

## Variable Annuity Guaranteed Living Benefits Practice Note

December 2001

The following questions relate to the National Association of Insurance Commissioners' (NAIC) proposed Actuarial Guideline MMMM, and specific section references are to the December 2001 draft of the proposed guideline as published on the NAIC's website ([www.naic.org](http://www.naic.org)). The questions and answers in this practice note are in draft format and the reader should not consider them to be representative of the American Academy of Actuaries' Variable Annuities with Guaranteed Living Benefits (VAGLBs) Work Group, but rather, a first attempt at an answer to the question.

This draft practice note addresses the draft actuarial guideline referenced above. It is intended that this draft practice note will be changed when the draft guideline is finalized. Inasmuch as the proposed guideline has not been adopted by the NAIC, compliance with it does not guarantee the acceptability of the resulting VAGLB reserves to any state insurance department. Nonetheless, this draft practice note may be helpful in understanding the requirements of the draft guideline.

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The American Academy of Actuaries (Academy) welcomes your comments and suggestions for additional questions to be addressed by this practice note. Please address all communications to Steve English, Life Policy Analyst ([english@actuary.org](mailto:english@actuary.org)).

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**Section I: General VAGLB Reserving Issues**

The following are general questions about applying proposed Actuarial Guideline MMMM to the calculation of VAGLB reserves.

**Q1. If the product is hedged, does the proposed guideline permit a capital markets approach to reserving to be used?**

**A:** A capital markets approach would involve using options available in the market to hedge the risk. On the asset side, the market value of these options is what is recorded on the statutory balance sheet. In order for surplus to not be affected by changes in the economic climate, the liabilities related to the option would need to be valued in the same way as the assets. This method of determining VAGLB liabilities may not technically be allowed under the proposed guideline. However, if one wants to use this method, the actuary may want to consider discussing this with the state of domicile and any other state that one is licensed in that has adopted specific rules (e.g., California and New York) to see if this method would be allowed.

**Q2. Are benefit streams that do not involve the payment of benefits enhanced by a VAGLB, included in the calculation of the Integrated Reserve?**

**A:** According to the proposed guideline, the Integrated Reserve is to reflect all the benefits provided under the contract. As such, benefit streams that do not involve a VAGLB benefit would also need to be considered in the reserve calculation.

**Q3. How do I ensure that the “Y” benefit stream for Projected Base Contract Values is consistent with the “X” Projected Net Amounts at Risk benefit stream?**

**A:** According to the proposed guideline, the “X” Projected Net Amounts at Risk represent the value of the VAGLB benefit as of the time a benefit (that may be enhanced by a VAGLB) is to be paid. According to the proposed guideline, this is determined by subtracting the Projected Contract Values from the Projected Living Benefit Amounts: both the Projected Contract Values and the Projected Living Benefit Amounts are contract values on the valuation date projected into the future, based on a set of Net Assumed Returns. The Projected Living Benefit Amounts reflect any enhancement due to the VAGLB, while the Projected Contract Values do not.

According to the proposed guideline, the “Y” 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 appropriate asset based charges. Except for the projected returns, a methodology under which these values are determined using the same assumptions, such as partial withdrawal incidence, mortality incidence, etc. for both Non-elective Benefits and Elective Benefits, as those used in the determination of the Projected Contract Values, ensures that the “X” and “Y” benefit streams will have been consistently determined.

**Q4. Where can I get further information regarding VAGLB testing and formulas that may be useful in the development and analysis of scenarios for Representative Scenarios?**

**A:** A short bibliography is included in Appendix A to this draft practice note.

**Section II: Minimum Reserve Requirements**

The following questions relate to the minimum reserve requirements in Section IV(I) of the proposed guideline for the time during which that Section is effective.

**Q5. According to the proposed guideline, what fund and other charges should be accumulated? What if no explicit charges are made?**

**A:** The proposed guideline indicates that actual fund and other charges made for the benefit should be accumulated, and that in the event no explicit charges are made for the benefit, a reasonable charge should be imputed and used for the accumulation. The actuary should be prepared to demonstrate that the reserve is reasonable, appropriate, and adequate under moderately adverse conditions.

**Q6. What premiums does a reinsurer generally use to determine the retrospective accumulation, the premium the direct writer charged or the reinsurance premium?**

**A:** Consistent with the answer to Q5, many actuaries feel that the reinsurance premiums are the minimum basis to be used for the retrospective accumulation for the reinsurer.

**Q7. If a combined charge is made for both VAGLBs and Guaranteed Minimum Death Benefits (GMDBs), how is the charge usually determined for just the VAGLB piece to calculate the retrospective charge accumulation?**

**A:** Many actuaries feel that actuarial judgment is needed to separate the combined charge and reach a reasonable result. For example, if the Guaranteed Minimum Death Benefit were return of premiums, but the VAGLB is a GMIB based on accumulations at five percent per year for 10 years, the actuary may want to consider that the charge be considered mostly for the GMIB and the remainder for the GMDB.

**Q8. Can surrenders be considered when determining the amount of accumulated charges that must be held?**

**A:** Yes, because, according to the proposed guideline, “the sum of the aggregate VAGLB charges from the date of issue to the valuation date” should only be for “VAGLB benefits in force (i.e. contracts still in force and still eligible for the VAGLB)”.

**Q9. On what basis or bases is the accumulation to be done?**

**A:** Seriatim is what is technically required, but the actuary may want to consider if reasonable approximations may be acceptable. For example, if accounting entries are made, as deductions of charges for the benefit occur, then an account balance may serve as a reasonable reserve estimate in some cases. Note, however, that the comparison of the accumulated charges to the reserves otherwise determined by application of the proposed guideline may be done on an aggregate basis or on a contract-by-contract basis.

**Q10. Are the charges accumulated at interest?**

**A:** The proposed guideline refers to the “sum of the aggregate charges for the benefit”. It does not state that interest need be considered.

**Q11. How might the determination of formula reserves for year-end 2001 be simplified?**

**A.** Section IV(I) of the draft guideline defines the formula reserve as the maximum of the reserve calculated according to the preceding sections of the guideline and the retrospective accumulation of charges. Before actually performing all of the reserve calculations outlined in the guideline, the actuary may be able to conclude which of the two procedures is likely to produce the maximum reserve, based on the specific characteristics of his or her company’s business. The actuary may be able to utilize projections of statutory reserves performed in conjunction with pricing of the VAGLB to form a basis for this conclusion, along with other sources of reserve testing. In particular, a review of some of the work done by the American Academy of Actuaries VAGLB Work Group may help the actuary determine that, if most of the company’s business is in the early years of the deferral period or is not “in the money”, then the retrospective floor will likely be greater than the draft guideline calculations referred to above. (See the reports made to LHATF by the VAGLB Work Group listed in Appendix A.) The actuary would typically also consider the extent of and the results of any asset adequacy analysis performed to confirm the adequacy of reserves held.

**Section III: Asset Adequacy Analysis**

The following questions relate to asset adequacy analysis of statutory reserves for variable annuity products containing VAGLB benefits.

**Q12. What methods are used to perform asset adequacy analysis for VAGLBs?**

**A:** Cash flow testing is considered by some actuaries to be the most appropriate form of asset adequacy analysis for VAGLBs. Both stochastic and deterministic scenarios can be used to perform such testing on VAGLBs. Consistent with Actuarial Standard of Practice Number 22 (ASOP 22), the actuary may consider performing sufficiently thorough modeling to satisfy himself/herself that all VAGLB cash flow risks have been adequately measured. In particular, the actuary may want to consider the impact on fund returns of financial market means and volatilities for a sufficient number of asset classes.

In considering the materiality of the VAGLB reserves in the construction of asset adequacy models, the actuary may want to consider looking beyond the size of the current reserves, and consider the risks assumed by the company. For example, the current VAGLB reserves might be relatively small in comparison with total variable annuity reserves, but the risks assumed by the company might be disproportionately large in comparison to the reserves. Increases in financial market volatility or changes in market value may result in very large VAGLB cash flows, as the VAGLB benefit becomes significantly “in the money.”

**Q13. How are the scenarios determined for VAGLB asset adequacy analysis?**

**A:** As stated in ASOP 22, the appointed actuary should be satisfied that the assumption bases chosen are adequate. This may depend on a number of considerations. For example, if there is a significant potential exposure to VAGLB market risk, the actuary may determine that relatively extensive scenario modeling may be necessary. Many actuaries feel that the scenarios can be determined using stochastic or deterministic methods, reflecting the impact of market volatility on fund returns and the resulting VAGLB cash flows. The Appendix in the back of this practice note gives some possible references with regard to developing stochastic scenarios. In certain situations, the actuary may decide that conservative simplified testing may be reasonable (e.g., using drops and small recoveries). As stated in ASOP 14, Section 5.6, the effort expended may vary in as much as – “[t]he analysis needs to be refined to the point where, in the judgement of the actuary, further refinement would not result in a materially different opinion or recommendation.” One consideration may be the potential exposure for the company. In some cases, the actuary may determine that conservative simplified testing may be all that is needed. However, in other cases, the actuary may determine that stochastic scenarios and modeling will need to be developed.

**Section IV: Reinsurance**

The following questions relate to ceded and assumed reinsurance reserves.

**Q14. How is the credit for reinsurance determined if there is a dollar limit on the yearly amount that would be paid as benefits under a reinsurance treaty?**

**A:** A dollar limit on yearly reinsurance benefits is normally expressed as an aggregate value (e.g., a percentage of aggregate account values or aggregate guaranteed amounts). As such, some actuaries feel that it can only be accurately measured with an aggregate projection of the inforce policy block. However, according to the proposed guideline, Integrated Commissioners' Annuity Reserve Method (CARVM) was intended to be calculated on a seriatim basis, and it would be difficult, in any case, to do an aggregate projection of all of the various benefit streams.

It may be possible to do a stand-alone aggregate projection of the expected reinsurance benefits using the assumptions in the proposed guideline and recognizing the dollar limit. The average portion of benefits paid by reinsurance can then be calculated and used as an approximation in the seriatim Integrated CARVM calculations. However, there are various items the actuary may decide to consider in making this determination (e.g., that the greatest present value for the reinsurance benefit may not be consistent with the greatest present value on an integrated basis, or that the year that would produce the highest reserves in one policy may not be the same for other policies). This is an area where actuarial judgment may be needed.

**Q15. If 100 percent of the VAGLB is reinsured, what is the reinsurance credit?**

**A:** Where a company cedes some or all of the VAGLB risk and is entitled to take a reinsurance reserve credit, the proposed guideline defines the reinsurance credit as the Integrated Reserve with Reinsurance less the Integrated Reserve without Reinsurance.

According to the proposed guideline, the Integrated Reserve with Reinsurance is calculated by altering the X stream to reflect the payment of VAGLB benefits by the reinsurer (that is, the normal X stream, reduced by the future Projected Net Amount(s) at Risk that would be recovered from the reinsurer) and introducing another stream Z which represents the future projected reinsurance gross premiums determined using Projected Contract Values.

The Integrated Reserve without Reinsurance is calculated as described elsewhere in this draft practice note in accordance with the proposed guideline. It represents the total reserve that would be held by the company in support of the entire variable annuity contract ignoring the costs and benefits of reinsuring the VAGLB.

According to the proposed guideline, each of these Integrated Reserves is calculated independently as the greatest present value considering all possible benefit streams. It is possible for the reinsurance credit to be either positive or negative. A negative credit could arise, for example, when the cost of reinsuring the VAGLB is more than the Projected Net Amount(s) at Risk. The amount of the reinsurance credit could either increase or decrease the size of the VAGLB reserve.

**Section V: Guaranteed Living Benefits in combination with other guaranteed benefits**

The following questions relate to reserve calculation for policies containing other guaranteed benefits other than VAGLBs, such as GMDBs.

**Q16. How are reserves developed under the proposed guideline for contracts with both GMDBs and VAGLBs?**

**A:** The proposed guideline states that the combined General Account reserve for an GMDB together with a VAGLB in the same contract should be determined as the difference between: i) an Integrated Reserve representing the total reserve held by the company in support of the entire variable annuity contract, and ii) a Separate Account reserve representing the total reserve that would have been held by the company in the absence of both the GMDBs and the VAGLBs.

Under the proposed guideline, both the Integrated Reserve and the Separate Account Reserve are determined using CARVM principles. The Standard Valuation Law states that “[r]eserves according to the commissioner’s annuity reserve method ... shall be the greatest of the respective excesses of the present values ... of the future guaranteed benefits.” Many actuaries feel that this means that all the benefits valued within the CARVM approach to determining the Separate Account Reserve should also be valued within the CARVM approach to determining the Integrated Reserve and in addition, the Integrated Reserve must reflect the benefit streams under CARVM arising from GMDBs and VAGLBs. However, a different benefit stream may generate the greatest present value under CARVM for each of the Separate Account Reserve and the Integrated Reserve.

The proposed guideline indicates in section IV-H that “[a]ctuarial 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.”

**Q17. Would a death benefit that offered to pay a percentage of the gain, (e.g., excess of the account value over the premiums less withdrawals), upon the death of the owner be covered under the proposed guideline or under Actuarial Guideline 34? What principles would be used to calculate the reserve?**

**A:** Assuming that any such benefit is viewed as an incidental benefit to a variable annuity product rather than a life insurance coverage that is offered in conjunction with an annuity, the natural starting point is to see if such a benefit would be covered under either the proposed guideline or Actuarial Guideline 34.

Since the proposed guideline defines a VAGLB as one or more guaranteed benefit amounts payable to a living contractholder or a living annuitant that have the potential to be enhanced, a death benefit would not appear to be covered by this proposed guideline. Actuarial Guideline 34 states its purpose as interpreting the standards for the valuation of reserves for Guaranteed Minimum Death Benefits. The Scope section states in part that, “[h]owever, the actuary should also exercise judgment in determining the applicability of this guideline. For example, it may be inappropriate to utilize this guideline for a contract with a GMDB where the associated net amount at risk (NAR) decreases when the underlying funds experience a drop in market value or period of underperformance.” The net amount at risk with this death benefit does indeed decrease when there is a drop in market value or period of underperformance, and increases after a period of over-performance. Both the proposed guideline and Actuarial Guideline 34 specify the future investment performance to be used. However, both guidelines emphasize underperformance since that is typically the risk with a GMDB or VAGLB. Although neither guideline appears to apply to such a benefit, there are many principles in each guideline that may be used to obtain a reserve consistent with the spirit of these guidelines.

#### **Section VI: Valuation Interest Rates**

The following questions relate to the determination of valuation interest rates and charges deducted from the valuation interest rate for the projection of benefits for CARVM reserve calculation (not for Projected Net Amounts at Risk).

**Q18. In calculating the reserve for a contract with an optional GMIB with an identified charge, what charges would be deducted from the valuation rate to determine the rate at which to project future benefits? Would the same answer apply to the Integrated Reserve with the VAGLB as that without?**

**A:** According to the proposed guideline, both the Integrated Reserve and the Separate Account Reserve, calculated for VAGLB reserve determination, reflect benefits other than VAGLB and/or GMDB benefits (which are represented as Projected Net Amounts at Risk) projected using valuation interest rate(s) less asset based charges (including asset based charges for the VAGLB benefit).

#### **Section VII: Development of Representative Scenarios**

The following questions relate to the development and use of Representative Scenarios.

**Q19. Are Representative Scenarios generated from a formula?**

**A:** According to the proposed guideline, the development of Representative Scenarios is completely at the discretion of the Valuation Actuary, except that the requirements of Section IV(D) of the proposed guideline must be satisfied. To facilitate the development of them, and in performing the resulting calculations, it may be desirable for the Representative Scenarios to take on a closed form (e.g., the Keel formula). However, the proposed guideline does not require a formula. For example, Representative Scenarios may consist of a set of individual scenarios chosen purposely to represent a larger set of stochastically generated scenarios with weights designed to result in reserves that satisfy the requirements of Section IV(D) of the proposed guideline.

**Q20. If my company is developing a new product that incorporates a VAGLB benefit, how are the key assumptions determined for testing the appropriateness of proposed Representative Scenarios since my company has not yet written any business?**

**A:** According to the proposed guideline, key assumptions must reflect the business characteristics and other factors specified in the proposed guideline, but are otherwise determined by the valuation actuary, using professional judgment, and are intended to represent the business anticipated to be issued. The purpose of Representative Scenarios is to conservatively project the value of VAGLB benefits payable in the future. By selecting an appropriate number of test values for the key assumptions, a lattice of reserve comparison testing points can be developed to compare VAGLB reserves for the Representative Scenario to VAGLB reserves derived from stochastically determined return scenarios. The key assumptions represent the important characteristics of the business, together with critical assumptions, such as the degree to which the VAGLB benefit is “in the money” as of the valuation date. As the company actually writes business under the new product, the actuary may consider performing the Representative Scenario testing using the actual distribution of business and other relevant factors to determine if they are still appropriate.

**Q21. Do the requirements of IV(D)(3) have to be met for every one of the key assumption test values before Representative Scenarios can be used?**

**A:** According to the proposed guideline, this is up to the Valuation Actuary, using professional judgment. However, many actuaries believe it is not generally possible to satisfy these requirements at each and every test value for the key assumptions. Keeping in mind the relative proportion of business at each such test value, and the impact it may have on the adequacy of overall reserves, the actuary uses professional judgment to decide if the Representative Scenarios and corresponding weights are appropriate.

**Q22. How often do actuaries do the testing of Representative Scenarios before continuing to use them?**

**A:** It may be necessary to develop Representative Scenarios prior to attaining policy form approval in some states. In any event, since according to the proposed guideline, the actuary must annually certify the appropriateness of the Representative Scenarios, the actuary may want to consider performing the testing as frequently as he/she deems necessary to continue to make the certification. As economic environment factors change, if the mix of business changes over time, or changes in other relevant factors occur, the actuary may want to consider re-performing the testing to ensure the appropriateness of the Representative Scenarios.

**Q23. Do actuaries ever use two or more sets of Representative Scenarios for a single VAGLB benefit?**

**A:** Some actuaries anticipate that there may be circumstances where a single set of Representative Scenarios may be difficult or impossible to develop, or may result in redundant reserves. As a result, it may be appropriate to use one set of Representative Scenarios for a portion of the business written on a particular product, and a different set of Representative Scenarios for the rest of that product’s business. For example, if a product provided a benefit guarantee with a waiting period of 10 years or age 70, if earlier, it may be appropriate to subdivide the business in force into groups by period to benefit maturity, with different Representative Scenarios for each group.

**Q24. How many Representative Scenarios are usually appropriate, and in what circumstances?**

**A:** This is generally determined by the actuary in the development of the Representative Scenarios through analytical methods to satisfy the requirements of section IV(D) of the proposed guideline. There are obvious calculational advantages to having fewer, rather than more, scenarios, but the primary concern is whether the Representative Scenarios appropriately represent stochastically determined scenarios in reserve calculation.

**Q25. If more than one Representative Scenario is required under the judgment of the actuary, how are results combined to calculate the Projected Net Amounts at Risk and VAGLB reserve for the policy?**

**A:** Part of the work involved in the development of Representative Scenarios is the determination of weighting factors to apply to the VAGLB reserves that result from Projected Net Amounts at Risk for each Scenario. Thus, according to the proposed guideline, for a given policy, Projected Net Amounts at Risk and an Integrated Reserve is calculated that correspond to each Representative Scenario and the CARVM reserve determined by ignoring the VAGLB is deducted to determine a VAGLB reserve that corresponds to that Scenario. Finally, the VAGLB reserve for the policy is determined by applying the associated weights to these Representative Scenario VAGLB reserves.

**Q26. What tolerances are generally appropriate in comparing representative scenario results to stochastic results?**

**A:** The proposed guideline states that the VAGLB reserve derived as the weighted average of the VAGLB reserves determined for each Representative Scenario may not be materially less than the VAGLB reserve based on the 83 1/3 rd percentile of the Benchmark Reserves. Many actuaries feel that the Valuation Actuary must use professional judgment in determining materiality for these purposes. Reference to the reports of the Academy's VAGLB Work Group (see Appendix A) regarding development and testing of the Keel Method formula may provide some guidance in this regard.

**Q27. How are Representative Scenarios constructed from the stochastic scenarios?**

**A:** As specified in the proposed guideline, the Valuation Actuary may choose to generate individual policy VAGLB reserves by ranking the reserves arising from a large number of stochastically generated Net Assumed Return scenarios for the policy and then setting that policy's reserve at the 83 1/3 percentile.

As an alternative to generating VAGLB reserves in this manner, which would involve a very large number of calculations for each policy, the proposed guideline provides that the Valuation Actuary may use the weighted average of VAGLB reserves generated for each of a suitable number of Representative Scenarios. These Representative Scenarios may be determined in any manner such that the weighted average of the VAGLB reserves determined for a Representative Scenario (across the key assumption sets) is not materially different from the VAGLB reserve based on the 83 1/3 percentile of the VAGLB reserves determined by the stochastic scenarios.

Many actuaries believe that the appropriateness of the Representative Scenarios will be established by testing key assumptions that represent the entire block of VAGLB business, such as by demographic and risk profile distribution, contract duration over time, asset class distributions and the degree of “in the moneyness” on the valuation date. Considering overall combinations of key assumptions, many actuaries believe that the reserves determined by the Representative Scenarios must not be materially different from those at the 83 1/3 percentiles of VAGLB reserves resulting from the stochastic scenarios.

**Q28. How do actuaries develop the Benchmark Reserves used to validate the Representative Scenarios?**

**A:** As specified in the proposed guideline, Benchmark Reserves may be determined by stochastically generating a large number, such as 1,000, of Net Assumed Returns for each combination of key assumptions and using them to project net amounts at risk. Each net amount at risk is equal to the value of the benefit provided by the VAGLB at the end of its waiting period less the benefit that would be provided by the projected contract value derived assuming the Net Assumed Returns were earned during the waiting period.

Each such net amount at risk is used to compute a CARVM reserve for the Net Assumed Return scenario giving rise to the net amount at risk. As a result, a large number, such as 1,000, of such reserves will be obtained for each combination of key assumption sets. To get the 83 1/3 percentile, many actuaries rank these reserves from smallest to largest to determine the reserve amount corresponding to the 83 1/3 percentile. The array of reserve amounts, across all key assumption sets, constitutes the benchmark against which Representative Scenarios may be compared for appropriateness of the proposed Representative Scenarios, and are thus referred to as Benchmark Reserves.

**Section VIII: Guaranteed Payout Annuity Floors**

The following questions relate to reserves for Guaranteed Payout Annuity Floor (GPAF) benefits.

**Q29. For a Guaranteed Payout Annuity Floor on a Variable Immediate Annuity, how would the extra reserve for the guaranteed minimum payment usually be calculated?**

**A:** The proposed guideline applies to a GPAF type of VAGLB, which guarantees that one or more of the periodic payments (under a variable immediate annuity) will not be less than a minimum amount. Some actuaries interpret the proposed guideline’s application to GPAFs as follows:

1. As with any CARVM calculation, each possible benefit stream is considered and the CARVM reserve would be the present value of benefits using the benefit stream that produces the greatest present value. For many variable immediate annuities, there may only be one benefit stream to consider. For others (such as those which provide a partial withdrawal benefit), there would often be many possible benefit streams to consider.
2. The reserve for the GPAF would be the difference of two CARVM reserves. One would include the effect of the GPAF in the universe of benefit streams that would be considered. This would be the Integrated Reserve. (The Integrated Reserve equals the greatest present value of future Integrated Benefit Streams, which include VAGLBs available under the terms of the contract). The other would not include the GPAF in the benefit streams that are being considered.

3. An Integrated Benefit Stream combines two separate benefit streams, the Projected Net Amounts at Risk (the X stream) with the Projected Base Contract Values underlying the Base Benefit Streams (the Y stream).
4. In determining the X stream for a GPAF, gross returns are projected for each of the future years and all asset-based charges under the contract are deducted to obtain Net Assumed Returns. The gross returns could be obtained from stochastic scenarios, Representative Scenarios, or the Keel Method, as appropriate. The asset-based charges deducted from the gross returns to determine Net Assumed Returns would include those for administration, fund charges, mortality and expense risks, and any asset-based charges for the guarantee of a minimum payment amount.
5. Using these Net Assumed Returns, the annuity income payments to be paid in the future would be calculated without the existence of the minimum guarantee. These are the Projected Contract Values. The Projected Living Benefits would also be determined using the Net Assumed Returns. The Net Amount at Risk is equal to the actual income payment that would be paid (the Projected Living Benefit Amount) less the income payment in the absence of the minimum guarantee (the Projected Contract Value). Unlike many other VAGLBs, the Projected Net Amount of Risk for a GPAF would generally be a series of numbers rather than a single number.
6. The Base Benefit Stream is a stream of projected benefit amounts, reflecting the Projected Base Contract Values and ignoring any VAGLBs in the contract. These contract values would be projected into the future using a return based on the valuation rate(s) less asset-based charges appropriate for this purpose.
7. The Integrated Benefit Stream and Base Benefit Streams would be discounted using valuation interest and, where applicable, mortality.

**Section IX: Keel Method**

The following questions relate to application of the Keel Method to determination of Projected Net Amounts at Risk.

**Q30. Are the calculations used for the development of the Keel Method available as a starting point in case I need to modify it for use with my VAGLB benefit?**

**A:** Yes, an example of application of the Keel Method to the calculation of VAGLB reserves is included in Appendix V of the June 15, 2000 VAGLB Work Group report to the Life and Health Actuarial Task Force and is titled “Numerical Example of VAGLB Reserve Calculation.” See Appendix A of this draft practice note to obtain a copy of that report.

**Q31. Suppose my product contains two VAGLB benefits, and one qualifies for use of the Keel Method under the proposed guideline’s safe harbor, and the other does not. Will the proposed guideline allow me to use the Keel Method for the qualifying benefit without following the requirements for developing Representative Scenarios as referenced in Section D of the proposed guideline?**

**A:** According to the proposed guideline, the answer is no. As illustrated in Example 11 of the proposed guideline’s Appendix III, the safe harbor determination is made on a contract level basis, and not on a benefit level basis. The actuary may still be able to use the Keel Method as a representative scenario, but he/she would have to follow the requirements of Section D of the proposed guideline.

## APPENDIX A

Below are some papers that may be of help in considering the level of reserves for VAGLBs:

American Academy of Actuaries VAGLB Work Group reports: These reports detail some of the considerations involved when developing proposed Actuarial Guideline MMMM ([www.actuary.org/naic.htm](http://www.actuary.org/naic.htm) ). The pattern of prospectively calculated VAGLB reserves can be found in the reports dated October, 1999 and November, 2000. The URL's for these reports are [http://www.actuary.org/pdf/life/vaglb\\_oct99.pdf](http://www.actuary.org/pdf/life/vaglb_oct99.pdf) and [http://www.actuary.org/pdf/life/vaglb\\_nov00.pdf](http://www.actuary.org/pdf/life/vaglb_nov00.pdf).

The Canadian Institute of Actuaries (CIA) Task Force on Segregated Fund Investment Guarantees: This is a well-researched paper on the equivalent Canadian product to VAGLBs, called segregated funds. It discusses equity scenarios that should be developed for these products. It is available from the CIA ([www.actuaries.ca](http://www.actuaries.ca))

2000 and 2001 Valuation Actuary Symposium: There were sessions covering VAGLBs that discussed the considerations in reserving and other issues. The 2000 session is currently available on the SOA website ([www.soa.org](http://www.soa.org)) at URL: [http://www.soa.org/library/valact/2000-09/valact\\_wa00.htm](http://www.soa.org/library/valact/2000-09/valact_wa00.htm). The 2001 session should be available shortly.

2000 and 2001 SOA Annual meeting: There were sessions having VAGLBs as a topic at the SOA's 2000 Annual Meeting and the SOA's 2001 Annual Meeting. The *Record* for the 2000 Annual Meeting is currently available on the SOA website ([www.soa.org](http://www.soa.org)) at URL: <http://www.soa.org/library/record/2000-09/chicago.htm>. The *Record* for the 2001 Annual Meeting should be available shortly.

Options, Futures, and Other Derivative Securities by John C Hull.

Black-Scholes and Beyond, Option Pricing Models by Neil A. Chriss.

A Regime Switching Model of Long-Term Stock Returns by Mary Hardy, published in the April, 2001 issue of the *North American Actuarial Journal*.