AMERICAN ACADEMY of ACTUARIES

Report of the American Academy of Actuaries VAGLB Work Group Presented to the NAIC's Life and Health Actuarial Task Force September, 2001

The American Academy of Actuaries is the public policy organization for actuaries practicing in all specialties within the United States. A major purpose of the Academy is to act as the public information organization for the profession. The Academy is non-partisan and assists the public policy process through the presentation of clear and objective actuarial analysis. The Academy regularly prepares testimony for Congress, provides information to federal elected officials, comments on proposed federal regulations, and works closely with state officials on issues related to insurance. The Academy also develops and upholds actuarial standards of conduct, qualification and practice and the Code of Professional Conduct for all actuaries practicing in the United States.

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.

Stephen J. Preston, F.S.A., M.A.A.A., Co-Chair

Thomas A. Campbell, F.S.A., M.A.A.A., Co-Chair

James E. Backus, F.S.A., M.A.A.A.

Robert A. Brown , F.S.A, M.A.A.A.

Franklin C. Clapper, Jr., F.S.A., M.A.A.A.

Larry M. Gorski, F.S.A., M.A.A.A.

Timothy Hill, F.S.A., M.A.A.A.

John O'Sullivan, F.S.A., M.A.A.A.

Timothy J. Ruark, F.S.A., M.A.A.A.

Stephen A. Steinberg, F.S.A., M.A.A.A.

Jan C. Brown, F.S.A., M.A.A.A.

Donna R. Claire, F.S.A., M.A.A.A

Robert A. Conover, F.S.A., M.A.A.A.

James P. Greaton, F.S.A., M.A.A.A.

James Lamson, F.S.A., M.A.A.A.

Timothy C. Pfeifer, F.S.A., M.A.A.A.

Vinaya K. Sharma, F.S.A., M.A.A.A.

Jonathan L. Wooley, F.S.A., M.A.A.A.

Table of Contents

I. INTRODUCTION

1. Conclusions Reached at June Meeting

a) The Academy's VAGLB Work Group (work group) concluded that there is no single stochastic distribution model for underlying fund returns that would optimally address both the issue of fit to empirical results and simplicity of implementation.

b) Therefore, the work group recommended that the valuation actuary be able to choose a stochastic distribution model subject to a set of "calibration points".

c) Under this approach, "calibration points" represent a set of accumulation factors that act as a benchmark in determining whether a stochastic distribution has sufficient fatness of tails.

2. Next Steps Recommended at June Meeting

a) For the Stochastic Method and Representative Methods outlined in Actuarial Guideline MMMM (AG MMMM), a set of calibration points would be generated for each fund class. The Regime Switching Lognormal (RSLN) distribution was proposed as the starting point, with suitable adjustments as necessary.

b) The work group would pursue a simplified alternative, such as the Keel Method scenario, for benefit designs that meet certain "safe harbor" criteria.

c) Modify Draft Actuarial Guideline MMMM as appropriate

(1) Make changes as needed to reflect the calibration methodology described above.

(2) Remove retrospective floor "placeholder", to reflect the completion of the theoretical work by the work group.

(3) Recommend timely adoption of AG MMMM to provide an interim solution.

d) Continue to work with the Academy's Life Risk Based-Capital (RBC) Committee to pursue a long-term non-formulaic VAGLB solution that addresses both reserve and RBC considerations.

3. Steps completed by the work group since the June Meeting

a) Created a set of calibration points to be used for the Stochastic Method and Representative Methods outlined in AG MMMM.

b) Modified the parameters used in the Keel Method scenario so they will meet the calibration points developed for the Stochastic Scenarios and the Representative Scenarios.

c) Modified draft AG MMMM by making changes as needed to reflect the calibration methodology described above.

d) Continued to work with the Academy's RBC Committee to pursue a long-term non-formulaic VAGLB solution that addresses both reserve and RBC considerations.

II. GENERATION OF CALIBRATION POINTS

1. **Scope of Products to be included in AG MMMM**

   a) The original intent of AG MMMM was to cover VAGLBs that contain "left tail risk" (i.e., VAGLBs producing guaranteed benefits in the event of market underperformance).

   b) The work group has discussed whether the scope of AG MMMM should be expanded to include products that contain "right tail risk" (i.e., VAGLBs producing guaranteed benefits in the event of market overperformance).

   c) In theory, VAGLBs may have "left tail risk" only (e.g., VAGLBs with rollup features), both "left tail risk" and "right tail risk" (e.g., VAGLBs with ratchet features), or "right tail risk" only.

   d) Work Group Recommendations

      (1) Products with any "left tail risk" (including products with both "left tail risk" and "right tail risk") are subject to AG MMMM.

      (2) Products which have only "right tail risk" are beyond the scope of AG MMMM

         (a) While such products could exist in the future, the work group is unaware of any currently offered in the marketplace.

         (b) Adding products with only "right tail risk" could add considerable complexity to the guideline.

         (c) Adding products with only "right tail risk" has the potential to significantly delay the adoption of AG MMMM.

      (3) Add language to AG MMMM clarifying that the exclusion of "right tail risk" products does not imply that reserves are not required.

2. **Number of calibration points for Stochastic Scenarios and Representative Scenarios**

   a) Draft AG MMMM provides a framework for 3 methodologies to determine fund return scenarios used to project VAGLB costs:

      (1) Stochastic Scenarios – a large number of stochastically determined sets of future gross assumed returns.

      (2) Representative Scenarios – optional sets of future gross assumed returns, determined by the valuation actuary to represent Stochastic Scenarios in VAGLB reserve calculations.

      (3) Keel Method Scenario – an optional, standardized simple set of future gross returns. Under certain "safe harbor" criteria, the Keel Method scenario may be used as a simplified alternative to Representative Scenarios.

b) This section deals with just the Stochastic and Representative Scenarios. The Keel Method is discussed in Section 4.

c) Calibration points were determined for both the left tail (at the 16.7th percentile) and the right tail (83.3rd percentile) by duration. (Note that calibration points at the 16.7th percentile are lower than calibration points at the 83.3rd percentile, whereas the opposite relationship occurs for VAGLB reserves.)

(1) Left – Right Tail (16.7th and 83.3rd Percentiles)

(a) The work group concluded that products which meet the "safe harbor" criteria, do not have "right tail risk", therefore the distribution of the Stochastic Scenarios chosen need only meet the left tail (16.7th percentile) calibration points.

(b) The work group also concluded that products which do not meet the "safe harbor" criteria, such as path dependent designed products (e.g., ratchets) must use Stochastic Scenarios with a distribution which meets both the left tail (16.7th percentile) and right tail (83.3rd percentile) calibration points.

(2) Calibration point durations

(a) Calibration point durations are the periods in which accumulation factors generated by the distribution of stochastic scenarios are checked against calibration points for determining the reasonableness of the tails.

(b) The work group recommends that 1, 5, and 10-year durations be required.

(c) While it may be appropriate to only require the use of calibration points for guaranteed living benefits "n" years from the valuation date, the work group recommends that (for practical purposes), the distribution of the Stochastic Scenarios chosen by the valuation actuary must meet all the calibration points at all three durations.

(d) Adding calibration points for other durations would increase the complexity of the calibration process, while having no material impact on the results.

(e) The work group has proposed language to be added to the "Principles" section of AG MMMM that requires consistency of durations not covered by the calibration points.

3. **Determination of Calibration Points**

a) The work group's June report analyzed several stochastic distributions for fund returns:

(1) Independent Lognormal (ILN) – "text book" two parameter model. This distribution was rejected for poor fit within the tails of the distribution compared to the empirical data.

(2) Regime Switching Lognormal (RSLN) – lognormal distribution where the returns and volatility vary based on movement between two "regimes" (e.g., in either a "typical" or a "volatile" return period). This 6 parameter distribution, which is

more complex than the independent lognormal, is generally believed to have the capability to produce a better fit than the independent lognormal.

(3) Stochastic Log Volatility & Drift Lognormal (SLV&D) – the continuous analogue of the RSLD model (i.e., infinitely many regimes), with separate but correlated stochastic mean reverting processes for both drift and log volatility. This distribution, which has the capability to produce an excellent fit to the empirical data, has 9 parameters which are extremely difficult to determine, ideally requiring daily return data for a monthly model.

(4) Statistical Sampling with replacement - although not a distribution, statistical sampling with replacement, using the empirical monthly returns, was used as another representative for determining calibration points.

b) Proposed calibration points are shown in Exhibit A.

(1) The proposed calibration points were chosen with two different objectives in mind:

(a) Create calibration points that do not give full credibility to any single distribution.

(b) Create calibration criteria that a RSLN distribution would be able to meet.

(2) Therefore, the proposed calibration points were determined as follows:

(a) The proposed calibration points for the 16.7^{th} percentile were calculated as the greater of RSLN and the average of the stochastic distributions (i.e., RSLN, SLV&D, and statistical sampling) rounded up to the nearest .005.

(b) The proposed calibration points for the 83.3^{rd} percentile were calculated as the lesser of RSLN and the average of the stochastic distributions rounded down to the nearest .005.

4. **Keel Method Simplification**

a) The work group proposes that a modified Keel Method be used with the same safe harbor criteria in draft AG MMMM.

b) The work group also recommends that a "fitted" Independent Lognormal Distribution should be used.

c) The ILN distribution is "fitted" in that a fund class volatility is solved for such that the resulting accumulation factors, using the Independent Lognormal Distribution, will meet the "left tail" calibration criteria.

d) The resulting Keel-based volatilities are higher than those based upon an Independent Lognormal Distribution with parameters generated from the empirical data.

e) Appendix I of AG MMMM reflects the updated parameters of the "fitted" Independent Lognormal Distribution based on the 40-year historical return database.

III. OTHER ISSUES

1. **Money Market Asset Class in AG MMMM – Fund Return Assumptions**

   a) As discussed at the June LHATF meeting, a 40-year historical fund return database was used in AG MMMM. This approach recognizes that there are daily fluctuations in the underlying funds, so the focus is more on a long-term historical return approach.

   b) Some concern was expressed that the current level of money market fund returns are lower than the historical returns underlying the requirements in AG MMMM.

   c) While Money Market funds have generally accounted for a relatively small percent of total funds (e.g., 4%, as of 12/31/00), the work group considered three possible approaches to address these concerns:

      (1) Change the fund return methodology for the Money Market asset class by using a formula that utilizes current money market rates (as of the valuation date) and then grades/reverts over a period of time (such as over 5 years) to the 40-year historical returns.

         (a) This would likely add complexity to numerous aspects of AG MMMM, including the need to modify the calibration approach and the Keel Method scenario for the Money Market asset class. This would likely result in delays in the adoption of the guideline.

         (b) It may also require the valuation actuary to revise the Stochastic Scenarios and the underlying certification each valuation period.

      (2) Change the mean returns for the Money Market asset class to be based on a shorter historical time period.

         (a) Under this method, a shorter historical time period would be used to calculate the net mean fund return and volatility for the Money Market asset class. For example, using the last 10 years of historical experience instead of the last 40 years would result in a reduction of the net mean return and volatility by approximately 2% and .5%, respectively.

         (b) Alternatively, net mean returns could be based upon a shorter (e.g., 10 year) time period, while the volatility could continue to be based on a longer (e.g., 40-year) time period.

      (3) Continue to use the 40-year historical fund returns and associated calibration points proposed in the attached draft of AG MMMM.

         (a) The work group believes the impact on reserves would generally be immaterial, due to the relatively small percent of total funds allocated to the Money Market asset class.

         (b) In addition, for many product designs, adjustments are made to the VAGLB formula to exclude any net amount at risk that might develop due to funds being in the Money Market asset class. So the impact of a change for such products would be negligible.

(c) Based on the considerations above, the work group recommends that no changes be made to the proposed draft of AG MMMM, since any change in the guideline could delay its adoption.

2. **AG MMMM Effective Date**

   a) Draft AG MMMM provides for a retroactive effective date of 12/31/2001.

   b) The work group proposes that the effective date be extended to 12/31/2002.

      1) It appears unlikely that AG MMMM will be adopted by both LHATF and the NAIC in 2001.

      2) The 12/31/02 effective date allows companies time to implement AG MMMM.

3. **AG MMMM Retrospective Floor**

   a) The existing LHATF draft of AG MMMM subjects AG MMMM prospective reserves to a "retrospective floor" equal to the accumulation of VAGLB charges.

   b) The version of AG MMMM we are commenting on is the September 2000 version that does not include the "retrospective floor" provision (Section IV.J.) added in December.

   c) At the June 2001 LHATF meeting, the work group proposed that the retrospective floor be removed from AG MMMM, given that the combination of prospective reserves and C-3 RBC amounts did not warrant such floor.

   d) Subsequently the work group's discussions focused on adequacy of the RBC requirements. The following observations were made:

      (1) The interim RBC factors were developed in 1999 and were based on the C-3 interest rate risk factors. They have been in use since year-end 2000.

      (2) The interim RBC factors were tested two years ago to assure that the resulting RBC met the 95th percentile adequacy requirement. This testing revealed that the interim factors were conservative in this regard.

      (3) Subsequent to the June 2001 LHATF meeting, the interim RBC requirement was reviewed at a high level. The review reflected changes in product offerings, recent volatility in the financial markets, and advancing duration of VAGLB business.

      (4) The work group reviewed this testing, and concluded that the interim factors should continue to be adequate up to the 95th percentile for the products we reviewed.

      (5) The C-3 Phase II Subgroup (of the Academy's Life RBC Committee) has been developing a longer-term solution for C-3 risk on variable product guaranteed benefits. The subgroup's preliminary results are leaning towards a RBC C-3 non-formulaic stochastic modeling solution based on a "Conditional Tail Expectation" (CTE) approach rather than the existing percentile approach. For example, CTE

(90) could be required in place of the existing 95th percentile approach underlying other RBC factors. Significant further testing of the interim VAGLB C-3 factors would be needed to determine whether these factors meet such a CTE requirement.

(6) In the event that such subsequent CTE testing of the interim RBC factors reveals a CTE-based shortfall, the work group believes that the AG MMMM retrospective floor would not be a theoretically correct approach to address the shortfall.

e) Based on the work group's discussions, LHATF appears to have several alternatives regarding inclusion of the retrospective floor in AG MMMM.

(1) Adopt AG MMMM with the retrospective floor:

(a) This addresses some concerns raised regarding the level of AG MMMM prospective reserves in the early contract years.

(b) While the retrospective floor has no theoretical merit, it seems to satisfy the CTE concerns raised by some members regarding interim RBC C-3 factors.

(c) If the retrospective floor were retained, its formula would need some technical adjustments for surrenders and benefit claims.

(2) Adopt AG MMMM without retrospective floor:

(a) This approach is based upon the premise that interim RBC factors cover at least up to the 95th percentile

(b) Even if a CTE approach for RBC is desired, interim RBC factors could be reviewed and adjusted if appropriate. Due to time constraints, such a change is not likely viable for 2001, but could be put in place in 2002).

(c) This approach recognizes the theoretical flaws associated with a retrospective floor.

(3) Delay adoption of AG MMMM pending further CTE testing of an interim RBC solution:

(a) This approach could allow for a prospective (rather than retrospective) adjustment to the reserve formula, in the event that the CTE testing of interim RBC factors reveals a shortfall.

(b) Even if LHATF desires a CTE based RBC solution, it may be inappropriate to address RBC needs by adjusting reserves.

(c) If AG MMMM adoption were delayed, no resulting VAGLB reserve standards would exist.

(d) Work on the long-term RBC C-3 solution could be negatively impacted.

IV. RECOMMENDED NEXT STEPS

1. **Recommend timely adoption of AG MMMM with the attached modifications.**
   a) Depending on how LHATF decides to handle the retrospective floor, additional modifications may be needed.

2. **Update VA Guaranteed Benefit Practice Note to reflect the changes in AG MMMM.**

3. **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 American Academy of Actuaries' Life Practice Council resources towards the C-3 Phase II Subgroup of the Life RBC Committee. 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

Accumulation Factors = the value of 1 dollar after n years at the x percentile.

				Accumulation Factors					
Asset Class	**Percentile**	**Duration**		**Sampling**	**RSLN**	**SLV&D**		**Average ***	**Proposed Calibration Points ** (cummulative accumulation benchmarks)**
Total Equity	**16.7th**	**1**		0.982	0.982	0.968		0.977	0.985
		5		1.293	1.269	1.250		1.271	1.275
		10		2.033	1.984	1.892		1.970	1.985
Total Equity	**83.3rd**	**1**		1.291	1.299	1.307		1.299	1.295
		5		2.435	2.515	2.544		2.498	2.495
		10		4.989	5.234	5.289		5.171	5.170
Total Bond	**16.7th**	**1**		1.014	1.018	1.014		1.015	1.020
		5		1.243	1.228	1.235		1.235	1.235
		10		1.647	1.589	1.630		1.622	1.625
Total Bond	**83.3rd**	**1**		1.131	1.125	1.131		1.129	1.125
		5		1.584	1.595	1.598		1.592	1.590
		10		2.326	2.412	2.369		2.369	2.365
Balanced	**16.7th**	**1**		1.001	1.005	0.992		0.999	1.005
		5		1.275	1.276	1.240		1.264	1.280
		10		1.826	1.825	1.743		1.798	1.825
Balanced	**83.3rd**	**1**		1.200	1.200	1.211		1.204	1.200
		5		1.926	1.942	1.989		1.952	1.940
		10		3.306	3.349	3.456		3.370	3.345
Money Market	**16.7th**	**1**		1.049	1.039			1.044	1.045
		5		1.301	1.227			1.264	1.265
		10		1.710	1.525			1.618	1.620
Money Market	**83.3rd**	**1**		1.066	1.086			1.076	1.075
		5		1.347	1.446			1.397	1.395
		10		1.797	1.992			1.895	1.895
Specialty	**16.7th**	**1**		0.971	0.974	0.958		0.968	0.975
		5		1.207	1.204	1.166		1.192	1.205
		10		1.738	1.735	1.637		1.703	1.735
Specialty	**83.3rd**	**1**		1.259	1.263	1.275		1.266	1.260
		5		2.208	2.245	2.292		2.248	2.245
		10		4.059	4.238	4.341		4.213	4.210

∗ Average accumulation factors are equal to the arithmetic average of the Sampling, RSLN, and SLV&D accumulation factors.

∗∗ Proposed calibration points were determined as follows:

1. Proposed calibration points were based on net accumulation factors. AG MMMM proposed calibration points are the above calibration points grossed up to reflect company's expense charges.
2. Net calibration points for the 16.7th percentile were calculated as the greater of RSLN and Average rounded up to .005.
3. Net calibration points for the 83.3rd percentile were calculated as the lesser of RSLN and Average rounded down to .005.

APPENDIX B

~~Draft: 9/8/00~~**Comments on 9/8/00 Draft from the American of Academy of Actuaries VAGLB Work Group as of 09/21/01.**

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~~.~~, 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, r~~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 $83^{1}/_{3}^{rd}$ percentile.

~~While t~~This approach, however, ~~has theoretical merit, it~~ 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 ~~historical~~ 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 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^{th} 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 $83^{1}/_{3}^{rd}$ 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 guaranteesd benefit amount 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&Emortality 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 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 $83^{1}/_{3}^{rd}$ ~~percentile.~~ percentile of the ranking. 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 VAGLB standardized asset classes shown in Appendix I.~~ A different set of Stochastic Scenarios may be used for each VAGLB standardized asset 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 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~~ Integrated ~~r~~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~~ Integrated ~~r~~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 $83^{1}/_{3}^{rd}$ 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 $83^{1}/_{3}^{rd}$ 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 Ssection 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.

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~~Section 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.~~Section 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 IV.A ~~above~~. 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^r, 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^r 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 Stochastic Scenarios, Representative Scenarios or the Keel Method Scenario)~~, and must comply with the applicable requirements of Sections 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^r 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 withfor 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 ~~i~~Integrated ~~benefit~~ 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. 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, 20021. However, 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.

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: $Index_t$ = 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^{th} percentile of the Cumulative Normal distribution, equals –.9674

~~Asset Class~~	~~Mean Gross Assumed Return~~	~~Gross Assumed Return Volatility~~
~~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%~~

Asset Class	**Mean Gross Assumed Return**	**Gross Assumed Return Volatility**
Equity	12.9%	14.3%
Bond	8.8%	6.9%
Balanced	10.9%	10.2%
Money Market	7.3%	2.6%
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:

Gross Assumed Annual Returns *					
Year	Equity	Bond	Balanced	Money Market	Specialty
0.08	-2.84%	-1.18%	-1.90%	-0.13%	-2.75%
0.5	-3.28%	-0.32%	-1.52%	1.89%	-3.39%
1	-0.93%	2.15%	1.04%	4.90%	-1.45%
2	7.43%	6.22%	7.05%	6.46%	6.45%
3	8.88%	6.91%	8.07%	6.72%	7.81%
4	9.63%	7.26%	8.61%	6.85%	8.52%
5	10.11%	7.49%	8.95%	6.94%	8.97%
6	10.46%	7.65%	9.19%	7.00%	9.30%
7	10.72%	7.78%	9.38%	7.04%	9.55%
8	10.93%	7.88%	9.52%	7.08%	9.74%
9	11.10%	7.96%	9.64%	7.11%	9.90%
10	11.24%	8.02%	9.74%	7.13%	10.04%

~~Gross Assumed Annual Returns *~~					
~~Year~~	~~Equity~~	~~Bond~~	~~Balanced~~	~~Money Market~~	~~Specialty~~
~~.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 ~~s~~Section ~~VI~~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).

_____
(Name of actuary)

_____
(Signature of actuary)

_____
(Date of Certification)

~~W:\drafts\misc\agmmmm~~

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 16.7th and 83.3rd 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 1/3rd 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 16.7th percentile, represent a more conservative requirement than those that occur at higher percentiles, such as the 83.3rd percentile.)

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 16.7th 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 83.3rd 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 83.3rd percentile. Note that this would only occur if the Keel Method scenarios were not being used.

Table 1 - Calibration Points			
		Accumulation Factors	
VAGLB Standardized Asset Class	Duration	16.7th Percentile Maximum	83.3th Percentile Minimum
Equity	1	1.005	1.315
	5	1.401	2.709
	10	2.387	6.114
Bond	1	1.040	1.145
	5	1.355	1.736
	10	1.953	2.824
Balanced	1	1.024	1.219
	5	1.400	2.107
	10	2.180	3.954
Money Market	1	1.063	1.093
	5	1.376	1.515
	10	1.917	2.236
Specialty	1	0.997	1.282
	5	1.340	2.465
	10	2.137	5.094

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.

AMERICAN ACADEMY *of* ACTUARIES

Status Report of the American Academy of Actuaries C-3 Subgroup Recommended Approach for Setting Regulatory Risk-Based Capital Requirements for Variable Account Guarantees

Presented to the NAIC's Life Risk-Based Capital Working Group Boston, Massachusetts - September 2001

The American Academy of Actuaries is the public policy organization for actuaries practicing in all specialties within the United States. A major purpose of the Academy is to act as the public information organization for the profession. The Academy is non-partisan and assists the public policy process through the presentation of clear and objective actuarial analysis. The Academy regularly prepares testimony for Congress, provides information to federal elected officials, comments on proposed federal regulations, and works closely with state officials on issues related to insurance. The Academy also develops and upholds actuarial standards of conduct, qualification and practice and the Code of Professional Conduct for all actuaries practicing in the United States.

This report was prepared by Robert A. Brown, Chair of the C-3 Subgroup of the Life Risk-Based Capital Committee. Along with the other members, he would also like to acknowledge the work of Anthony E Amodeo, Jeffrey M. Brown, Thomas A. Campbell, Geoffrey H. Hancock, Timothy E. Hill, Stephen J. Preston, Mark S. Tenney, and Miles B. Yakre.

Robert A. Brown, F.S.A., M.A.A.A., Chair

David N. Becker, F.S.A., M.A.A.A.
Franklin C. Clapper, Jr., F.S.A., M.A.A.A.
Larry Gorski, F.S.A., M.A.A.A.
Alastair G. Longley-Cook, F.S.A., M.A.A.A.
James F. Reiskytl, F.S.A., M.A.A.A.
Linn K. Richardson, F.S.A., M.A.A.A.
David K. Sandberg, F.S.A., M.A.A.A.
Stephen A. Sedlak, F.S.A., M.A.A.A.
George M. Wahle, F.S.A., M.A.A.A.
William H. Wilton, F.S.A., M.A.A.A.

Overview:

Following the "C-3 Phase I" project, the American Academy of Actuaries (Academy) C-3 Subgroup of the Life RBC Committee has agreed on an approach to be recommended to the National Association of Insurance Commissioners. The approach involves setting capital requirements for fixed guarantees (both living benefits and death benefits) with reference to variable products. The following conclusions are still just working premises, but they appear to be fairly solid. The issues that remain are "implementation" ones.

Phase I of the project recommended the determination of capital requirements for interest sensitive products by scenario testing (October 1999 report; available at: www.actuary.org). Benefiting from the work done by the Academy on Variable Annuity Guaranteed Living Benefits (VAGLB - see Sept, Dec, and June 2000 reports at www.actuary.org) and by the Canadian Institute of Actuaries on "Segregated Fund Guarantees" (available at: www.actuaries.ca), the subgroup was able to reach this recommended approach.

Summary:

The favored approach is to run stochastic scenarios using a calibrated fund performance distribution function, and using prudent best estimates of parameters, for the entire book of guaranteed variable business on an aggregated basis. The measure of required capital for each scenario is consistent with the metric used in C-3 Phase I: under each scenario, the year by year accumulated statutory surplus is calculated, reflecting estimated statutory reserves, Federal Income Tax, and expenses. For each scenario, the point in time with the greatest present value of statutory loss is chosen and that PV tabulated. The scenarios are then sorted on this measure. Unlike the Phase I project, we are favoring the approach introduced in the CIA work and recommending the use of CTE 90%: the arithmetic average of the worst 10% of all scenarios, with no scenario being calculated as a negative loss. Note: this establishes capital requirements above the starting reserve level, so the stronger the current reserve the lower the capital requirement.

For "Guaranteed Minimum Income Benefits", the risk to expected margins in the purchase rate from uncertain future interest rates will be reflected in the modeling. An equity fund's degree of volatility will be reflected in the modeling. Reinsurance and hedging will also be reflected. For hedging, an adjustment to the modeled result may be made (reflecting basis risk, gap risk, and cost risk).

The way grouping, sampling, number of scenarios, and simplification methods are handled is up to the actuary. However, all these methods are subject to Actuarial Standards of Practice (ASOP), supporting documentation, and justification requirements. Actuarial certification will be required. A material change in model (or assumptions), from that used previously, may require regulatory disclosure and review, and also be subject to regulatory disapproval.

Future Issues:

The above working premises seem fairly solid. Some key implementation issues are:

--Nature of calibration requirements for broad stock market fund;

--For other types of funds, how to categorize and calibrate;

--How prescriptive the requirements should be;

--Estimation of interim reserves;

--How to adjust hedge credit;

--Scope, particularly with regard to indexed products;, and

--Comprehensiveness of actuarial report; Sensitivity analysis; Conditional Tail Expectation (CTE) 95%?

Appendix: Points of difference between current, our working premises, and the CIA paper.

In general, we are studying the RBC standards for variable annuity guarantees and are coming to the same conclusions and solutions as were reflected in the CIA report last year. There do seem to be a few points of difference, however:

a) Base-line calibration to U.S. markets instead of Canadian data;

b) Method of working around the reserve (since the Commissioners' Annuities Reserve Valuation Method – CARVM, reserves do not follow the stochastic methodology);

c) Flooring against estimated interim values;

d) Calibration: fewer points, some on “right tail”, some “shape” constraints;

e) Way to categorize and model equity funds other than quasi-index funds;

f) “Prudent best estimate” instead of “Provisions for Adverse Deviations” (PfAD); and

g) Perhaps more control of assumptions and methods, either by specifically limiting them or by more explicit standards of regulatory review and/or approval.

AMERICAN ACADEMY *of* ACTUARIES

Status Report of the American Academy of Actuaries C-3 Subgroup Recommended Approach for Setting Regulatory Risk-Based Capital Requirements for Variable Account Guarantees

Presented to the NAIC's Life Risk-Based Capital Working Group Boston, Massachusetts - September 2001

The American Academy of Actuaries is the public policy organization for actuaries practicing in all specialties within the United States. A major purpose of the Academy is to act as the public information organization for the profession. The Academy is non-partisan and assists the public policy process through the presentation of clear and objective actuarial analysis. The Academy regularly prepares testimony for Congress, provides information to federal elected officials, comments on proposed federal regulations, and works closely with state officials on issues related to insurance. The Academy also develops and upholds actuarial standards of conduct, qualification and practice and the Code of Professional Conduct for all actuaries practicing in the United States.

This report was prepared by Robert A. Brown, Chair of the C-3 Subgroup of the Life Risk-Based Capital Committee. Along with the other members, he would also like to acknowledge the work of Anthony E Amodeo, Jeffrey M. Brown, Thomas A. Campbell, Geoffrey H. Hancock, Timothy E. Hill, Stephen J. Preston, Mark S. Tenney, and Miles B. Yakre.

Robert A. Brown, F.S.A., M.A.A.A., Chair

David N. Becker, F.S.A., M.A.A.A.
Franklin C. Clapper, Jr., F.S.A., M.A.A.A.
Larry Gorski, F.S.A., M.A.A.A.
Alastair G. Longley-Cook, F.S.A., M.A.A.A.
James F. Reiskytl, F.S.A., M.A.A.A.
Linn K. Richardson, F.S.A., M.A.A.A.
David K. Sandberg, F.S.A., M.A.A.A.
Stephen A. Sedlak, F.S.A., M.A.A.A.
George M. Wahle, F.S.A., M.A.A.A.
William H. Wilton, F.S.A., M.A.A.A.

Overview:

Following the "C-3 Phase I" project, the American Academy of Actuaries (Academy) C-3 Subgroup of the Life RBC Committee has agreed on an approach to be recommended to the National Association of Insurance Commissioners. The approach involves setting capital requirements for fixed guarantees (both living benefits and death benefits) with reference to variable products. The following conclusions are still just working premises, but they appear to be fairly solid. The issues that remain are "implementation" ones.

Phase I of the project recommended the determination of capital requirements for interest sensitive products by scenario testing (October 1999 report; available at: www.actuary.org). Benefiting from the work done by the Academy on Variable Annuity Guaranteed Living Benefits (VAGLB - see Sept, Dec, and June 2000 reports at www.actuary.org) and by the Canadian Institute of Actuaries on "Segregated Fund Guarantees" (available at: www.actuaries.ca), the subgroup was able to reach this recommended approach.

Summary:

The favored approach is to run stochastic scenarios using a calibrated fund performance distribution function, and using prudent best estimates of parameters, for the entire book of guaranteed variable business on an aggregated basis. The measure of required capital for each scenario is consistent with the metric used in C-3 Phase I: under each scenario, the year by year accumulated statutory surplus is calculated, reflecting estimated statutory reserves, Federal Income Tax, and expenses. For each scenario, the point in time with the greatest present value of statutory loss is chosen and that PV tabulated. The scenarios are then sorted on this measure. Unlike the Phase I project, we are favoring the approach introduced in the CIA work and recommending the use of CTE 90%: the arithmetic average of the worst 10% of all scenarios, with no scenario being calculated as a negative loss. Note: this establishes capital requirements above the starting reserve level, so the stronger the current reserve the lower the capital requirement.

For "Guaranteed Minimum Income Benefits", the risk to expected margins in the purchase rate from uncertain future interest rates will be reflected in the modeling. An equity fund's degree of volatility will be reflected in the modeling. Reinsurance and hedging will also be reflected. For hedging, an adjustment to the modeled result may be made (reflecting basis risk, gap risk, and cost risk).

The way grouping, sampling, number of scenarios, and simplification methods are handled is up to the actuary. However, all these methods are subject to Actuarial Standards of Practice (ASOP), supporting documentation, and justification requirements. Actuarial certification will be required. A material change in model (or assumptions), from that used previously, may require regulatory disclosure and review, and also be subject to regulatory disapproval.

Future Issues:

The above working premises seem fairly solid. Some key implementation issues are:

--Nature of calibration requirements for broad stock market fund;

--For other types of funds, how to categorize and calibrate;

--How prescriptive the requirements should be;

--Estimation of interim reserves;

--How to adjust hedge credit;

--Scope, particularly with regard to indexed products;, and

--Comprehensiveness of actuarial report; Sensitivity analysis; Conditional Tail Expectation (CTE) 95%?

Appendix: Points of difference between current, our working premises, and the CIA paper.

In general, we are studying the RBC standards for variable annuity guarantees and are coming to the same conclusions and solutions as were reflected in the CIA report last year. There do seem to be a few points of difference, however:

a) Base-line calibration to U.S. markets instead of Canadian data;

b) Method of working around the reserve (since the Commissioners' Annuities Reserve Valuation Method – CARVM, reserves do not follow the stochastic methodology);

c) Flooring against estimated interim values;

d) Calibration: fewer points, some on “right tail”, some “shape” constraints;

e) Way to categorize and model equity funds other than quasi-index funds;

f) “Prudent best estimate” instead of “Provisions for Adverse Deviations” (PfAD); and

g) Perhaps more control of assumptions and methods, either by specifically limiting them or by more explicit standards of regulatory review and/or approval.

AMERICAN ACADEMY of ACTUARIES

Status Report of the American Academy of Actuaries Nonforfeiture Work Group

Presented to the NAIC's Life and Health Actuarial Task Force September, 2001

The American Academy of Actuaries is the public policy organization for actuaries practicing in all specialties within the United States. A major purpose of the Academy is to act as the public information organization for the profession. The Academy is non-partisan and assists the public policy process through the presentation of clear and objective actuarial analysis. The Academy regularly prepares testimony for Congress, provides information to federal elected officials, comments on proposed federal regulations, and works closely with state officials on issues related to insurance. The Academy also develops and upholds actuarial standards of conduct, qualification and practice and the Code of Professional Conduct for all actuaries practicing in the United States.

This report was prepared by the Academy's Nonforfeiture Work Group of the Committee on State Life Insurance Issues.

Douglas J. Bennett, F.S.A., M.A.A.A., Chair

Andrew M. Erman, F.S.A., M.A.A.A., Co-Chair

Noel J. Abkemeier, F.S.A., M.A.A.A.

Donna R. Claire, F.S.A., M.A.A.A

Frank P. Dino, F.S.A., M.A.A.A.

Douglas C. Doll F.S.A., M.A.A.A.

Barbara J. Lautzenheiser, F.S.A., M.A.A.A.

Stephen J. Preston, F.S.A., M.A.A.A.

Walter S. Rugland, F.S.A., M.A.A.A.

Donald E. Sanning, F.S.A., M.A.A.A.

William J. Schreiner, F.S.A., M.A.A.A.

Sheldon D. Summers, F.S.A., M.A.A.A.

Roger Wiard-Bauer, F.S.A., M.A.A.A.

The American Academy of Actuaries' Nonforfeiture Work Group has been having conference calls throughout the summer. The purpose of these calls has been to develop an approach to determine the extent of the methods and procedures that companies have in place for determining and re-determining non-guaranteed elements. It is our anticipation that such methods and procedures are rigorous and that an actuary (who must comply with actuarial standards of practice) is involved in the process. If this regulatory approach is working for the re-determination of non-guaranteed elements, is it then possible that a similar approach could be used for the regulation of nonforfeiture values?

Initially, we intended to survey actuaries with respect to Actuarial Standards of Practice No. 1 and 15. We hoped to show that in fulfilling their professional obligations, they were completing reports that documented their company's methods and procedures in a way that could be extended to the proposed approach for regulating nonforfeiture values.

The work group has subsequently determined that a better first step would be to study the content of the responses to Interrogatory 3 of Exhibit 8 of the annual statement. Interrogatory 3 requires companies, which have policies with non-guaranteed elements, to provide a description of the determination procedures and any changes during the year. Further, the appointed actuary is required to attest to the fact that the non-guaranteed elements are determined in accordance with generally accepted actuarial principles and practices. At least initially, this study would provide insight into the comprehensiveness of the methods and procedures that exist within each company and the extent to which the professionalism of the actuary can be relied upon.

At this point, we have begun to review a small sample of statements in order to better understand the ways in which companies comply with this annual statement requirement. It is still too early for us to draw conclusions.