6,043
Balanced	5,000	4,976	5,224	5,534	5,890	6,286
Money Market	5,000	5,151	5,389	5,651	5,935	6,237
Specialty	10,000	9,665	10,057	10,594	11,229	11,950
Total	50,000	49,407	51,919	55,116	58,823	62,997
${}_np_x$	100.0%	98.3%	96.4%	94.3%	92.1%	89.8%

The ${}_np_x$ values reflect the assumed valuation mortality. The account value projection above is used to calculate the Net Amount at Risk (NAR) for the GMIB. Recall that the account value in the example has not risen at all from the original $50,000 by time 5 (the valuation date). The following example shows the calculation of the GMIB NAR.

Year	5	6	7	8	9	10
Projected Account Value	50,000	49,407	51,919	55,116	58,823	62,997
GMIB Benefit Base	66,911	70,926	75,182	79,692	84,474	89,542
PV of Guaranteed Payments*	49,689	53,083	56,705	60,570	64,695	69,097
Projected GMIB NAR	-	-	-	-	-	6,100
PV of Projected GMIB NAR*	-	-	-	-	-	4,045

* using Type A, with guarantee on considerations after one year, guarantee duration 5-years or less (6.25%)

The next step in the reserve calculation is to determine the Y benefit stream (as described in Section IV). In this stream, the account value is projected at a rate equal to the valuation interest rate (6.25%), less M&E charge (1.35%), and the GMIB charge (0.40%). This projection

determines the account value assumed to be paid at the same time as the commencement of GMIB benefit in benefit stream X. The following example demonstrates this calculation.

Valuation Rate	6.25%
M&E Charge	-1.35%
VAGLB Charge	-0.40%
Projection Rate	4.50%

Year	5	6	7	8	9	10
Projected Account Value	50,000	52,250	54,601	57,058	59,626	62,309
PV of benefit stream Y						
PV Projected AV (6.25%, ${}_{n}p_{x}$)	50,000	48,331	46,622	44,876	43,100	41,301
PV Cumulative Deaths		853	1,774	2,760	3,806	4,904
						46,205
PV of benefit stream X						
PV of Projected GMIB NAR	-	-	-	-	-	4,045
PV of Integrated Benefit Stream	-	-	-	-	-	50,250

This is only one Integrated Benefit Stream (i.e., one where the GMIB is elected at end of the waiting period). All other Integrated Benefit Streams, including those that do not include the GMIB, must also be considered in determining the greatest present value that will be the Integrated Reserve.

If it is assumed that the $50,250 from above is the greatest present value, the reserve for the variable annuity ignoring the GMIB (the Separate Account reserve) would next be calculated. If it is assumed the Separate Account Reserve is equal to the cash surrender value of $48,500, the reserve attributable to the GMIB is $1,750 ($50,250 less $48,500), which would be held in the General Account.