



AMERICAN ACADEMY *of* ACTUARIES

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**Report of the American Academy of Actuaries VAGLB Work Group  
Presented to the NAIC's Life and Health Actuarial Task Force  
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## **I. INTRODUCTION**

### **A. LHATF Conclusions Reached During October 26 Conference Call.**

1. The National Association of Insurance Commissioners' Life and Health Actuarial Task Force (LHATF) decided to set the mean return for the Money Market assets class on the lower of the 10-year and 40-year database, but to retain the volatility in the most current draft of Actuarial Guideline (AG) MMMM.
2. LHATF decided to change the effective date to 12/31/02 and to change the phase-in period from three years to two years.
3. LHATF decided to keep the VAGLB retrospective reserve floor, but recognized that changes need to be made in the mechanics of the retrospective reserve calculation to allow for a release for the reserve. LHATF asked the VAGLB Work Group to suggest alternative approaches for the mechanics.
4. LHATF decided to re-open the issue of expanding the number of AG MMMM equity fund classes.

## **II. AG MMMM Money Market Asset Class Update**

### **A. The following updates were made to the Money Market Asset Class, consistent with the decisions made during the October 26 LHATF conference call.**

1. The mean return for the Money Market assets class is the lower of the 10-year and 40-year database
2. The volatility was not changed from the most current draft of AG MMMM.

### **B. The resulting changes are reflected in the proposed changes to AG MMMM in Appendix B.**

1. The Keel Method mean, volatility, and annual gross returns for the Money Market Asset Class were updated in Appendix I of the draft guideline.
2. The calibration points for the Money Market Asset Class were updated in Appendix V of the draft guideline, based upon the calibration point methodology used in the September 2001 VAGLB Work Group Report to LHATF.

### **III. AG MMMM EQUITY ASSET CLASSES**

#### **A. Historical Background**

1. When AG 34 was created, the Academy MGDB Reserve Work Group initially proposed the use of the following 11 Morningstar asset classes:
  - a. Equity Growth
  - b. Equity Growth and Income
  - c. Equity Aggressive Growth
  - d. International Equity
  - e. Corporate Bond
  - f. Government Bond
  - g. High Yield Bond
  - h. International Bond
  - i. Money Market
  - j. Balanced
  - k. Specialty
2. Based on input from the MGDB Reserve Work Group, LHATF subsequently decided to reduce the number of asset classes in AG 34 to five. This was accomplished by aggregating the four equity classes and the four bond classes.
3. These same five asset classes used in AG 34 have also been used for the last several years in the development of AG MMMM.
4. During the October 26 conference call, LHATF requested that the Academy VAGLB Work Group expand the number of equity classes back to the original four asset classes, thus increasing the total number of asset classes to eight. This modification was suggested to incorporate equity asset fund classes with different mean and volatility characteristics.
5. Subsequent to the October 26 LHATF conference call, the Academy VAGLB Work Group revealed a number of concerns relating to the moving from five asset classes to eight, many of which were the basis for the original consolidation of the 11 asset classes to five.

#### **B. Reasons for Using Five Asset Classes for AG 34 and AG MMMM**

1. Concerns were raised during the development of AG 34 that the International Equity sub-class had inadequate experience that caused the mean and volatility for this sub-class to be lower than current expectations. While additional data has been added for AG MMMM, this concern still remains.

2. Some of the funds classified as Aggressive Growth had characteristics and means/volatilities, which would allow them to be classified as Growth Funds.
3. Since Morningstar loosely defines parameters to distinguish one equity class from another, the Academy MGDB Reserve Work Group struggled to define the subtle differences between the equity asset sub-classes.
4. Since the presence of a higher mean in an equity sub-class was typically offset by a higher volatility, analysis concluded that the impact on MGDB reserves were not sufficient to warrant the additional equity sub-classes.
5. Since the mix of the underlying assets within a given equity sub-class changes over time, it was noted the existence of multiple equity sub-classes might necessitate a regular review of the appropriate asset sub-class category for all funds.
6. Using certain assets classes, such as the four Morningstar equity classes, runs the risk that the classifications used by Morningstar may be changed or refined causing the guideline to be inconsistent with the new equity classifications.
7. LHATF expressed concern that the existence of multiple equity sub-classes in AG 34 created the potential for manipulation by valuation actuaries in order to minimize MGDB reserves.
8. Since most products with VAGLBs also have MGDBs, using AG MMMM with eight asset classes would be inconsistent with the five asset classes in AG 34. This could also create additional valuation systems work, such as the need to create a different set of asset fund mappings. The additional complexity may be inappropriate, given the interim nature of AG MMMM.
9. Risk-Based Capital (RBC) C-3 Phase II requirements are expected to reflect most of the impact of using of an aggregated equity class instead of the four equity sub-classes.

### **C. Analysis of Equity Fund Sub-Classes**

1. An analysis of the Keel Method mean returns, volatilities, and gross assumed returns for the four equity sub-classes is shown in Appendix A. Note that some minor estimates were required since the revised calibration points were not available for the analysis.
2. Findings for the Four Equity sub-classes based on the estimates
  - a. The International Equity sub-class has a statistical mean and volatility that appeared lower than what is intuitively expected. The VAGLB Work Group believes this is likely due to lack of historical data for this sub-class.

- b. Based on the estimated Keel Method Returns, it appears that the Aggressive Growth sub-class produces the highest five to 10-year cumulative returns of the four equity sub-classes. This would generally lead to the conclusion that the VAGLB reserves would be lower in early durations for this sub-class, which is inconsistent with the major reason for the proposed expansion of the fund classes.
- c. Based on the estimated Keel Method Returns, it appears that the Growth & Income sub-class produces the lowest two to 10-year cumulative returns of the four equity sub-classes. This would generally lead to the conclusion that the VAGLB reserves would be higher in the early durations for this sub-class.

#### **D. Recommendations**

- 1. Based on the considerations above, the VAGLB Work Group recommends AG MMMM be adopted with the current five asset fund classes.

## **IV. OPTIONS FOR THE RETROSPECTIVE RESERVE FLOOR IN AG MMMM**

### **A. Current Status**

1. Section IV.I. of the current draft of AG MMMM reads as follows:

*Reserves for a company's VAGLB business shall be no less than accumulated fund charges for the benefit. In the event that there are no charges, a charge should be imputed. In either case, the company should be prepared to demonstrate that the reserve is reasonable, appropriate and adequate under moderately adverse conditions.*

2. In this section, this requirement will be referred to as the "retro reserve requirement."

### **B. Apparent Motivations for Requiring a Retro Reserve Requirement**

1. For some regulators, the requirement is viewed as a simplified alternative to the AG MMMM prospective requirements, until AG MMMM is adopted by the NAIC.
  - a. Since the retro reserve requirement is already required in some states, the requirement provides a practical alternative to the more complex AG MMMM reserve requirement.
  - b. In some jurisdictions, the currently exposed guideline set the rules to be followed for calculating minimum reserves for VAGLBs.
  - c. It also allows companies to avoid expensive valuation system modifications to handle reserve calculations that are not yet final.
  - d. For those who take this view, it is presumed that the need for the retro reserve requirement will no longer exist once AG MMMM is adopted.
2. For other regulators, the requirement addresses concerns that the interim RBC C-3 factors for VAGLBs may be inadequate under certain scenarios.
  - a. Although the interim RBC factors were tested two years ago (and recently reviewed by the VAGLB Work Group) to assure that the resulting RBC met a 95<sup>th</sup> percentile adequacy requirement, there is concern that the interim factors may be lower than the new RBC C-3 Phase II requirement based on a "Conditional Tail Expectation" (CTE). The Academy C-3 Work Group is moving toward using a CTE approach rather than the existing percentile approach in developing a longer-term solution for C-3 risk on variable product guaranteed benefits. Since it is unknown whether the interim RBC factors would be adequate under a CTE basis (such as CTE (90)), the retro reserve requirement may provide an "earmarking" of capital until a longer-term RBC approach can be introduced.
  - b. For those who take this view, it is presumed that the need for the retro reserve requirement will no longer exist once the C-3 Phase II standards are adopted.

3. For other regulators, the requirement addresses concerns that the AG MMMM prospective reserve requirement may not produce significant levels of reserves, especially in the early years of the waiting period.
  - a. The retro reserve requirement eliminates the possibility of companies releasing a portion of the charges for VAGLBs into earnings, only to later have a large increase in reserves, should there be a drop in the assets supporting the underlying variable annuity contracts.
  - b. It is presumed that those who take this view would prefer that the retro reserve requirement become a permanent part of AG MMMM until a more non-formulaic reserve methodology is developed.

### **C. Issues that Need to be Addressed if the Retro Reserve Requirement is Used**

1. The retro reserve requirement was clearly proposed as a temporary measure. If it becomes necessary to use the requirement for any extended length of time, the VAGLB Work Group believes several issues will need to be addressed:
  - a. The wording of the provision within the current draft of AG MMMM does not give appropriate direction for the calculation of the reserve. For example:
    - (1) Some members of LHATF have indicated the original intent of the retro reserve requirement was to be an alternative to the AG MMMM prospective reserve. If LHATF decides to retain the retro reserve requirement, LHATF may also want to consider adding language to the guideline clarifying that the retro reserve requirement is an alternative for valuation dates prior to the effective date of the guideline.
    - (2) It does not provide for an interest rate at which to accumulate charges;
    - (3) The wording assumes that there is a comparison made between the retro reserve requirement and the AG MMMM prospective reserve. The current wording should be changed to clarify that this comparison is performed on an aggregate basis; and
    - (4) It does not specify whether the comparison is made before or after the cash surrender value floor is applied.
  - b. In addition, the retro reserve requirement will need to provide for a release mechanism within the reserve calculation (referred to below as "formulaic releases"), such as:
    - (1) A release of the reserve for actual withdrawals, death benefits, and other benefits as they are paid;
    - (2) A release of the reserve for contracts that become ineligible for the VAGLB, such as the expiration of the benefit; and
    - (3) An adjustment to the reserve as the company's risk profile, such as through contracts where the VAGLB is well "out of the money."

- c. Finally, if it is desired for the retro reserve requirement to be a temporary measure, the requirement will need to specify how or when the requirement will be permanently released (referred to below as a "full release").
  - (1) The VAGLB Work Group wishes to provide, for consideration by LHATF, alternatives for providing releases within AG MMMM.
  - (2) The alternatives include (as necessary) both provisions for "formulaic releases" and a "full release."

#### **D. Alternatives for Providing a Release from the Retro Reserve Requirement**

- 1. Incorporate formulaic releases, but make the retro reserve requirement a permanent part of the guideline (i.e., no full release).
  - a. Advantages:
    - (1) Addresses concerns that the AG MMMM prospective reserve requirement may not produce significant levels of reserves, especially in the early years of the waiting period (i.e., the third of the three motivations listed in III.B above).
  - b. Disadvantages:
    - (1) Changes to the retro reserve calculation to accommodate formulaic releases will result in further delays to the guideline, and would further increase the complexity of the reserve calculation.
    - (2) A permanent retro reserve requirement would magnify the concerns raised in the past over the requirement (e.g., no theoretical justification, inconsistent with CARVM, results in reserve well in excess of the 83<sup>rd</sup> percentile under many scenarios).
- 2. Full release of the retro reserve requirement when the new RBC C-3 Phase II standards become effective. Because there is no guarantee regarding the ultimate form or adoption date of timely new RBC C-3 Phase II requirements, changes would have to be made to the retro reserve calculation to accommodate formulaic releases.
  - a. Advantages:
    - (1) Since many companies are currently using the retro reserve requirement as an interim placeholder, this alternative continues the requirement to hold a non-zero interim reserve, which addresses the concerns of those who believe the reserves should be non-zero.
    - (2) Earmarks potential capital (albeit as reserves) until the new RBC standards are finalized.
    - (3) To the extent that the new RBC C-3 Phase II standards produce an RBC requirement exceeding the existing interim factors, this approach avoids the disconnect of releasing reserves and then increasing required RBC later.

- (4) Addresses the concerns raised by those who espouse the second of the three motivations listed in III.B above.
- b. Disadvantages:
- (1) Changes to the retro reserve calculation to accommodate formulaic releases will need to be made, especially if the new RBC C-3 Phase II standards are delayed. This could result in further delays to the guideline and would further increase the complexity of the reserve calculation.
  - (2) Inconsistent with the VAGLB Work Group conclusion that the retro reserve requirement has no theoretical merit, is inconsistent with CARVM, and results in a reserve in excess of the 83<sup>rd</sup> percentile under many scenarios.
  - (3) This alternative may result in higher reserves than the prospective CARVM reserves required by the guideline.
  - (4) LHATF would need to evaluate issues relating to the linkage of AG MMMM language to RBC requirements not yet adopted.
3. Provide both a simplified release mechanism designed to phase-out the retro reserve requirement over a period of time.

Under this alternative, the retro reserve would be calculated without a complete formulaic release mechanism. If the retro reserve is greater than the prospective AG MMMM reserve, hold a weighted average of the two (where the weighting changes over time). As an example, weights might be as follows:

<u>Year</u>	<u>Weight for Retro Reserve</u>	<u>Weight for AG MMMM Reserve</u>
1	100%	0%
2	80	20
3	60	40
4	40	60
5	20	80
6 and greater	0	100

The term “year” above could be based on either policy year or the number of calendar years since AG MMMM adoption. The VAGLB Work Group believes using calendar year for this approach, would be simpler.

- a. Advantages:
- (1) Smooths the transition for companies currently holding the retro reserve requirement by releasing any excess into earnings over several years.
  - (2) Avoids the need to develop complex formulaic releases for the retro reserve requirement.
  - (3) Addresses concerns that the AG MMMM prospective reserve requirement may not produce significant levels of reserves, in the early years of the waiting period. Any additional reserve phases out in later years when the prospective AG MMMM reserve is more responsive to the movements in asset values.

- (4) Provides a “safety net” for a number of years until the new RBC C-3 Phase II requirements are adopted. If necessary, this approach can be combined with alternative #2, which would provide for an earlier full release if the RBC C-3 Phase II standards are adopted.
- b. Disadvantages:
  - (1) If the weightings are applied on a contract-by-contract basis, multiple retro reserves would need to be maintained (as many as five -- one for each issue year), which could further complicate the reserve calculation.
  - (2) Unless this is combined with alternative #2, this alternative makes the retro reserve requirement a feature of the guideline for several years.
  - (3) This release mechanism is crude and is not theoretically correct. For example, the actual benefit type is disregarded in the calculation.
4. Full release of the retro reserve requirement when AG MMMM is adopted by the NAIC. Assuming the guideline has a 12/31/02 effective date, no formulaic release of the retro reserve requirement would be needed under this alternative.
  - a. Advantages:
    - (1) Easy to implement -- no changes to the wording in the current wording of AG MMMM to accommodate a formulaic release.
    - (2) Since many companies are currently using the retro reserve requirement as an interim placeholder, this alternative continues the requirement to hold a non-zero interim reserve until the guideline is adopted.
    - (3) Consistent with the VAGLB Work Group conclusion that the retro reserve requirement has no theoretical merit.
    - (4) Addresses the concerns raised by those who espouse the first of the three motivations listed in III.B above.
  - b. Disadvantages:
    - (1) To the extent that the new RBC C-3 Phase II standards produce an RBC requirement exceeding the existing interim factors, this approach would result in a release of required capital (from the release of the retro reserve) followed by a subsequent additional capital requirement when the new RBC standards become effective.
    - (2) Does not address the concerns of those regulators who prefer a permanent solution.
5. Remove the retro reserve requirement from AG MMMM and request the NAIC RBC Task Force to add the retro requirement to the already existing RBC C-3 requirements until new RBC C-3 Phase II standards become effective. This could be accomplished by requiring an additional C-3 component (above the already existing component) for the excess of the retro reserve requirement over the AG MMMM VAGLB reserve.

a. Advantages:

- (1) More appropriately addresses the concern that led to the retro reserve requirement by earmarking capital until the RBC C-3 Phase II work is finalized.
- (2) To the extent that the new RBC C-3 Phase II standards produce an RBC requirement exceeding the existing interim factors, this approach avoids the disconnection of holding additional reserves now and then increasing required RBC later.
- (3) Avoids the concerns raised in the past over having a retro reserve requirement in AG MMMM (e.g., no theoretical justification, inconsistent with CARVM, results in reserve well in excess of the 83<sup>rd</sup> percentile under most scenarios).

b. Disadvantages:

- (1) This alternative would still require changes to the RBC retro requirement to accommodate formulaic releases, which would further increase the complexity of the calculation (but would not necessarily delay the guideline).
- (2) RBC is calculated at year-end, while reserves are typically calculated quarterly.
- (3) Since LHATF does not have jurisdiction over RBC, it may not be guaranteed that a RBC requirement can be implemented by 12/31/02.

**V. VAGLB PRACTICE NOTE UPDATE**

- A. The VAGLB Work Group is in the process of updating the current Draft VAGLB Practice Note to support changes to AG MMMM.**
  
- B. The final VAGLB Practice Note is expected to be delivered by the March NAIC meeting.**

## **VI. RECOMMENDED NEXT STEPS**

- A. Make changes to AG MMMM to reflect the decisions made on issues discussed in this report.**
- B. Expose revised draft for adoption by LHATF at the March NAIC meeting.**
- C. Update VAGLB Practice Note to reflect the changes in AG MMMM.**
- D. Shift Academy and LHATF emphasis on future guaranteed benefit issues towards pursuing a long-term non-formulaic solution that addresses both reserve and RBC considerations. This step will require a shift in the Academy's Life Practice Council resources towards the C-3 Work Group of the Life Capital Adequacy Subcommittee. The Scope of the project would also be expanded to include other variable product guaranteed benefit projects, including reserves and RBC for variable annuities with fixed percentage death benefits.**

## Appendix A

### Results for Equity Sub-Classes

Fund Class	Weight	Keel Method *		Keel Gross Assumed Cumulative Returns**			
		Mean	Volatility	1 year	2 year	5 year	10 year
<i>Growth &amp; Income</i>	42.1%	11.6%	13.4%	-1.32%	5.04%	33.79%	112.03%
<i>Growth</i>	37.4%	13.1%	14.4%	-0.85%	6.69%	40.98%	138.65%
<i>Aggressive Growth</i>	10.4%	16.0%	18.9%	-2.21%	6.40%	48.03%	178.25%
<u><i>International Equity</i></u>	<u>10.1%</u>	<u>13.0%</u>	<u>13.1%</u>	<u>0.31%</u>	<u>8.36%</u>	<u>44.06%</u>	<u>144.94%</u>
<i>Average Equity***</i>	100.0%	<b>12.9%</b>	<b>14.3%</b>	<b>-0.93%</b>	<b>6.43%</b>	<b>39.89%</b>	<b>134.56%</b>

  

	Average Annual Return**			
	1 year	2 year	5 year	10 year
<i>Growth &amp; Income</i>	-1.32%	2.49%	5.99%	7.80%
<i>Growth</i>	-0.85%	3.29%	7.11%	9.09%
<i>Aggressive Growth</i>	-2.21%	3.15%	8.16%	10.78%
<u><i>International Equity</i></u>	<u>0.31%</u>	<u>4.10%</u>	<u>7.57%</u>	<u>9.37%</u>
<i>Average Equity***</i>	<b>-0.93%</b>	<b>3.17%</b>	<b>6.94%</b>	<b>8.90%</b>

\* Approximation of calibrated fitted lognormal to be used in the Keel Method is based on a 40 year historical database for years 1961-2000

\*\* Based on 83rd percentile.

\*\*\* Equity class currently in AG MMMM

**Comments on 12/01/00 Draft from the American of Actuaries VAGLB Work Group as of 12/06/01.**

The NAIC solicits comments on this draft. Comments should be addressed to Mark Peavy, NAIC, 2301 McGee, Suite 800, Kansas City, Missouri, 64108. E-mail submissions to mpeavy@naic.org are preferred.

**ACTUARIAL GUIDELINE MMMM**

**RESERVES FOR VARIABLE ANNUITIES WITH GUARANTEED LIVING BENEFITS**

I. Introduction

A. Background

The purpose of this Actuarial Guideline is to interpret the standards for the valuation of reserves for Guaranteed Living Benefits included in variable deferred and immediate annuity contracts (VAGLBs). This Guideline codifies the basic interpretation of the Commissioners Annuity Reserve Method (CARVM) by clarifying the assumptions and methodologies that will comply with the intent of the NAIC Model Standard Valuation Law (SVL).

Reserve calculations for VAGLBs shall be performed following the requirements defined in this Guideline, but with reliance on the guidance provided under Actuarial Guideline XXXIII, where appropriate.

This Guideline interprets the standards for applying CARVM to VAGLBs, employing methods that are consistent with the principles of the Variable Annuity Model Regulation (i.e., 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”). It clarifies standards for developing Integrated Benefit Streams, where VAGLBs are integrated with other guaranteed and variable benefits. It also clarifies standards for determining the level of reserves for VAGLBs to be held in the General Account.

The methodology does not address how “base variable annuity reserves” (i.e., reserves for variable annuity contracts ~~with no~~ignoring VAGLBs) should be calculated. Rather, it only addresses the calculation of reserves for VAGLBs to be held in the General Account.

In addition, this Guideline clarifies standards for reserves when the VAGLB risk is reinsured.

Finally, because some contracts with VAGLBs may also have other guaranteed benefits (e.g., minimum guaranteed death benefits), this Guideline ~~presents an approach on how to integrate~~ interprets standards for integrating VAGLBs with other guaranteed benefits within Integrated Benefit Streams.

In many areas of this Guideline, the Valuation Actuary is given the responsibility to determine an appropriate course of action. Where this responsibility is given, the Valuation Actuary should be prepared to justify his or her course of action, where appropriate.

## B. Principles

### 1. Integrated CARVM Reserve Approach

The reserve methodology in this Guideline is based on an integrated CARVM reserve structure, 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.

For variable annuity contracts with more than one type of guaranteed benefit (e.g., VAGLBs and MGDBs), Integrated CARVM reserves should be calculated for the entire contract including all guarantees ~~(i.e., a holistic approach should be used)~~.

~~There are some companies that interpret CARVM differently in~~ In calculating reserves for base variable deferred or immediate ~~annuities.~~ annuities, some companies interpret CARVM differently than others. For example, ~~some companies~~ hold a reserve equal to the account value. Such companies may be able to demonstrate that their reserves meet or exceed the levels ~~set by applying~~ required by this Guideline, and that no additional VAGLB reserves are required. Alternatively, other companies that hold base reserves at a lower level may need to hold an additional VAGLB reserve such that their total reserve is at least equal to the levels set by applying this Guideline. In these situations, the company must determine an appropriate allocation of the total reported reserve between the General and Separate Accounts.

### 2. Impact of VAGLBs on Integrated Benefit Streams

For variable deferred or immediate annuity contracts with VAGLBs, the resulting VAGLB reserve should reflect the potential for benefit amounts in excess of the variable account value. Because companies are required to hold assets in the Separate Account for variable annuity contracts equal to the variable account

value, such excess amounts must be provided by the ~~general account~~General Account. Therefore, VAGLB reserves should be held in the ~~general account~~General Account.

Integrated Benefit Streams reflecting VAGLBs should include streams of projected benefits corresponding to those VAGLBs. Such benefits are measured as the excess of the projected VAGLB amounts over the corresponding projected benefit amounts in the absence of the VAGLB, where both amounts are projected using ~~conservative~~ Separate Account fund return scenarios that will result in a conservative determination of the VAGLB benefits (i.e., tending toward higher benefit costs). These streams are referred to as Net Amounts at Risk in this Guideline.

### 3. Scenarios Used to Project VAGLBs

~~In theory, reserves~~Reserves for VAGLBs ~~could~~can be determined by generating ~~VAGLB contract~~ reserves for each of a large number of stochastically determined fund return scenarios. The resulting reserves would then be ranked from the smallest to the largest, and the reserve held would be the reserve at the 83<sup>1/3</sup><sup>rd</sup> percentile.

~~While this approach has theoretical merit, it~~This approach, however, may be impractical to apply ~~such a stochastic approach~~ to each inforce contract within a CARVM framework. Thus, a methodology allowing fewer scenarios, which constitute a simplified representation of a large number of stochastically determined scenarios, may be used under certain conditions. These “Representative Scenarios” must be tested for appropriateness by comparing, for a sufficient sample of the contracts containing VAGLBs, the reserves resulting from the Representative Scenarios to reserves resulting from stochastically determined scenarios.

The fund return assumptions used to generate the stochastic scenarios should vary by five asset classes in order to reflect the risk/return differentials inherent in each class, and ~~are~~should be based on a distribution of returns that meets calibration criteria designed to ensure that an adequate portion of the distribution resulting in conservative VAGLB benefit costs is represented. In the determination of these stochastic scenarios, the Valuation Actuary must comply with the requirements of this Guideline. Special care is needed in choosing a distribution to generate returns so that no systematic bias is introduced unless it is clearly supported by credible analysis based on historical returns results.

Although the calibration criteria, which is set forth in Appendix V, include calibration points (in the form of fund return accumulation factors) for durations 1, 5, and 10 years, meeting the calibration criteria should be viewed as a necessary but not sufficient condition. It is also important to compare for reasonableness the percentile accumulation factors at other durations with the

calibration points. For example, the accumulation factor for the 16.7<sup>th</sup> percentile at duration 3 should not be as large as the calibration point at duration 5.

Since techniques used to model investment returns are still evolving, the Valuation Actuary has considerable flexibility in choosing the alternative form of the scenario methods (i.e., Stochastic Scenarios, Representative Scenarios, or Keel Method Scenarios) and in the distribution underlying the Stochastic Scenarios. This flexibility allows for a single set of scenarios to be constructed at issue and used in all subsequent valuations. It also allows for the underlying distribution to be changed at a subsequent valuation period.

The guiding principle in using this flexibility is establishing appropriate reserves for the contractual guarantees. A secondary principle is the continuity of results from one valuation period to another. The Valuation Actuary should be prepared to justify the choices that have been made.

For example, the initial use of a conservative approach for administrative ease and the later use of a more refined method as the amount of in-force business grows may be a legitimate use of this flexibility. There may be other instances, however, that are more difficult to justify, such as the introduction of an unusual (e.g., a multi-modal) distribution that materially reduces the level of reserves. Such an approach will call for a more rigorous justification.

#### 4. Level of Reserves

The methodology in this Guideline sets reserves ~~ranked from smallest to largest~~ for VAGLBs at the 83<sup>1</sup>/<sub>3</sub><sup>rd</sup> percentile ~~by considering a broad range of fund return assumptions~~ after ranking, from smallest to largest, the total reserves resulting from stochastically generated future fund return assumptions

#### 5. Impact of Reinsurance on Integrated Benefit Streams

Because some companies reinsure all or a portion of the VAGLB risk, it is appropriate for the VAGLB reserve methodology to address the treatment of reserves for both ceding and assuming companies.

Where a company cedes some or all of the VAGLB risk and is entitled to take reinsurance reserve credit, a reserve net of reinsurance should be calculated. This is accomplished by modifying the Integrated Benefit Streams before reinsurance to reflect:

- a. the payment of future reinsurance premiums as an additional benefit; and
- b. the recovery of future reinsured benefits as a reduction to the VAGLB benefits otherwise payable in the absence of the reinsurance.

Where a direct writing company does not reinsure any portion of the variable annuity other than the VAGLBs, reinsurers will not be able to integrate the VAGLB with other variable annuity contract benefits. In these situations, the reinsurer should hold an Integrated CARVM reserve reflecting both the projected future reinsured VAGLB benefits and the projected future reinsurance premiums. In determining the Integrated Benefit Streams to be used by the reinsurer, the reinsurer should use the same incidence rates for both elective and non-elective benefits as used by the ceding company in its determination of reserves.

Since assuming companies face fund performance risks consistent with the ceding companies, it is appropriate that the projection of future reinsurance benefits and reinsurance premiums be based on fund performance assumptions that are consistent with those used by the direct writer.

## II. Scope

This Guideline applies to variable deferred and immediate annuity contracts that provide one or more guaranteed living benefits (defined below as VAGLBs – Variable Annuity Guaranteed Living Benefits). This Guideline does not apply to those Group Annuity contracts that are not subject to CARVM.

VAGLB designs falling under the scope of this Guideline include, but are not limited to, currently offered provisions commonly referred to as Guaranteed Minimum Accumulation Benefits (GMABs), Guaranteed Minimum Income Benefits (GMIBs), Guaranteed Minimum Withdrawal Benefits (GMWBs), and Guaranteed Payout Annuity Floors (GPAFs).

The actuary should exercise judgment, however, in determining the applicability of the reserve methodology in this Guideline to both current and future VAGLB designs. For example, it may be inappropriate to utilize the methodology for a contract with a VAGLB where the associated Net Amounts at Risk decrease when the underlying funds experience a drop in market value or a period of underperformance. In such case, or for contract benefits to which this guideline does not apply, the Valuation Actuary should nonetheless reflect such benefits in the calculation of the reserve for the contract. Although direct application of this Guideline may not be appropriate, there may be principles of this Guideline that could be utilized for reflecting the benefits in the contract reserve.

## III. Definitions

1. Variable Annuity Guaranteed Living Benefit (VAGLB) is a guaranteed benefit included in a variable deferred or immediate annuity contract providing that:
  - a. One or more guaranteed benefit amounts payable to a living contractholder or living annuitant, under contractually specified conditions (e.g., upon annuitization), if any, will be enhanced should the Projected

Contract Value (as defined below) fall below a given level or fail to achieve certain performance levels; and

- b. Only such guaranteed ~~benefit amounts~~ having the potential to provide benefits whose present value as of the benefit commencement date may exceed the Projected Contract Value, are included in this definition.
2. 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 (e.g., 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.
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 Minimum Withdrawal Benefit (GMWB) is a VAGLB design for which the benefit is contingent on one or more withdrawals from a variable deferred annuity contract. The benefit typically guarantees that a minimum amount will be available to be withdrawn over a term specified in the contract.
5. 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.
6. 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 at points in time other than the beginning and ending dates of the waiting period, if any.
7. Projected Contract Values are the contract values on the valuation date projected into the future, based on a set of Net Assumed Returns earned on the variable fund assets supporting the contract and before the enhancement by any VAGLB. For a variable deferred annuity, the appropriate contract value is typically the account value. For a variable immediate annuity, the appropriate contract values are typically the periodic income benefits provided for in contract. The Valuation Actuary is responsible for determining which contract value or values are appropriate for purposes of calculating the VAGLB reserve.
8. Net Assumed Returns are equal to Gross Assumed Returns less all asset based charges. Gross Assumed Returns may be based on Stochastic Scenarios, Representative Scenarios or the Keel Method Scenario as defined below. For

purposes of determining the Net Assumed Returns, asset based charges include, but are not limited to, M&E mortality and expense charges, asset based administrative and funds charges, and asset based VAGLB (and other guaranteed benefit) charges.

9. Stochastic Scenarios are a large number of stochastically determined sets of future Gross Assumed Returns, which vary by each standardized asset class, assumed to be earned on the variable assets supporting the contract, adhering to the principles and requirements of Section IV.C. VAGLB standardized asset classes are described in Appendix II.
10. Representative Scenarios are sets of future Gross Assumed Returns, which vary for each VAGLB standardized asset class, assumed to be earned on the variable assets supporting the contract. Representative Scenarios may be determined by the Valuation Actuary to represent Stochastic Scenarios in VAGLB reserve calculations. VAGLB standardized asset classes are described in Appendix II.
11. Keel Method Scenario is an optional, standardized single set of future Gross Assumed Returns, which varies for each VAGLB standardized asset class, assumed to be earned on the variable assets supporting the contract. The Keel Method Scenario is based on the “Keel Method” defined in Appendix I below. Under certain “Safe Harbor” criteria, outlined below, in Section IV.E, the Keel Method Scenario may be used as a simplified alternative to Representative Scenarios.
12. Projected Living Benefit Amounts are the contract values on the valuation date projected into the future, based on a set of Net Assumed Returns earned on the variable fund assets supporting the contract and after the enhancement, if any, by any VAGLB. The projection should reflect any specified conditions (e.g., annuitization), extensions and/or limitations, including waiting periods, contractually allowed for, or imposed on, the VAGLB. Elective Contractholder options to reset (e.g., treat all or a portion of the contract account value existing on a particular date after issue as “new premium” for purposes of the VAGLB) or terminate the VAGLB should be reflected in reserve calculations in a manner consistent with that for any other Elective Benefit.
13. Projected Net Amounts at Risk for a VAGLB are benefit streams consisting of the difference between (i) and (ii), where both (i) and (ii) are determined as of the time a benefit which may be enhanced by a VAGLB is assumed to be paid, and where:
  - (i) are the Projected Living Benefit Amount(s) corresponding to the VAGLB; and
  - (ii) are the Projected Contract Value(s) corresponding to (i).

In situations where (i) or (ii) is the present value of a stream of future amounts, such amounts should be discounted using valuation mortality, interest, and any applicable incidence rates required for statutory reserve valuation. For example, for a GMIB, (i) may be the present value of a stream of income benefits determined by applying an annuity purchase rate to the projected contract value at the end of a waiting period enhanced by the VAGLB and (ii) may be the corresponding projected contract value, also at the end of the same waiting period, ignoring the VAGLB.

The Projected Net Amounts at Risk may be positive or negative.

14. Projected Base Contract Values are the contract values on the valuation date, projected into the future using a return based on valuation rate(s) less asset based charges appropriate for this purpose. For a variable deferred annuity, the appropriate contract value is typically the account value. For a variable immediate annuity the appropriate contract values are typically the periodic income benefits provided for in the contract. The Valuation Actuary is responsible for determining which contract value or values are appropriate for purposes of calculating the VAGLB reserve.
15. Base Benefit Streams are streams of projected benefit amounts available under the contract (including any ancillary benefits, riders or non-VAGLB guarantees, such as Minimum Guaranteed Death Benefits), reflecting the Projected Base Contract Values, and ignoring any VAGLBs.
16. 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.
17. 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.
18. Accumulation Factor for a year is equal to the product of factors for that year and each preceding year, with the factor for a given year equal to one plus the Gross Assumed Return for the year.
19. Calibration Points are the maximum or minimum Accumulation Factors that the statistical distribution of Gross Assumed Returns, chosen by the Valuation Actuary as the Stochastic Scenarios, must meet at certain percentiles and over certain time periods in order to satisfy the calibration criteria specified in Appendix V.

#### IV. Text

## A. VAGLB Reserve Methodology

The 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 VAGLBs, 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 VAGLBs. It equals the greatest present value of future Integrated Benefit Streams, which includes should consider, but may or may not include, VAGLBs available under the terms of the contract.

Integrated Benefit Streams that include VAGLBs should integrate those VAGLBs 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 Amounts at Risk assumed to be paid to those projected to receive VAGLBs during the Calculation Period reflected in the Integrated Benefit Stream using any applicable incidence rates required for statutory reserve valuation.
- Y is the Projected Base Contract Values underlying the Base Benefit Stream provided during the Calculation Period for the corresponding benefit stream structure in X.

The Valuation Actuary is responsible for assuring that consistent types of contract values are used in X and Y. For example, where the Projected Net Amounts at Risk in X are based on account value, Y should also be based on account value.

## B. Net Assumed Returns

As described in Section III, Projected Net Amounts at Risk are determined, in part, by projecting the variable fund assets supporting the contract on the valuation date using Net Assumed Returns, as defined in Section III.

The Net Assumed Returns may reflect returns over various lengths of time, and may include portions of full years (including periods less than one year).

The portion of the contract allocated to any fixed account options on the valuation date should use a Net Assumed Return equal to the guaranteed rate(s).

The portion of the variable fund assets allocated to each Separate Account asset class may be projected separately, using the Net Assumed Returns for each standardized asset class, with the results being added together.

To accomplish this, the Separate Account funds supporting the variable annuity contracts on the valuation date should be allocated to the following five VAGLB standardized asset classes:

- Equity Class
- Bond Class
- Balanced Class
- Money Market Class
- Specialty Class

Alternatively, the Valuation Actuary may deem it appropriate to average the Net Assumed Returns for each of the VAGLB standardized asset classes listed above (weighted by the percentage of assets in each class) and project the entire portion of the variable fund assets. This will produce results similar to what would be obtained if one assumes that the contractholder rebalances the variable fund assets among the Separate Account asset classes to maintain the same proportional distribution at future intervals as exists on the valuation date.

Descriptions of the VAGLB standardized asset classes listed above are contained in Appendix II. Since these descriptions are broad in nature, the ultimate determination of the appropriate fund classifications, for purposes of this Guideline, is the responsibility of the Valuation Actuary.

#### C. Stochastic Scenarios

In calculating VAGLB reserves the Valuation Actuary may choose to generate ~~VAGLB reserves~~ Integrated Reserves for each of a large number of stochastically determined Net Assumed Return scenarios. The Integrated Reserves resulting ~~reserves~~ from each scenario would then be ranked from the smallest to the largest, and the Integrated reserve Reserve held would be the reserve at the 83<sup>1/3</sup>~~rd~~ percentile. This ranking can be done on a contract-by-contract basis or by first aggregating the Integrated Reserve for each scenario for groups of contracts and then performing the ranking.

For the purposes of this Section, VAGLB reserves shall mean the “solved for” VAGLB reserves calculated for the entire contract as the excess, if any, of the Integrated Reserve including the VAGLBs, over the CARVM reserve ignoring the VAGLBs.

For purposes of calculating ~~VAGLB~~ reserves using Stochastic Scenarios:

- The distribution of Stochastic Scenarios must satisfy the calibration criteria specified in Appendix V.
- Stochastic Scenarios must be determined using a Lognormal distribution of fund values (i.e., the fund performance for a specified period of time must be determined using a Normal distribution), based on the mean returns and standard deviations for the five A different set of Stochastic Scenarios may be used for each VAGLB standardized asset ~~classes shown in class,~~ but the development of the Stochastic Scenarios must reflect 100% correlation between the Equity, Balanced, and Specialty asset classes. The required 100% correlation will ensure consistency of movement, for Appendix I these three asset classes, in assumed returns from one time period to another in the Stochastic Scenarios.

For example, if returns for the Equity class are assumed to change by a given amount over a period, then returns for the Balanced class and the Specialty class should also be assumed to change in a manner consistent with the relationship between the statistical distributions underlying the respective class returns (e.g., relatively large returns from one distribution correspond to relatively large returns in the other distributions over the same time period).

- The Valuation Actuary is responsible for determining the number of Stochastic Scenarios to be used that reflect the risk profile of the underlying VAGLB. In most cases, a minimum of 1,000 scenarios is needed.
- To be considered appropriate for the uses contemplated by this Guideline, Stochastic Scenarios developed as described in this Section must adhere to the principles expressed in this Guideline.

- The Valuation Actuary must maintain documentation on file for the work performed to meet the requirements of this Section, including but not limited to:
  - (i) a description of the statistical distribution or other method used to generate scenarios;
  - (ii) work papers or documents supporting that the requirements of Appendix V have been met; and
  - (iii) justification for any changes made to the scenarios used.
- The Valuation Actuary must monitor all pertinent emerging factors over time to ensure that the requirements of this Section continue to be met.

#### D. Representative Scenarios

As an alternative to generating ~~VAGLB reserves~~ Integrated Reserves for each of a large number of Stochastic Scenarios, the Valuation Actuary may choose to determine VAGLB reserves using the weighted average of ~~VAGLB reserves~~ Integrated Reserves generated for each of a suitable number of Representative Scenarios. The Valuation Actuary must determine these Representative Scenarios, along with the appropriate weightings for each scenario.

For Representative Scenarios to be used, the Valuation Actuary must:

1. Annually certify that the Representative Scenarios chosen and the weighting chosen for each scenario are appropriate. Such certification shall be based on the comparison described in 2(iii) below and be submitted with the annual statutory financial statement filed with the appropriate regulatory official in each state-jurisdiction. A sample certification is shown in Appendix IV.

The certification should be given the same confidentiality status as the Actuarial Memorandum filed as required by the NAIC Model Actuarial Opinion and Memorandum Regulation.

2. Maintain documentation on file for the work performed to meet the requirements of this Section, including but not limited to:
  - (i) a description of the Representative Scenarios used;

- (ii) the methodology by which the Representative Scenarios were determined or redetermined; and
- (iii) a comparison of VAGLB reserves resulting from the Representative Scenarios with the VAGLB reserves resulting from Stochastic Scenarios for ~~a sample of contracts,~~ modeled key assumption points, as described below.

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

For the above certification, Representative Scenarios are considered appropriate if, for an actual or anticipated block of variable annuity contracts with VAGLBs, (a) is not materially less than (b), where:

- (a) equals the VAGLB reserve based on the weighted average of the VAGLB reserves determined for each Representative Scenario; and
- (b) equals the VAGLB reserve based on the 83<sup>1/3</sup><sup>rd</sup> percentile of the VAGLB reserves determined by the Stochastic Scenarios (“Benchmark Reserves”) ranked from smallest to largest.

For the purposes of this Section, VAGLB reserves shall mean the “solved for” VAGLB ~~Reserves~~ reserves calculated for the entire contract as the excess, if any, of the ~~CARVM reserve~~ Integrated Reserve including the VAGLBs, over the CARVM reserve ignoring the VAGLBs.

The Stochastic Scenarios used in this comparison must adhere to the principles and requirements of Section IV.C

In practice, the appropriateness of 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, considering possible changes over time, and

- Contract 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).

For each combination of key assumptions, the VAGLB reserves resulting from the Stochastic Scenarios are ranked from smallest to largest and the VAGLB reserve resulting from the Representative Scenarios is compared to the ranked Benchmark Reserves to determine its percentile ranking. The Representative Scenarios are considered appropriate if the resulting VAGLB reserves are not materially less than the 83<sup>1/3</sup><sup>rd</sup> percentile of the ranked Benchmark Reserves.

To the extent that, in the judgement of the Valuation Actuary, actual experience varies materially from such modeled key assumptions, the Representative Scenarios may need to be redetermined.

#### E. Keel Method Scenario

If the criteria described in this ~~section~~[Section](#) are met, the Valuation Actuary may use the Keel Method Scenario as a simplified alternative to Representative Scenarios without following the requirements of Section D. For purposes of this Guideline, this approach is referred to as the “Safe Harbor.”

For a contract to qualify for the Safe Harbor, the following requirements must be satisfied on a contract level basis:

1. The only VAGLB designs that may be included in the contract are GMABs, GMIBs, GMWBs, or GPAFs. ~~(Note—Further VAGLB work group analysis is required on GMWBs and GPAFs before these conclusions should be finalized.) Lauren was curious as to if this was supposed to be included in the document~~
2. 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 premiums are 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 amounts 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 amounts described above.

3. VAGLBs may be available on more than one date.
4. 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).
5. 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).

~~For~~ **Only for** purposes of determining whether a contract meets the above criteria:

1. The impact on VAGLB guaranteed benefit amounts of any contractholder bonus arrangements must be considered (e.g., such arrangements must not result in the guaranteed benefits being path dependent),
2. The impact on VAGLB guaranteed benefit amounts 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
3. The possibility of future market value adjustments to contract values, and contractholder options to cancel a VAGLB benefit (and thereby avoid future charges), need not be considered.

Appendix III gives examples of various VAGLB designs that fit the Safe Harbor criteria and gives reasons why some other designs do not.

Since the use of the Keel Method Scenario is optional, the Valuation Actuary may alternatively elect to meet the **Stochastic Scenario requirements in Section IV.C or the Representative Scenario requirements in Section ~~V~~IV.D** for VAGLBs that meet the Safe Harbor requirements.

Similarly, some VAGLB designs may not meet the Safe Harbor requirements, but **the Valuation Actuary** may be able to demonstrate that the use of the Keel Method Scenario meets the requirements of Section **~~V~~IV.D**. In this case, the Keel Method Scenario may be used, but all requirements (including providing the actuarial certification) must be met.

## F. 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 Stream as described in Section [A above IV.A](#). The valuation interest rates used for both the Separate Account Reserve and the Integrated Reserve should be annuity valuation interest rates, consistent with those required in the SVL, as interpreted by Actuarial Guideline XXXIII.

For the portion of the Integrated Benefit Stream represented by Benefit Stream Y, the valuation interest rates are those otherwise applicable to deferred [or immediate](#) variable annuities in the absence of the guarantee.

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 Net Amounts at Risk should be considered.

## G. Reinsurance Reserves

This [subsection](#) addresses the treatment of reserves and reserve credits where all or a portion of the VAGLB is reinsured and it is appropriate for the ceding company to take such reserve credit. This methodology applies to most forms of reinsurance, such as coinsurance, modified coinsurance and risk premium reinsurance, where the ceding company reinsures a significant portion of the VAGLB risk on a proportional basis. Adjustments may need to be made to the reserve credit taken by ceding companies and the reserves calculated by assuming companies where the underlying reinsurance treaty contains non-proportional elements. In addition, the calculation methods and assumptions used by both the ceding and assuming companies should be consistent.

### 1. Reinsurance Ceded

For contracts where some or all of the VAGLB is reinsured, an Integrated Reserve net of reinsurance must be calculated. This reserve should be calculated as outlined in Section [IV.A](#), with the Integrated Benefit Streams being modified to reflect both the payment of future reinsurance premiums and the recovery of future reinsured benefits. This is accomplished by treating the future reinsurance premium as an additional benefit, and reducing the VAGLBs in the benefit stream of the Integrated Reserve calculation by future reinsurance recoveries.

Similar to the method described in Section [IV.A](#), the determination of future Integrated Benefit Streams including reinsurance is accomplished by combining three separate benefit streams: X<sup>T</sup>, Y and Z, described

below. These Integrated Benefit Streams are determined over all Calculation Periods, and are discounted at the valuation interest and mortality.

- $X^I$  is the stream of Projected Net Amounts at Risk assumed to be paid to those projected to receive VAGLBs during the Calculation Period reflected in the Integrated Benefit Stream. It is equal to benefit stream X defined in Section [IV.A](#), reduced by future Projected Net Amounts at Risk reinsurance recoveries.
- Y is as defined in Section [IV.A](#).
- Z is the stream of future projected reinsurance gross premiums during the Calculation Period, determined using Projected Contract Values.

The Valuation Actuary is responsible for assuring that consistent contract values are used in all three benefit streams.

The greatest present value occurs where the present value of the Integrated Benefit Streams, net of reinsurance, is maximized. This Integrated Benefit Stream does not necessarily have to ~~reflect~~occur during the same Calculation Period as the one that maximizes the Integrated Benefit Streams before consideration of reinsurance.

Where it is appropriate for the ceding company to take reinsurance reserve credit, such credit should equal the difference between the Integrated Reserve before any consideration of reinsurance and the Integrated Reserve net of reinsurance. The Integrated Reserve net of reinsurance may be greater than the Integrated Reserve before any consideration of reinsurance (i.e., the reserve credit may be negative).

## 2. Reinsurance Assumed

For companies where VAGLB risk is assumed, an Integrated Reserve must be calculated using the methodology outlined in Section [IV.A](#). The reserve should equal the maximum difference, at each Calculation Period, between the present value of projected reinsured benefits and the present value of projected reinsurance premiums. The reinsurer should use the same ~~utilization assumptions~~incidence rates for both elective and nonelective benefits as used by the ceding company in its determination of the Integrated Reserve net of reinsurance.

The projection of future reinsurance premiums and benefits should be based upon Net Assumed Returns, using the requirements outlined above for Integrated Reserves before ~~reinsurance (i.e., the Net Assumed Returns may be based on~~reinsurance, ~~Stochastic Scenarios, Representative~~

~~Scenarios or the Keel Method Scenario), and must comply with the applicable requirements of Sections C, D, and E. IV.C, IV.D, and IV.E. The principle of consistent fund performance assumptions does not preclude the assuming company from using a different scenario method (i.e., Stochastic Scenarios, Representative Scenarios, or the Keel Method Scenario) or underlying stochastic return distribution than the ceding company.~~

Referring to the formulas above, the stream of reinsured VAGLBs is the difference between Benefit Stream  $X^I$  and Benefit Stream  $X$ , while Benefit Stream  $Z$  represents the stream of reinsurance premiums defined above. Each of these streams is discounted using valuation mortality and interest assumptions consistent with those used by the ceding company.

The greatest present value occurs in the Calculation Period in which the difference between the present value of the reinsured benefits and the present value of reinsurance premiums is maximized. This Calculation Period does not necessarily have to be the same as the Calculation Period which maximizes the ceding company's Integrated Reserve, either before or after consideration of reinsurance.

#### H. Reserves for Contracts with VAGLBs and Other Guaranteed Benefits

~~For variable annuity contracts that contain both VAGLBs and For VAGLB contracts with for variable annuity contracts with more than one type of guaranteed benefit should be calculated using a holistic approach (i.e., Integrated CARVM reserves for the entire contract including all guarantees should be held).~~ other types of guaranteed benefits, reserves should be based on the Integrated CARVM reserve, for the entire contract, that includes all the guarantees. 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~~ Integrated CARVM reserve for the entire contract including all guaranteed benefits; and
- (b) equals the reserve held in the absence of all guaranteed benefits.

Actuarial judgment may also be needed if it is necessary to split up the "solved for" guaranteed benefit reserve into reserve components for each guaranteed benefit.

Where a company reinsures one or more of the guaranteed benefits, reserves net of reinsurance should reflect the methodology in Section IV.G, where applicable.

~~The~~For example, the calculation of reserves for variable annuity contracts that include both VAGLBs and Minimum Guaranteed Death Benefits (MGDBs) involves 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 in the General Account for the VAGLBs and the MGDBs equals the excess of the Integrated Reserve over the Separate Account Reserve, but is not less than zero.

The Integrated Reserve in this example is a CARVM reserve determined considering all contract benefits, including streams involving ~~VAGLBs (subject to this Guideline)~~VAGLBs, where the benefits are projected using the principles of this Guideline, and streams involving MGDBs, where the benefits are projected using guidance applicable to MGDBs ~~(currently subject to~~(e.g., Actuarial Guideline XXXIV). It equals the greatest present value of these and any other future Integrated Benefit Streams available under the terms of the contract.

In the case where guidance for projecting guaranteed benefits does not exist (e.g., VAGLBs that do not fall under the scope of this Guideline), the Valuation Actuary should nonetheless consider such benefits in the calculation of reserves for the contract. In this situation, the Valuation Actuary is responsible for demonstrating that the reserve held is appropriate for the risks of the benefits offered.

#### I. Minimum Reserve

~~Reserves for a company's VAGLB business shall be no less than accumulated fund charges for the benefit. In the event that there are no charges, a charge should be imputed. In either case, the company should be prepared to demonstrate that the reserve is reasonable, appropriate and adequate under moderately adverse conditions.~~

[Note: this subsection needs to be modified based on the direction LHATF decides to take regarding the Minimum Reserve.]

#### J. Effective Date

This Guideline affects all contracts issued on or after January 1, 1981. Where the application of this Guideline produces higher reserves than the company had otherwise established by their previously used interpretation, such company must comply with this Guideline effective December 31, 200~~2~~4. However, such company may request a grade in period, of not to exceed ~~three-two~~ (23) 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.

Appendix I – Determination of Keel Method Scenarios - Methodology

Keel Method returns are determined using the following formula:

$$Index_t = Index_{t-s} \times e^{\mu s + N\sigma \sqrt{s}}$$

- Where:
- Index<sub>t</sub> = the index at time t
  - μ = Mean Gross Assumed Return (as shown in table below)
  - σ = ~~Cost~~Gross Assumed Fund Return Volatility (as shown in table below)
  - s = period in years between t-s and t
  - N = 16.67<sup>th</sup> percentile of the Cumulative Normal distribution, equals -0.9674

<u>Asset Class</u>	<u>Mean Gross Assumed Return</u>	<u>Gross Assumed Return Volatility</u>
Equity	13.20%	12.70%
Bond	9.10%	7.10%
Balanced	11.00%	9.50%
Money Market	7.50%	2.70%
Specialty	12.00%	13.00%

<u>Asset Class</u>	<u>Mean Gross Assumed Return</u>	<u>Gross Assumed Return Volatility</u>
Equity	12.9%	14.3%
Bond	8.8%	6.9%
Balanced	10.9%	10.2%
Money Market	5.2%	2.4%
Specialty	11.7%	13.6%

Annual returns corresponding to the above Gross Assumed Returns and Gross Assumed Return Volatilities are shown in the following table:

<b>Gross Assumed Annual Returns *</b>					
<b>Year</b>	<b>Equity</b>	<b>Bond</b>	<b>Balanced</b>	<b>Money Market</b>	<b>Specialty</b>
0.08	-2.84%	-1.18%	-1.90%	-0.24%	-2.75%
0.5	-3.28%	-0.32%	-1.52%	0.96%	-3.39%
1	-0.93%	2.15%	1.04%	2.92%	-1.45%
2	7.43%	6.22%	7.05%	4.33%	6.45%
3	8.88%	6.91%	8.07%	4.56%	7.81%
4	9.63%	7.26%	8.61%	4.68%	8.52%
5	10.11%	7.49%	8.95%	4.76%	8.97%
6	10.46%	7.65%	9.19%	4.82%	9.30%
7	10.72%	7.78%	9.38%	4.86%	9.55%
8	10.93%	7.88%	9.52%	4.89%	9.74%
9	11.10%	7.96%	9.64%	4.92%	9.90%
10	11.24%	8.02%	9.74%	4.94%	10.04%

<u>Year</u>	<u>Equity</u>	<u>Bond</u>	<u>Balanced</u>	<u>Money Market</u>	<u>Specialty</u>
.08	-2.42%	-1.22%	-1.72%	-0.13%	-2.60%
.5	-2.07%	-0.31%	-0.99%	1.92%	-2.85%
1	-0.92%	2.26%	-1.83%	5.01%	-0.57%
2	8.45%	6.45%	7.46%	6.63%	7.03%
3	9.74%	7.16%	8.41%	6.90%	8.33%
4	10.42%	7.53%	8.91%	7.04%	9.01%
5	10.85%	7.77%	9.23%	7.13%	9.45%
6	11.16%	7.93%	9.46%	7.19%	9.76%
7	11.39%	8.06%	9.63%	7.24%	10.00%
8	11.58%	8.16%	9.77%	7.28%	10.19%
9	11.73%	8.24%	9.88%	7.31%	10.34%
10	11.86%	8.31%	9.98%	7.33%	10.47%

\* For years less than 1, a cumulative return is used for the appropriate duration.

## 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 GMIB (that otherwise meets the Safe Harbor criteria) with a variable annuitization option, where the Assumed Investment Return is specified and is fixed, would meet the Safe Harbor criteria. A GMIB with a variable annuitization option that includes a GPAF would not.
7. A GMAB or GMIB with a guarantee of 125% of net premiums accumulated at 5% would be acceptable.
8. 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.
9. 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.
10. A 10 year GMAB ~~roll-up benefit~~ based on net premiums accumulated at 3% and a 20 year GMIB ~~roll-up benefit~~ based on net premiums accumulated at 3% in the same contract would meet the Safe Harbor criteria.

11. A 10 year GMAB ~~roll-up benefit~~ based on net premiums accumulated at 3% 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.
12. 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.
13. 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.
14. 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~~**IV** REQUIREMENTS

I, (state name and professional designation) am the appointed actuary for (company name). This certification, made under the requirements of Actuarial Guideline MMMM 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 Benchmark Reserves. 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~~**Section IV** of Actuarial Guideline MMMM [insert Guideline number here] 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).

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(Name of actuary)

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(Signature of actuary)

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(Date of Certification)

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## Appendix V – Calibration Criteria

For each of the Stochastic Scenarios, an Accumulation Factor, based on Gross Assumed Returns, should be determined at durations 1, 5 and 10. These Accumulation Factors should, for each VAGLB standardized asset class and duration, be ranked from smallest to largest. The 16.7<sup>th</sup> and 83.3<sup>rd</sup> percentiles of the ranked values for each VAGLB standardized asset class and duration should comply with the appropriate calibration point criteria.

(Note: In this Guideline, there are references to establishing reserves at the 83<sup>1/3</sup><sup>rd</sup> percentile, which represents a certain level of conservatism. If reserves are set at lower percentiles they are lower, or less conservative, and if set at higher percentiles, they are higher, or more conservative. The Accumulation Factors, however, measure the overall increase in asset value over a period of time represented by a stochastic scenario. Therefore, for those VAGLBs that involve a guarantee of minimum asset performance, lower Accumulation Factors, such as those that occur at the 16.7<sup>th</sup> percentile, represent a more conservative requirement than those that occur at higher percentiles, such as the 83.3<sup>rd</sup> percentile, do.)

Under the calibration point criteria, the ranked Accumulation Factors determined above should satisfy the calibration values shown in Table 1. The Accumulation Factors at the 16.7<sup>th</sup> percentile for the statistical distribution must be less than or equal to the calibration values. These represent periods of under-performance. Except as noted below, the Accumulation Factors at the 83.3<sup>rd</sup> percentile must be at least as large as the calibration values. These represent periods of over-performance.

For contracts that qualify for the Safe Harbor under the criteria of Section IV.D, it is not necessary for the distribution of the Stochastic Scenarios to meet the calibration criteria at the 83.3<sup>rd</sup> percentile. Note that this would only occur if the Keel Method scenarios were not being used.

<b>Table 1 - Calibration Points</b>			
		<b>Accumulation Factors</b>	
<b>VAGLB Standardized</b>		<b>16.7<sup>th</sup> Percentile</b>	<b>83.3<sup>th</sup> Percentile</b>
<b>Asset Class</b>	<b>Duration</b>	<b>Maximum</b>	<b>Minimum</b>
<b>Equity</b>	<b>1</b>	<u>1.005</u>	<u>1.315</u>
	<b>5</b>	<u>1.401</u>	<u>2.709</u>
	<b>10</b>	<u>2.387</u>	<u>6.114</u>
<b>Bond</b>	<b>1</b>	<u>1.040</u>	<u>1.145</u>
	<b>5</b>	<u>1.355</u>	<u>1.736</u>
	<b>10</b>	<u>1.953</u>	<u>2.824</u>
<b>Balanced</b>	<b>1</b>	<u>1.024</u>	<u>1.219</u>
	<b>5</b>	<u>1.400</u>	<u>2.107</u>
	<b>10</b>	<u>2.180</u>	<u>3.954</u>
<b>Money Market</b>	<b>1</b>	<u>1.043</u>	<u>1.068</u>
	<b>5</b>	<u>1.242</u>	<u>1.371</u>
	<b>10</b>	<u>1.567</u>	<u>1.824</u>
<b>Specialty</b>	<b>1</b>	<u>0.997</u>	<u>1.282</u>
	<b>5</b>	<u>1.340</u>	<u>2.465</u>
	<b>10</b>	<u>2.137</u>	<u>5.094</u>

A different process or distribution may be used for each VAGLB standardized asset class subject to the correlation requirements of Section IV.C of this Guideline. Except for distributions for which scenario rates depend on rates for prior time periods, such as with mean reversion, a single set of Stochastic Scenarios may be established at issue and used thereafter.