
**Report of the American Academy of Actuaries' C3 Life and Annuity Capital Work Group
On RBC C3 Requirements for Life Products**

**Presented to the National Association of Insurance Commissioners'
Life Risk Based Capital Working Group**

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~~The C3WG would also like to acknowledge the work of Susan Christy and Jason Alleyne F.S.A., F.C.I.A., F.I.A.~~

Certain Changes from the March 2009 C3 Life and Annuity Capital Work Group Report

- ~~(1).Scope. Scope language in prior reports referred to individual life policies. The language has been clarified to refer to all life insurance policies as the proposed approach is equally applicable and appropriate to both individual and group life products.~~
- ~~(2).Adjustment for existing RBC factor amounts. Placement of the language regarding adjustment to the C3 amount for the factor based RBC covering market volatility risk of equity assets at the valuation date and adjustment for the factor based RBC covering recoverability of expense allowances at the valuation date relating to liabilities being modeled has been moved from section I to section G so as to limit any adjustment as being applicable only to determination of the Stochastic Amount.~~
- ~~(3).Discount Rates: A numerical example of the development of discount rates for companies that model only fund returns or do not model interest rates stochastically has been added in section 6F.~~
- ~~(4).Clarifications and Typographic Corrections. A number of minor clarifications and corrections have been made as a result of comment letters received and NAIC Life Risk Based Capital Working Group conference call discussions.~~
- ~~(5).References to "Guidance." References to the term "guidance" have been removed so as to prevent any confusion with guidance as provided by Actuarial Standards of Practice.~~

C3 Requirements for Life Products

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~~Section 1. Background~~ Summary of Required Approach

~~The C3 Life and Annuity Capital Work Group (C3WG) was formed in June 2008 as a work group of the American Academy of Actuaries' Life Capital Adequacy Subcommittee (LCAS). C3WG represents the merger of the American Academy of Actuaries' Life Capital Work Group (LCWG), originally charged with reviewing and evaluating the interest rate and market risk (C3) component of the current Life Risk Based Capital framework in the context of life products valued under a principle-based reserving approach, and the American Academy of Actuaries' Life Capital Work Group (ACWG), similarly charged with respect to annuity products.~~

~~C3WG will draw resources from and work with the LCAS, the Life Reserves Work Group (LRWG) and the Annuity Reserves Work Group (ARWG) to recommend changes to the Life Risk Based Capital formula, as necessary, for consideration by the NAIC's Capital Adequacy Task Force.~~

~~C3WG is working on a proposal for a single C3 framework that covers interest rate risk and market risk for both life insurance and annuities. It is envisioned that, in the future, C3 risk for both life and annuities will be determined under a single combined framework, perhaps with separate nuances within that framework that reflect product differences.~~

~~As the project has evolved over time the charge of the group has also evolved to fit the developing solution. As a result, the project was expanded to include the market risk portion of Asset Risk (C1) and all inforce business.~~

~~The scope of the work does not include a review of the other existing C risk components.~~

~~This report summarizes the work of C3WG to date by outlining the recommended approach and providing detail on how the amounts necessary should be calculated. Recommendations are limited to life insurance at this time but future recommendations may include annuities.~~

Recommended ~~Required~~ Approach

The recommended ~~required~~ approach to calculating the RBC requirements for interest rate risk and market risk for all individual life insurance policies is summarized by the following steps. Terms which are capitalized are as they are defined in Section 5.

- (1). Project asset and liability cash flows using Prudent Estimate Assumptions over a series of stochastically generated interest rate and/or equity return scenarios calculating the net accumulated asset amount (projected statement value of invested assets).
- (2). Calculate the accumulated deficiency at the end of each projection year. The accumulated deficiency is the excess of the cash surrender value (zero is used for products that do not have a cash surrender value) over the net accumulated asset amount.
- (3). For each scenario, calculate the present value of each accumulated deficiency and determine the greatest present value.
- (4). The Scenario Amount is the sum of the statement value of starting assets and the greatest present value from (3) above for that scenario.
- (5). Determine the Stochastic Amount by calculating the CTE 90 value of the Scenario Amounts by taking the average of the highest 10% of the Scenario Amounts.

Recognizing the desire, in certain situations, to utilize approaches that are simpler than the process used to quantify the Stochastic Amount, simplified methods are included in this recommendation subject to a minimum based on the current C3 factors for life insurance products. For policies deemed not to have material tail risk, this recommendation permits the use of the current C3 factors. Additionally, recognizing that there may be some liabilities not included in a company's models, an amount for non-modeled liabilities is included as an alternative. In determining the total C3 requirement, the Total Asset Requirement is the greater of (a) and (b), where (a) is equal to the sum over all Business Segments of the Stochastic Amount, Alternative Amount, Factor-Based Amount for each Business Segment or combination of Business Segments, plus any and an amount for non-modeled amount related to each segment or combination of segments liabilities, and (b) is equal to the sum of the current factor based amount and corresponding reserve amount on the valuation date for all of the Company's liabilities falling within the scope of this report. The C3 component for Risk-Based Capital is the Total Asset Requirement less the statutory value on the valuation date of the liabilities included in the determination of the Total Asset Requirement.

This C3 RBC amount relates to interest rate risk and market risk. That portion which is attributable to interest rate risk is to be combined with the current C3a component of the formula. That portion which is attributable to market risk is to be allocated and combined with the current C3c component of the formula.

This method of calculation has an impact on other aspects of the RBC calculation. Specifically:

- C1 Expense Allowance Elimination for Covered Products. The current RBC formula has a charge for the expense allowance in reserves of 2.4 percent (pre-tax) if the surrender charges are based on fund contributions and the fund balance exceeds the sum of premium-less-withdrawals; otherwise the charge is 11 percent. This amount provides for the possible non-recovery of the full "CRVM Allowance", if the stock market performs poorly. Since this impact will be captured directly in the stochastic modeling, or implicitly in the Alternative Amount, this separate requirement is no longer necessary for products covered by the stochastic modeling or Alternative Amount.
- Market Volatility Adjustment for Supporting Equity Assets. The development of the C3 amount in the recommended required approach includes an amount with respect to the market volatility of equity assets backing the reserves on the products in scope. To avoid a double-counting of this amount in the RBC formula, it is recommended that the C31 RBC Amount may be reduced by the portion of the C3 RBC amount attributed to equities factor-based RBC on such supporting assets. The reduced C31 RBC amount may not be reduced beyond the amount attributed to equities less than zero.
- In this report, C3WG recommends that Single Premium Life products be included in the scope of products covered by this report. Currently, C3 on such products is covered by C3 Phase I.

~~In order to allow time for the work required to develop the capital requirements, we recommend that an estimated value, based on data as of a date preceding year end, be permitted for the year end annual statement.~~

~~Since the data to be used for the development of these capital requirements is not available to us, we have made no attempt to quantify the overall impact of these requirements. We suggest revisiting all aspects of this methodology after two years of regulatory filings, including but not limited to assumption setting, regulatory issues, hedge evaluation, standards, results in practice, and areas in need of clarification. C3WG would be glad to assist in such review.~~

Section 2. Purpose

- A. The purpose of this report is to ~~prescribe~~ recommend a principle-based approach (PBA) to the determination of the C3 component and ~~the~~ portion of the C1 component of Risk-Based Capital for life products attributed to equities to the extent such equities are captured in the determination of C3.
- B. A principle-based approach is one that:
1. Captures the benefits and guarantees associated with the contracts and their identifiable, quantifiable and material risks, including the risks represented in the tails of the distribution and the funding of the risks.
 2. Utilizes risk analysis and risk management techniques to quantify the risks and is guided by the evolving practice and expanding knowledge in the measurement and management of risk. This may include, to the extent required by an appropriate assessment of the underlying risks, stochastic models or other means of analysis that properly reflect the risks of the underlying contracts.
 3. Incorporates assumptions, risk analysis methods, and models and management techniques that are consistent with those utilized within the company's overall risk assessment process. Risk and risk factors explicitly or implicitly included in the company's risk assessment and evaluation processes will be included in the risk analysis and cash flow models used in the PBA. Examples of company risk assessment processes include economic valuations, internal capital allocation models, experience analysis, asset adequacy testing, GAAP valuation and pricing.
 4. Should use company experience, based on the availability of relevant company experience and its degree of credibility, to establish assumptions for risks over which the company has some degree of control or influence.
 5. Incorporates assumptions that reflect an appropriate level of conservatism when viewed in the aggregate and that, together with the methods utilized, recognizes the solvency objective of statutory reporting.
 6. Reflects risks and risk factors in the calculation of the PBA minimum statutory reserves and statutory Risk-Based Capital that may be different from one another and may change over time as products and risk measurement techniques evolve, both in a general sense and within the company's risk management processes.

These statements should be applied in a manner consistent with statutory requirements and company risk measurement practices then in effect.

Section 3. Scope

- A. The method defined by this report applies to all life insurance policies whether directly written or assumed through reinsurance.
- B. Risk-Based Capital requirements for life policies, supplemental benefits, and riders on those policies that are not directly identified in this report are to be determined on a basis that is consistent with the principles and methodologies defined in this report.

Section 4. General Concepts

C3WG had a number of thoughts in mind when these recommendations were developed. Understanding these concepts will help in understanding the method.

Our intention was to provide a framework that can be applied to in-scope life insurance (and possibly extended to annuity products sometime in the future). As a result, the method has to be broad and general enough to cover the range of products.

The C3 RBC amount to be calculated should be based on a prospective valuation method that appropriately captures all material C3 risks underlying the product being valued, the revenue to fund those risks, and the effect of any risk mitigation techniques.

While the method contemplates a stochastic approach to the determination of appropriate values, a deterministic approach may be sufficient for certain products, depending on the nature of the risks. A stochastic approach may be necessary for other products.

The only assumptions for which stochastic processes were considered are those for interest rates and equity returns. All other assumptions which are neither stochastically determined nor prescribed should incorporate appropriate margins for uncertainty. These margins should be consistent with those that would be appropriate for reserves.

Assumptions should be updated as experience data emerges and expectations of future experience and economic conditions change. In other words, assumptions are not locked in at issue.

Finally, we recognize that while a stochastic cash flow model attempts to include all real world risks relevant to the objective of the stochastic cash flow model and relationships among the risks, it will still contain limitations because it is only a model. Neither a cash flow scenario model, nor a method based on factors calibrated to the results of a cash flow scenario model, can completely quantify a company's exposure to risk. A model attempts to represent reality, but will always remain an approximation thereto and hence, uncertainty in future experience is an important consideration when determining the amount being valued. As such:

1. The actuary must take the model's limitations into consideration when setting assumptions, applying the methodology and determining the appropriateness of the resulting amounts.
2. The use of assumptions and risk management strategies should be appropriate to the business and not merely constructed to exploit foreknowledge of the components of the required methodology. Therefore, the use of assumptions, methods, models, risk management strategies (e.g., hedging), other Derivative Programs, structured investments or any other risk transfer arrangements (such as reinsurance) that serve to materially reduce the calculated amounts without also reducing risk on scenarios similar to those used in the actual cash flow modeling are inconsistent with these principles.

Note that the ~~recommended~~required C3 amount is determined as CTE90 less the statutory value on the valuation date of the liabilities included in calculating the Total Asset Requirement (hereafter referred to as statutory liabilities). An alternative that C3WG has also considered is determining C3 as CTE90 – CTE65, with a possible adjustment for the difference between the statutory liabilities and CTE65.

This alternate C3 calculation establishes the capital requirement as the difference between a measure of interest rate and market risk volatility at the capital risk level and a similar measure at the risk level inherent in reserves, both measured using a consistent set of cash flow assumptions. This may be a more theoretically correct determination of C3 capital.

Each of these alternative calculations has issues in terms of integrating into the existing RBC calculation. It is important that these issues are well understood in making decisions with respect to the recommendation.

The ~~recommended~~required approach of CTE90 less statutory liabilities is consistent with C3 Phase II in its determination of C3 risk. For policies valued under a principle-based approach, the statutory liabilities will be consistent with CTE65 and the C3 amount determined will represent the spread of cashflow variation, measured on a consistent set of assumptions (anticipated experience and margins), at different risk levels.

However, for policies valued under the ~~current~~ approach the statutory reserve may be higher or lower than the CTE65 amount.

For those policies for which the reserve amount is lower than CTE65, the C3 amount determined is higher under the ~~recommended~~required approach. It could be viewed that the reserve in light of AOMR requirements should be reasonably proximate to a CTE65 amount and as such, the added amount in the C3 requirement may not be an issue from the regulator perspective.

For those policies for which the reserve amount is higher than CTE65, the C3 amount determined is lower under the ~~recommended~~required approach. In effect, redundancy in the reserve creeps into the C3 calculation, dampening the C3 amount. As the reserve exceeds the CTE65 amount, some or all of the C3 risk is covered by the reserve held by the company and the company should in some way be given credit for the risk being covered. Whether that credit should be provided through the C3 amount or some alternate means outside the C3 amount needs further consideration.

The issue of which of the alternative C3 calculations is to be used is important because the ~~recommended~~required calculation of C3 covers all inforce policies and not just those that have principle-based reserves. In the initial years after adoption of the new reserve method, most policies will fall into the group that does not have principle-based reserves.

In order to assist in the analysis of these issues C3WG has performed a limited amount of modeling. As a result of this modeling, C3WG recommends that the C3 measure be based on CTE90 less the statutory liabilities.

Section 5. Definitions

The following terms shall have the indicated meanings for purposes of this report:

- A. Accumulated Deficiency. The projected working reserve, if any, less the annual statement value of projected assets and measured as of the projection start date and as of the end of each projection year.
- B. Actuarial Report. A document prepared by the company that summarizes all of the material decisions supporting the calculation of the Reported Amount, including assumptions, margins and methodologies used to calculate the Reported Amount
- C. Alternative Amount. Provides for all material C3 risks of a group of policies, including Material Tail Risk arising from sensitivities to changing economic conditions. It equals the amount determined by the actuary, using methods and assumptions deemed appropriate by the actuary, subject to the amount meeting the minimum requirements specified in this report.
- D. Anticipated Experience Assumption. The actuary's expectation of future experience for a Risk Factor given available, relevant information pertaining to the assumption being estimated.
- E. Asset-associated Derivative. A derivative program whose derivative instrument cash flows are combined with asset cash flows within the Cash Flow Model.
- F. Business Segment. A group of assets associated with a group of policies that are modeled together to project future Accumulated Deficiencies. This grouping will generally follow the company's asset segmentation plan, investment strategies, or approach used to allocate investment income for statutory purposes.
- G. Cash Flow Model. A model designed to simulate asset and liability cash flows.
- H. Cash Surrender Value. The amount available to the contract/policyholder, if any, due to surrender of the contract/policy, prior to any outstanding contract/policy indebtedness and net of any applicable surrender charges. The cash surrender value shall reflect any applicable market value adjustments where the underlying assets are reported at market value, but shall not reflect any market value adjustments where the underlying assets are not reported at market value. (Note: where there is a group certificate and it has a cash value, this applies to the certificate within the group contract/policy).
- ~~I. Clearly Defined Hedging Strategy. A type of prospective Derivative Program of the company established to hedge risks through the future purchase or sale or the opening and closing of hedging positions. Such Derivative Program may be dynamic, static or a combination thereof and must meet the requirements of a Clearly Defined Hedging Strategy as described in Subsection E (9) of Section 6.~~
- ~~J. Conditional Tail Expectation (CTE). A risk measure that is calculated as the average of all modeled outcomes (ranked from lowest to highest) above a prescribed percentile.~~
- ~~K. J. Derivative Instrument. An agreement, option, instrument or a series or combination thereof:~~
- a. To make or take delivery of, or assume or relinquish, a specified amount of one or more underlying interests, or to make a cash settlement in lieu thereof; or
 - b. That has a price, performance, value or cash flow based primarily upon the actual or expected price, level, performance, value or cash flow of one or more underlying interests.

This includes, but is not limited to, an option, warrant, cap, floor, collar, swap, forward or future, or any other agreement or instrument substantially similar thereto or any series or combination thereof. Each Derivative Instrument shall be viewed as part of a specific Derivative Program.

- L. Derivative Program. A program to buy or sell one or more Derivative Instruments or open or close hedging positions to achieve a specific objective. Both hedging and non-hedging programs (e.g., for replication or income generation objectives) are included in this definition.
- M. Discount Rates. The path of rates used to derive the present value.
- N. Duration. The period of time elapsed from the Projection Start Date to a future date within the Projection Period.
- O. Factor-based Amount. The portion of the Total Asset Requirement relating to liabilities which have been optionally subjected to and pass the Stochastic Exclusion Test.
- P. Gross Wealth Ratio. The Gross Wealth Ratio is the cumulative equity index return for the indicated time period and percentile (e.g., 1.0 indicates that the index is at its original level).
- Q. Liability-associated Derivative. A Derivative Program for which the Derivative Instrument cash flows are combined with liability cash flows within the Cash Flow Model.
- R. Margin. The term “margin” means an amount included in the assumptions used to determine the Reported Amount that incorporates conservatism in the calculated value consistent with the requirements of the various sections of this report. It is intended to provide for estimation error and adverse deviation.
- S. Material Tail Risk. Material Tail Risk arises when the Scenario Amount for one or more Scenarios is materially higher when compared to the Scenario Amount for the rest of the Scenarios.
- T. Net Asset Earned Rates. The path of earned rates reflecting the net general account and guaranteed separate account portfolio rate in each projection interval (net of appropriate default costs and investment expenses).
- U. Net Revenue Sharing Income. The amount of Revenue Sharing to be included in cashflow projections as defined in Subsection B of Section 8.
- V. Non-Guaranteed Elements (NGE). Either: (a) dividends under participating policies or contracts; or (b) other elements affecting life insurance or annuity policyholder/contract holder costs or values that are both established and subject to change at the discretion of the insurer.
- W. Non-modeled Amount. The portion of the Total Asset Requirement relating to liabilities for which neither the Stochastic Amount, Alternative Amount, nor Factor-based Amount has been quantified.
- X. Policy. A life insurance policy included in the scope of this Report.
- Y. Policyholder Behavior. Any action a policyholder, contract holder or any other person with the right to elect options, such as a certificate holder, may take under a policy or contract subject to this Act including, but not limited to, lapse, withdrawal, transfer, deposit, premium payment, loan, annuitization, or benefit elections prescribed by the policy or contract but excluding events of mortality or morbidity that result in benefits prescribed in their essential aspects by the terms of the policy or contract.
- Z. Projection Start Date. The date on which the Projection Period begins.
- AA. Projection Year. A 12-month period starting on the Projection Start Date or an anniversary of the Projection Start Date.
- BB. Projection Interval. The time interval used in the Cash Flow Model to project the cash flow amounts (e.g. monthly, quarterly, annually).
- CC. Projection Period. The period over which the Cash Flow Model is run.
- DD. Proprietary Scenario Sets. A small number of paths of interest rate and equity performance that are not necessarily a representative sample of a larger set of stochastic paths, but a

conservative sample developed by the company for the purpose of calculating the Stochastic Amount for policies within the scope of this report.

- EE. Prudent Estimate Assumption. A deterministic assumption, used to represent a Risk Factor, developed by applying a Margin to the Anticipated Experience Assumption for that Risk Factor.
- FF. Qualified Actuary. An actuary who meets the qualifications as defined in Section 11 (Certification and Documentation Requirements) to certify that the amounts for the policies subject to this report have been calculated following all applicable laws, regulations, actuarial guidelines (AGs) and Actuarial Standards of Practice. The Qualified Actuary shall be referred to throughout this report as “the actuary”.
- GG. Risk Factor. An aspect of future experience that is not fully predictable on the Valuation Date.
- HH. Reported Amount. The minimum amount as of the Valuation Date for the policies falling within the scope of this report using a principle-based approach. The Reported Amount equals the Total Asset Requirement less the statutory value on the valuation date of the liabilities included in the determination of the Total Asset Requirement.
- II. Revenue Sharing. Any arrangement or understanding by which an entity responsible for providing investment or other types of services makes payments to the company (or to one of its affiliates). Such payments are typically in exchange for administrative services provided by the company (or its affiliate), such as marketing, distribution and record-keeping. Only payments that are attributable to charges or fees taken from the underlying variable funds or mutual funds supporting the policies that fall under the scope of this report shall be included in the definition of Revenue Sharing.
- JJ. Scenario. A sequence of outcomes used in the cash flow model, such as a path of future interest rates, equity performance, or separate account fund performance
- KK. Scenario Amount. Equals the amount determined in Section 6(G)(6) for a given set of policies for a given Scenario that is used as a step in the calculation of the Stochastic Amount.
- LL. Starting Assets. The assets assigned to a Business Segment prior to the calculation of the Reported Amount, and valued as of the Projection Start Date.
- MM. Stochastic Amount. The amount determined by applying a prescribed CTE level to the distribution of Scenario Amounts over a broad range of stochastically generated Scenarios calculated using Prudent Estimate Assumptions for all assumptions not stochastically modeled.
- NN. Stochastic Exclusion Test. A test to determine whether the block of policies being tested is considered to have material tail risk arising from interest rate movements or equity performance. Passing the test allows the company to exclude the block of policies from the stochastic modeling calculation, and instead, use the current C3 RBC factors in determining the C3 amount on that block.
- OO. Total Asset Requirement. The minimum amount as of the Valuation Date for the policies falling within the scope of this report using a principle-based approach and equals the greater of (a) and (b), where (a) is equal to the sum over all Business Segments of the Stochastic Amount, Alternative Amount or Factor-based Amount for each Business Segment or combination of Business Segments, plus any Non- modeled Amount related to each segment or combination of segments, and (b) is equal to the sum of the current factor based amount and corresponding reserve amount on the valuation date for all of the Company’s liabilities falling within the scope of this report.
- PP. Valuation Date. The date for which the Reported Amount is to be valued as required by the NAIC Life Risk Based Capital Instructions.
- QQ. Working Reserve. The assumed reserve used in the projections of Accumulated Deficiencies

supporting the calculation of the Scenario Amount.

Section 6. Definition of General Methodology

A. Summary

1. This report applies the principles of risk management and asset adequacy analysis, using the tool of stochastic modeling to establish the C3 RBC risk component for the products within its scope. In general, a stochastic approach to interest rates and equity performance is preferred. However, an exception to the stochastic modeling requirement can be made if certain conditions are met, as described in Sections 6(G)(2) and 6(G)(3) below.
2. This report recommends that the Reported Amount for policies falling within its scope be based on an amount calculated using a stochastic method when appropriate (Stochastic Amount). The Stochastic Amount shall be determined based on projections of net cash flows using the methods described below.
3. The actuary may elect to perform the calculations required by this report on a date other than the Valuation Date, but in no event earlier than ~~six~~three months before the Valuation Date, as long as an appropriate method is used to adjust the amounts so determined to the Valuation Date. Disclosure of the results of such adjustment and the methodology used to determine the adjustment is required.
4. The Stochastic Amount is calculated in the aggregate using a projection of net cash flows over a broad range of stochastically generated Scenarios, using Prudent Estimate Assumptions for all assumptions not stochastically modeled, and then applying a prescribed Conditional Tail Expectation level.
5. It will not be necessary to determine the Stochastic Amount for groups of policies where such policies are deemed not have material tail risk by means of passing the Stochastic Exclusion Test detailed in Section 6(G)(2). For groups of policies passing the Stochastic Exclusion Test, the C3 amount may be determined as the Factor-based Amount as described in section 6I.
6. A company may elect to exclude certain policies from the stochastic modeling requirement if certain conditions are met (as described in Section 6(G)(3) below.) The Alternative Amount is otherwise determined for those policies not covered by the Factor-based Amount and otherwise excluded from the stochastic modeling requirement.
7. Recognizing that there may be some liabilities not included in a company's models, an amount for non-modeled liabilities should be included in the Total Asset Requirement determined.
8. The Total Asset Requirement is the greater of (a) and (b), where (a) is equal to the sum over all Business Segments of the Stochastic Amount, ~~the~~ Alternative Amount or ~~the~~ Factor-based Amount for each Business Segment or combination of Business Segments plus any Non-modeled Amount related to each segment or combination of segments, and (b) is equal to the sum of the current factor based amount and corresponding reserve amount on the valuation date for all of the Company's liabilities falling within the scope of this report.
9. The Reported Amount is the Total Asset Requirement less the statutory value on the valuation date of the liabilities included in the determination of the Total Asset Requirement.

B. Prudent Estimate Assumptions

1. The actuary shall determine Prudent Estimate Assumptions used in the calculation for each Risk Factor that is not prescribed or is not stochastically modeled. The Prudent Estimate Assumptions shall vary from Scenario to Scenario as appropriate. A Prudent Estimate Assumption is developed by applying a Margin to the Anticipated Experience

Assumption for the Risk Factor. The Prudent Estimate Assumption for each Risk Factor shall be:

- a. Consistent with the general concepts stated in Section 4 herein;
- b. Based on any relevant and credible experience that is available, including, but not limited to, the company's own experience studies and industry experience studies; and
- c. Supported by a documented process to reassess the appropriateness of the assumptions in future valuations.

2. Anticipated Experience Assumption. The actuary shall use company experience, if relevant and credible, to establish the Anticipated Experience Assumption for any Risk Factor. To the extent that company experience is not available or credible, the actuary may use industry experience or other data to establish the Anticipated Experience Assumption, making modifications as needed to reflect the actuary's expectation of the risk.

3. The company shall include margins to provide for adverse deviations and estimation error in the prudent estimate assumption for each risk factor that is not stochastically modeled or prescribed, subject to the following:

The company shall determine an explicit set of initial margins for each material assumption independently (i.e., ignoring any correlation among risk factors) in compliance with this section. Next, if applicable, the level of a particular initial margin may be adjusted to take into account the fact that risk factors are not normally 100% correlated. However, in recognition that risk factors may become more heavily correlated as circumstances become more adverse, the initially determined margin may only be reduced to the extent the company can demonstrate that the method used to justify such a reduction is reasonable considering the range of scenarios contributing to the CTE calculation or considering the scenario used to calculate the deterministic reserve as applicable or considering appropriate adverse circumstances for risk factors not stochastically modeled. If not stochastically modeled or prescribed, assumptions that are generally considered material include but are not limited to mortality, morbidity, interest, equity returns, expenses, lapses, partial withdrawals, loans, and option elections.

34. In setting the Margin for a Risk Factor, the actuary must assure that:

- a. The Margin is directly related to uncertainty in the Risk Factor, whereby the greater the uncertainty, the larger the required Margin, with the Margin added or subtracted as needed to produce a larger Reported Amount than would otherwise result without it;
- b. Larger Margins are used if experience data are lacking or limited than would be the case if abundant and relevant experience data are available;
- c. The Margin satisfies any further conditions set forth by this report and applicable Actuarial Standards of Practice with respect to Margins or Prudent Estimate Assumptions for the Risk Factor.

45. In addition, in setting the Margin for a Risk Factor, the actuary must consider:

- a. That larger Margins may be required to reflect contingencies related to policyholder behavior in situations where a given policyholder action results in the surrender or exercise of a valuable option; and
- b. The margin should also reflect the extent to which the experience assumption is dynamically tied to the stochastically modeled elements, and therefore has variation already built into the base assumption; and

- c. The magnitude of fluctuation in the historical experience of the company for the Risk Factor, as measured by the standard deviation around the mean or other standard statistical measure (if meaningful historical experience data are available for the Risk Factor).

C. Cash Flow Models

1. Purpose. The Stochastic Amount calculations require the use of Cash Flow Models for each Business Segment. The Cash Flow Models shall:
 - a. Project the premiums, benefits, expenses, and other applicable revenue items to be used in the calculations; and
 - b. Project the total asset and liability cash flows, Net Investment Earnings, and invested asset balances for the purpose of determining the path of Accumulated Deficiencies.
2. General description of cash flow projections. For each Scenario for the Scenario Amount, a cash flow projection shall be made reflecting Federal Income Tax and shall reflect the

dynamics of the expected cash flows for the entire Business Segment. The projection shall include the effect of all material product features, both guaranteed and non-guaranteed.

- a. Actual gross premiums received from the policyholder shall be included as revenue in the cash flow projection. Amounts charged to account values on General Account business and guaranteed separate account business (such as cost of insurance and expense charges) shall not be included in the cash flow projection as revenue, but shall be projected since they will affect the level of cash surrender benefits.
- b. All material benefits paid to policyholders, including but not limited to, death claims, surrender benefits, and withdrawal benefits, reflecting the impact of all material guarantees will be included in the cash flow projection.
- c. Net cash flows between the General Account and Separate Account for variable products will be included in the cash flow projection. Examples include allocation of net premiums to the Separate Account, policyholder-initiated transfers between fixed and variable investment options, transfers of Separate Account values to pay death or withdrawal benefits, and amounts charged to Separate Account values for cost of insurance, expenses, etc.
- d. Insurance company expenses and taxes (including overhead expenses), commissions, fund expenses, contractual fees and charges are to be reflected on a basis consistent with the requirements herein.
- e. Asset cash flows shall include cash receipts or disbursements associated with investment income, realized capital gains and losses, principal repayments, appropriate asset default costs, investment expenses, asset prepayments, and asset sales.
- f. Revenue sharing income received by the company (net of applicable expenses) and other applicable revenue and fees associated with the policies are to be reflected as described in Section 8.
- g. Cash flows from derivative liability and derivative asset programs are to be reflected as described in Section 7.
- h. Net cash flows associated with any reinsurance are to be reflected as described in Section 9.
- i. Throughout the projection, where estimates of asset or liability items are made that are neither stochastically generated nor prescribed, such estimates shall be on a Prudent Estimate basis.

3. Cash flows from starting assets. Assets at the beginning of the projection shall be selected from the company's actual assets backing the policies associated with each Business Segment. The amount of starting assets shall be determined as described in Section 6.E.1. Cash flows on General Account and guaranteed Separate Account starting assets for each Projection Interval shall be determined as follows:

- a. Fixed income investments. (e.g., public bonds, convertible bonds, preferred stocks, private placements, ABS, commercial mortgage loans, residential mortgage loans, MBSs, and CMOs) including Derivative Instruments associated with these assets.
 1. Gross investment income and principal repayments shall be modeled in accordance with the contractual provisions of each asset and in a manner consistent with each Scenario. Grouping of assets is allowed if the actuary can demonstrate that grouping does not result in a materially lower Scenario Amount than would have been obtained using a seriatim approach.

2. Appropriate asset default costs and investment expenses shall be reflected through a deduction to the gross investment income using Prudent Estimate Assumptions.
3. Realized capital gains and losses on asset sales shall be modeled in a manner that is consistent with the company's documented investment and disinvestment policy.
4. Any uncertainty in the timing and amounts of asset cash flows related to the paths of interest rates, equity returns, or other economic values contained in the various Scenarios shall be reflected directly in the projection of asset cash flows under the various Scenarios within the model as defined in Section 6.D.

b. Equity investments. (i.e., non-fixed income investments having substantial volatility of returns such as common stocks and real estate investments) including Derivative Instruments associated with these assets.

1. The number of equity investment categories, and the allocation of specific assets to each category (e.g. large cap stocks, international stocks, owned real estate, etc.) shall be determined by the actuary as described in Section 6.E.6.
2. The gross investment return (including realized and unrealized capital gains) for each investment category shall be projected in a manner that is consistent with the projected total return on the S&P 500 for the Scenario, reflecting any differences in the total return and risk between the S&P 500 and each equity investment category. This does not imply a strict functional relationship between the returns on the various investment categories and the return on the S&P 500, but it would generally be inappropriate to assume that an investment category consistently 'outperforms' (i.e. has lower risk, but achieves a higher expected return relative to the efficient frontier) the S&P 500.
3. The projected S&P 500 return for each Scenario shall be modeled stochastically as described in Section 6.D. 1.
4. The time of sale of the asset shall be modeled in a manner that is consistent with the investment policy of the company for the respective equity investment categories. Investment expenses shall be reflected through a deduction to the gross investment return using Prudent Estimate Assumptions.

c. All other assets. Asset cash flows on other assets that are not described in item a) and b) above shall be modeled using methods consistent with the methods described in items a) and b) above. This includes assets that are a hybrid of fixed income and equity investments.

4. Cash flows from reinvestment assets. Net cash flows in each Projection Interval shall be reinvested in a manner consistent with the company's investment policy for each Business Segment. Handling of disinvestment shall be consistent with the company's investment policy and reflect economic reality such as the reasonable short-term borrowing capacity of the company. Cash flows from reinvestment assets shall be determined as described in Section 6.C.3., but with the following additional requirement that net spreads (net of default costs and investment expenses) ~~over U.S. Treasuries reflect what a company expects to receive on the purchase and/or sale of securities and the strategies the company expects to utilize in managing its assets.~~ for each projection interval for general account and guaranteed separate account fixed income assets including derivative asset programs associated with these assets:

For fixed income investments including derivative asset programs associated with these assets, at purchase of each asset, determine an appropriate combination of market price

and contractual cash flow provisions for which the resulting purchase yield appropriately reflects the then-current U.S. Treasury interest rate curve plus 4% of the appropriate U.S. Treasury interest rate curve plus .25%.

5. Frequency of Projection. Use of an annual cashflow frequency (“timestep”) is generally acceptable for benefits/features that are not sensitive to projection frequency. The lack of

sensitivity to projection frequency should be validated by testing wherein the actuary should ensure that the use of a more frequent (i.e., shorter) timestep does not materially increase capital requirements. A more frequent time increment should always be used when the product features are sensitive to projection period frequency.

6. Length of Projection Period. The Projection Period shall be sufficiently long that no materially greater Stochastic Amount would result from a longer Projection Period.
7. Simplified approaches. Simplified approaches may be acceptable if they can be shown to produce amounts that are not ~~materially~~ less than those produced by a more robust Cash Flow Model.
8. Asset adequacy analysis principles and techniques as defined by applicable regulations, actuarial guidelines and Actuarial Standards of Practices shall be relied on for many of the detailed aspects encountered in projecting cash flows.

D. Description of Scenarios

1. The cash flow projections shall be made in a manner that reflect stochastically generated paths of U.S. Treasury yield curves, S&P 500 returns for General Account and guaranteed Separate Account equity assets, and future fund performance for Separate Account assets. These stochastically generated paths shall be determined using the by:

~~a. Stochastic generators and model parameters prescribed by the NAIC; or~~

~~b. Pre-packaged scenarios generated from the stochastic generators and model parameters prescribed by the NAIC;~~

~~a. The use of Proprietary Scenario Sets developed by the company for the purpose of calculating the Stochastic Amount for policies within the scope of this report; or~~

~~*[Note: The Proprietary Scenario Sets will be constructed from a universe of scenarios in a manner that produces a result that is reasonably similar to, but not less than, the prescribed CTE amount. This is intended to provide companies an alternative to modeling a large sample from an interest rate generator, or a large number of prepackaged scenarios.]*~~

~~b. Stochastic models developed by the company, if mandated calibration criteria established by the NAIC are met. Returns for equity performance and groupings of variable funds shall be determined on a stochastic basis such that the resulting distribution of the Gross Wealth Ratios of the Scenarios meets the scenario calibration criteria established by the NAIC.~~

~~If the company chooses to use a fully integrated interest rate/equity return model, the equity return scenarios must satisfy the equity return calibration criteria adopted by the NAIC and the interest rate scenarios must satisfy the interest rate calibration criteria adopted by the NAIC.~~

- ~~2. The number of scenarios for which Scenario Amounts are computed shall be considered to be sufficient if any resulting understatement in Reported Amount, as compared with that resulting from running a broader/more robust range of additional scenarios, is not material.~~

~~It is anticipated that the scenarios being used for the purposes of the C3-RBC amount will generally be the same scenarios as those used in the determination of principle-based reserves. However, the use of the same scenarios underlying the reserves may not be appropriate for capital with respect to the number of scenarios and any resulting understatement of Reported~~

~~Amount. The actuary should document and justify the choice of scenarios used in the determination of C3 capital.~~

E. Starting and Projected Assets

1. Starting Asset Amount. The value of assets at the Projection Start Date shall be set equal to an amount no less than 98% and no greater than 102% of the statutory value of the reserve and other liabilities on the policies being valued at the Projection Start Date. All starting assets must be in the company's asset portfolios at the projection start date and be normally associated with supporting the Business Segment being modeled. Assets shall be valued consistently with their annual statement values. Starting assets shall include:
 - a. Where assets supporting policies are held in Separate Accounts, the entire value of the assets in the Separate Accounts.
 - b. The balance of any policy loans outstanding.
 - c. An amount of assets in the General Account and guaranteed Separate Account such that the sum of the assets in the non-guaranteed Separate Account in E. 1.a. and Policy Loans in E. 1 .b. and those selected from the General Account and guaranteed Separate Account are at least equal to 98% and no greater than 102% of the reserve and other liabilities on the policies being valued. If specific "hedge assets," such as equity put options, are being held for the benefit of these products, these are to be reflected in the model in full.

Drafting Note: Why not just use the reserve as a starting point (i.e. An iterative process is already used to determine starting assets in VM-20; therefore, it seems unnecessary to go through the same process here).

General Account assets chosen for use shall be selected on a consistent basis from one valuation hereunder to the next. For products in which a substantial portion of policyholder funds are allocated to Separate Accounts, in many instances the initial General Account assets may be negative, resulting in a projected interest expense.

2. Due and Accrued Investment Income. Starting Assets shall include the balance of any due and accrued investment income on the invested assets included in the starting asset amount.
3. Treatment of Derivative Instruments. Derivative Instruments currently held at the start of the projection that are part of a Derivative Program allocable to the business being valued and meeting the requirements described in Section 6.E.9 below shall be reflected in the projections and included with other General Account assets under Section 6.E. 1 .c above. To the extent that the sum of the value of such Derivative Instruments and the value of assets in Section 6.E. 1.a. and b. above is greater than the estimated value of the Reported Amount as of the start of the projection, then the amount in Section 6.E. 1 .c. above may include enough negative General Account assets such that the sum of items 6.E. 1.a and 6.E. 1 .b and 6.E. 1 .c above equals the estimated value of the Stochastic Amount as of the start of the projection.
4. Treatment of IMR. Any positive IMR balance allocable to the business being valued may be included. Any negative IMR balance allocable to the business being valued, to the extent it offsets positive IMR balances elsewhere in the entity, may also be included. IMR should only be used for the purpose of determining starting assets (i.e., it should not be projected into the future).
5. Valuation of Projected Assets. The values of projected Starting Assets shall be determined in a manner consistent with their values at the start of the projection. For reinvestment assets, the value shall be determined in a manner consistent with the value of assets at the start of the projection that have similar investment characteristics.
6. Grouping of equity investments in the General Account and guaranteed Separate

Account. The portion of the Starting Asset Amount held in the General Account and guaranteed Separate Account represented by equity investments (e.g. common stocks, real estate investments) may be grouped for modeling using an approach that establishes various equity investment categories, as determined by the actuary, with each investment category defined to reflect the different types of equity investments in the portfolio. In assigning each equity investment to an investment category, the

fundamental characteristics of the asset shall have an appropriate relationship to the other assets assigned to the investment category.

An appropriate proxy for each equity investment category shall be designed in order to develop the investment return paths. The development of the returns for the proxy equity investment categories is a fundamental step in the modeling and can have a significant effect on results. As such, the actuary must map each investment category to an appropriately crafted proxy investment category normally expressed as a linear combination of recognized market indices (or sub-indices). The proxy construction process should include an analysis that establishes a firm relationship between the investment return on the proxy and the specific equity investment category.

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

An appropriate proxy for each variable sub-account shall be designed in order to develop the investment return paths. The development of the returns for the proxy funds is a fundamental step in the modeling and can have a significant effect on results. As such, the actuary must map each variable account to an appropriately crafted proxy fund normally expressed as a linear combination of recognized market indices (or sub-indices). The proxy construction process should include an analysis that establishes a firm relationship between the investment return proxy and the specific variable funds.

- ~~8.8. Modeling of Derivative Programs.~~ The appropriate costs and benefits of Derivative Instruments that are currently held by the company in support of the policies falling under the scope of the report shall be included in the projections when determining the Stochastic Amount. The appropriate costs and benefits of anticipated future Derivative Instrument transactions ~~associated with the execution of a Clearly Defined Hedging Strategy~~ shall ~~also not~~ be included in the projections when determining the Stochastic Amount. ~~The appropriate costs and benefits of anticipated future Derivative Instrument transactions associated with non-hedging Derivative Programs (e.g., replication, income generation) undertaken as part of the investment strategy supporting the policies shall also be included in the projections when determining the Stochastic Amount provided they are normally modeled as part of the company's risk assessment and evaluation processes. Non-hedging programs included in the model must meet the principles outlined in Section 4 of these requirements (particularly that strategies should be appropriate to the business and not merely constructed to exploit foreknowledge of the components of the required methodology), and the actuary shall take due care in maintaining conditions in the model consistent with the requirements for permissibility of such programs.~~

9. Specifics as to the modeling of Derivative Instruments are given in Section 7.

~~9. Requirements of a Clearly Defined Hedging Strategy.~~ In order to qualify as a Clearly Defined Hedging Strategy, the strategy shall, at a minimum, identify:

- ~~a. The specific risks being hedged (e.g., delta, rho, vega, etc.);~~
- ~~b. The hedge objectives;~~
- ~~c. The financial instruments that will be used to hedge the risks;~~
- ~~d. The hedge trading rules including the permitted tolerances from hedging objectives; and~~
- ~~e. The criteria, metrics and frequency for measuring hedging effectiveness.~~

~~The hedge strategy may be dynamic, static, or a combination thereof.~~

~~Strategies involving the offsetting of the risks associated with other products outside of the scope of this report do not currently qualify as a Clearly Defined Hedging Strategy.~~

10. Modeling Federal Income Tax. The projections in support of the stochastic amount should be made on an after-tax basis. Reasonable approximations may be made by the Actuary for the projection of tax reserves and other items impacting the calculation of taxable income for a Business Segment. However, the actuary is required to consider adjusting Scenario Amounts under circumstances described in Section G.6.a.5. where approximations for tax reserves are made.

F. Discount Rates

1. For the Scenario Amount calculations, the path of Discount Rates for each Business Segment shall be ~~calculated as follows:~~

~~a. Companies that model scenarios of interest rates either alone or integrated with scenarios of fund returns are to use the one-year treasury rates from that model multiplied by a factor of 105% and reduced for purposes of federal income tax.~~

~~a. Companies that model only fund returns or do not model interest rates stochastically are to use the 90 CTE of the scenario discount factors. These factors are described below using an example.~~

Assume the use of 200 scenarios. For year 1, 200 discount factors are determined, i.e. $1/(1+i_{1,s})$, where the discount rates are the one-year treasury yields from 6.F. 1.a above, multiplied by 105%. These are ordered from lowest to highest, and the average of the highest 20 is taken. For year 2, 200 discount factors are determined, i.e. $1/(1+i_{1,s})(1+i_{2,s})$. These are ordered from lowest to highest, and the average of the highest 20 is taken. This process is continued for year 3 and so on. The interest rates are also tax adjusted above to a post-tax basis

Over a 30 year horizon period the approach outlined above will give rise to 30 different discount rates. The company may simplify the discounting process by using fewer discount rates or even a single discount rate over the entire period. If the company follows this practice it must demonstrate or justify that the risk-based calculation is not materially lower as a result of this simplification.

Numerical examples of this process using 10 scenarios over a 10 year projection are given on the following page.

One Year Treasury Rates

Scenario / Year	1	2	3	4	5	6	7	8	9	10
1	1.99%	2.71%	2.71%	2.77%	2.93%	3.25%	2.87%	2.64%	2.40%	2.48%
2	1.38%	1.50%	1.86%	1.50%	1.67%	1.77%	1.56%	1.38%	1.32%	1.61%
3	1.71%	1.87%	1.81%	1.98%	1.65%	1.59%	1.37%	1.35%	1.33%	1.30%
4	1.93%	1.55%	1.69%	1.93%	1.83%	1.85%	1.80%	2.10%	2.27%	2.48%
5	1.96%	2.29%	2.41%	2.26%	2.01%	2.03%	2.27%	2.67%	2.70%	2.73%
6	1.87%	1.92%	1.72%	1.40%	1.68%	1.59%	1.49%	1.57%	1.42%	1.26%
7	1.91%	1.88%	2.16%	1.83%	1.91%	2.22%	2.24%	2.53%	2.74%	2.80%
8	1.67%	1.42%	1.51%	1.90%	1.80%	2.17%	2.10%	2.42%	2.55%	2.70%
9	2.00%	1.70%	2.03%	2.08%	2.02%	2.03%	2.06%	2.30%	1.93%	1.57%
10	1.94%	1.30%	1.52%	1.23%	1.44%	1.20%	1.23%	1.26%	1.48%	1.46%

105% of After-tax Discount Factors (taxes at 35%)

Scenario / Year	1	2	3	4	5	6	7	8	9	10
1	0.98658	0.96868	0.95106	0.93339	0.91508	0.89520	0.87801	0.86249	0.84860	0.83450
2	0.99065	0.98062	0.96834	0.95855	0.94777	0.93647	0.92663	0.91797	0.90975	0.89988
3	0.98850	0.97606	0.96413	0.95128	0.94066	0.93059	0.92196	0.91358	0.90536	0.89743
4	0.98703	0.97671	0.96555	0.95299	0.94123	0.92947	0.91817	0.90518	0.89136	0.87654
5	0.98677	0.97159	0.95587	0.94137	0.92865	0.91595	0.90196	0.88584	0.86982	0.85390
6	0.98742	0.97463	0.96331	0.95419	0.94336	0.93324	0.92387	0.91408	0.90529	0.89755
7	0.98711	0.97463	0.96051	0.94869	0.93650	0.92253	0.90864	0.89325	0.87683	0.86042
8	0.98873	0.97923	0.96925	0.95686	0.94526	0.93144	0.91830	0.90340	0.88793	0.87186
9	0.98652	0.97521	0.96187	0.94841	0.93549	0.92269	0.90990	0.89585	0.88419	0.87482
10	0.98694	0.97826	0.96819	0.96014	0.95078	0.94304	0.93517	0.92722	0.91793	0.90888

Re-ordered Highest to lowest within year

Scenario / Year	1	2	3	4	5	6	7	8	9	10
1	0.99065	0.98062	0.96925	0.96014	0.95078	0.94304	0.93517	0.92722	0.91793	0.90888
2	0.98873	0.97923	0.96834	0.95855	0.94777	0.93647	0.92663	0.91797	0.90975	0.89988
3	0.98850	0.97826	0.96819	0.95686	0.94526	0.93324	0.92387	0.91408	0.90536	0.89755
4	0.98742	0.97671	0.96555	0.95419	0.94336	0.93144	0.92196	0.91358	0.90529	0.89743
5	0.98711	0.97606	0.96413	0.95299	0.94123	0.93059	0.91830	0.90518	0.89136	0.87654
6	0.98703	0.97521	0.96331	0.95128	0.94066	0.92947	0.91817	0.90340	0.88793	0.87482
7	0.98694	0.97463	0.96187	0.94869	0.93650	0.92269	0.90990	0.89585	0.88419	0.87186
8	0.98677	0.97463	0.96051	0.94841	0.93549	0.92253	0.90864	0.89325	0.87683	0.86042
9	0.98658	0.97159	0.95587	0.94137	0.92865	0.91595	0.90196	0.88584	0.86982	0.85390
10	0.98652	0.96868	0.95106	0.93339	0.91508	0.89520	0.87801	0.86249	0.84860	0.83450

Discount rate = average of highest 10% within year

0.99065	0.98062	0.96925	0.96014	0.95078	0.94304	0.93517	0.92722	0.91793	0.90888
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G. The Stochastic Amount

1. Purpose. The purpose of the Stochastic Amount is to produce an amount that is adequate to cover the product benefits, revenue and expenses over a broad range of stochastically generated Scenarios for all policies falling under the scope of this report. It is meant to capture all material C3 risks. The Stochastic Amount may be determined assuming that all, or only some, of the risks underlying the policies are modeled stochastically, but at a minimum, it must assume that interest rate movements, equity movements, and separate account fund performance be modeled stochastically.

2. Stochastic Exclusion Test

It will not be necessary to perform stochastic modeling for groups of policies where such policies are deemed not have material tail risk by means of passing the Stochastic Exclusion Test detailed in Section 10. For groups of policies passing the Stochastic Exclusion Test the C3 amount may continue to be determined as the Factor-based Amount as described in section 6I below.

3. Stochastic Modeling Exclusion: The actuary may elect to exclude certain groups of policies from the stochastic modeling requirement upon demonstration that the Alternative Amount for those policies will adequately provide for all material C3 risks underlying such policies. Policies that do not pass the Stochastic Exclusion Test are still eligible to use this stochastic modeling exclusion.

4. Stochastic Amount Calculation Description: The Stochastic Amount is determined using the following steps:

- a. Determine policy grouping as defined in Section 6.G.5;
- b. Determine Prudent Estimate Assumptions as defined in Section 6.B above;
- c. Project cash flows for each Business Segment for each Scenario as described in 6 C, D, and E;
- d. Calculate the path of Discount Rates for each Business Segment for each Scenario as described in 6 F;
- e. Calculate the Scenario Amount for each Scenario using the methodology described in 6.G.6; and;
- f. Calculate the Stochastic Amount as described in 6.G.7, below.

5. Grouping of Policies for Modeling: Projections may be performed for each policy in force on the date of valuation or by grouping policies into representative cells of model plans using all characteristics and criteria having a material impact on the size of the Reported Amount. Grouping shall not be done in a manner that intentionally understates the resulting Reported Amount.

6. Calculation of the Scenario Amount

- a. For each Scenario, the Scenario Amount for one or more Business Segments is determined by following steps (1) through (5) below:
 1. Calculate the net accumulated asset amount for each Business Segment at the end of each Projection Year and at the Projection Start Date, as described in 6.G.6.c below. Note that the net accumulated asset amount can be either positive or negative;
 2. Calculate the Accumulated Deficiency for each Business Segment at the end of each Projection Year and at the Projection Start Date for each Business Segment as the excess of the Working Reserve over the net accumulated asset amount at that duration. Note that the Accumulated Deficiency can be either positive or negative. The

Working Reserve is equal to the cash surrender value for purposes of this calculation. For policies having no cash surrender value the Working Reserve is equal to zero;

3. At the end of each Projection Year and at the Projection Start Date, calculate the discounted value of the Accumulated Deficiency for each Business Segment that was calculated in step 6.a.(2) above. The discounted value shall be calculated using the path of Discount Rates for the Business Segment from the Projection Start Date to the end of the Projection Year;
4. Determine the aggregate discounted value of the Accumulated Deficiency at the end of each Projection Year and at the Projection Start Date as the sum of the discounted value of Accumulated Deficiency at that Duration across Business Segments; and
5. Determine the Scenario Amount as the sum of (a) the statement value of the starting assets across Business Segments and (b) the maximum of the values calculated in step (4) above. Note that the amount in (b) herein can be either positive or negative.

The Actuary shall consider making an adjustment to the Scenario Amount for the difference between the modeled and actual tax reserves at the beginning of the projection, if necessary.

In the case where actual tax reserves are higher (lower) than the modeled tax reserve at the beginning of the projection period, the modeled tax expense may be understated (overstated) over the projection period. If a tax adjustment is required the Total Asset Requirement must be increased (decreased) on an approximate basis to correct for the understatement (overstatement) of modeled tax expense. A tax adjustment is more likely to be required where tax reserves are not projected directly; for example, where projected tax reserves are approximately modeled as cash values or other approximations.

An acceptable adjustment to the Scenario Amount may be calculated as the corporate tax rate (i.e. 35%) times 'f' times the difference between modeled tax reserves and actual tax reserves at the start of the projections. For this calculation, f is calculated as follows. For the scenarios reflected in calculating CTE (90), the lowest of these present values of Accumulated Deficiency is determined for each calendar year-end and its associated projection duration is tabulated. At each such duration, the ratio of the number of contracts in force (or covered lives for group contracts) to the number of contracts in force (or covered lives) at the start of the modeling projection is calculated. The average ratio is then calculated, over all CTE (90) scenarios, and f is one minus this average ratio.

- b. The aggregation of one or more Business Segments for purposes of determining the Scenario Amount is up to actuarial judgment.

It is not required that each Business Segment use the same set of stochastic Scenarios. However, any set of Scenarios would be subject to the scenario requirements specified in Section 6.D above. The use of a different set of stochastic Scenarios would generally result in the inability to aggregate results across the two or more Scenario sets.

- c. For each Scenario the net accumulated asset amount for a Business Segment at the end of each Projection Year is equal to the projected statement value of

invested assets for that Business Segment. For all Scenarios, the net accumulated asset amount for a Business Segment at the Projection Start Date is the statement value of starting assets for that Business Segment. The projected statement value of invested assets at any future duration must reflect the accumulation of cash flows into and out of the portfolio for the items listed in (1) through (8) below as described in Sections 6.C.2. and 6.C.3. The net accumulated asset amount can be either positive or negative, according to:

1. Benefits, including but not limited to death and cash surrender benefits;
2. Expenses, including but not limited to, commissions, general expenses, and premium taxes;
3. Gross premium payments;
4. Other applicable revenue such as fees and revenue on assets invested in sub-accounts, and any Revenue Sharing income;
5. Net payments to/from the General Account from/to the Separate Account;
6. Net Investment Earnings (including realized gains);
7. Net cash flows from Liability-associated Derivatives, and
8. Federal income taxes.

7. The Stochastic Amount

The Stochastic Amount is determined as the sum of applying steps a. and b. below to each segment or set of segments for which a Scenario Amount has been calculated.

- a. Rank the Scenario Amounts from lowest to highest; and
- b. Take the average of the highest 10% of the Scenario Amounts.

If necessary, add an amount to item (b) above to capture any material risk included in the scope of these requirements but not already reflected in item (b) above.

The actuary may elect to base the projections on asset and policy inforce data that have an “as of” date prior to the valuation date, but in no event earlier than six months before the Valuation Date, provided that such data can be adjusted so that the calculated amount that is based on such data is, in the actuary’s judgment, appropriate. The actuary should disclose and discuss in the supporting memorandum any use of prior period data and the reasoning leading to the conclusion that the calculated amount based on such data is appropriate. Disclosure of the results of such adjustment and the methodology used to determine the adjustment is required. Any such adjustment would generally consider:

1. Changes in economic conditions between the prior period date and the valuation date;
2. The recognition of estimated cash flows from new business during that period;
3. Material transactions such as reinsurance (either ceded or assumed) of a block of business;
4. Material changes in asset profile;
5. Material changes in liability profile;
6. Material change in matching position of assets and liabilities;
7. Change in the effectiveness of Derivative Programs; changes to existing or addition of new Derivative Programs; and
8. Changes to existing or addition of new reinsurance arrangements.

[Note: If Proprietary Scenarios Sets are used, the derivation of the Stochastic Amount will be defined by a separate process, rather than the process defined above.]

The Stochastic Amount may be reduced, but not to less than zero, by the factor-based RBC covering market volatility risk of equity assets used in the determination of the Stochastic Amount. The amount of such adjustment and its derivation is to be documented in the Actuarial Report. The actuary who certifies the RBC amount must be reasonably certain that the risks that the factor-based RBC are attempting to measure are captured in the Stochastic Amount and that the amount of assets included in determination of the adjustment is not greater than the statutory value of such assets included in the models underlying the Stochastic Amount.

The Stochastic Amount may be reduced, but not to less than zero, by the factor-based RBC covering recoverability of expense allowances at the valuation date relating to liabilities being modeled. The amount of such adjustment and its derivation is to be documented in the Actuarial Report. The actuary who certifies the RBC amount must be reasonably certain that the risks that the factor-based RBC are attempting to measure are captured in the Stochastic Amount and that the amount of expense allowances included in determination of the adjustment is not greater than the statutory value of such allowances relating to the liabilities included in the models underlying the Stochastic Amount.

To the extent the Stochastic Amount is based on data prior to the valuation date and the Total Adjusted Capital is less than 110 percent of the Company Action Level amount, it will be necessary to re-determine the Stochastic Amount subsequent to filing, using actual year-end data. If the re-determined RBC value exceeds that estimated earlier in the blanks filing by more than 5 percent, or if the actual value triggers regulatory action, a revised filing with the NAIC and the state of domicile is required by June 15; otherwise re-filing is permitted but not required.

H. The Alternative Amount

1. Purpose. The purpose of the Alternative Amount is to produce a C3 amount that is adequate to cover the C3 risks related to the product benefits and expenses, reflecting future revenue, for those policies for which the stochastic modeling exclusion has been made.
2. Alternative Amount Description. The Alternative Amount for a given set of policies within a Business Segment is to be determined by the actuary, subject to the minimum floor described in H.5. below. The actuary must be able to demonstrate how he/she came to the conclusion that the Alternative Amount covers adverse experience at a comparable CTE level to the Stochastic Amount which would have been calculated for such policies had the stochastic modeling exclusion not been made. The actuary must be able to demonstrate how he/she came to the conclusion that the Alternative Amount considers the dynamics of the liability and supporting asset cash flows in response to changes in interest rates and market movements.
- ~~2.3.~~ The appropriate costs and benefits of Derivative Instruments that are currently held by the company in support of the policies falling under the scope of the report shall be included in the projections when determining the Alternative Amount. The Alternative Amount shall **not** take into account the appropriate costs and benefits of Derivative Instruments expected to be held in the future, ~~through the execution of that strategy only if the company is following a Clearly Defined Hedging Strategy and the hedging strategy meets the requirements as defined in Section 6.E.9 above.~~
- ~~3.4.~~ As a minimum requirement, the Alternative Amount may be determined for a set of policies if and only if such policies have been subjected to asset adequacy testing at the valuation date. Asset adequacy testing analysis methods need not be limited to cash flow testing. The actuary should use professional judgment in choosing an appropriate testing

method among those currently in use in generally accepted actuarial standards of practice.

5. The Alternative Amount may not be less than the sum of the following amounts:

- a. The statutory reserve at the Valuation Date relating to such policies; and
- b. ~~0.5%~~1.0% of the net balance of item (a) above less the reserve corresponding to associated policy loans in the case of the company submitting an unqualified actuarial opinion based on asset adequacy testing and where asset and liability durations differ by no more than 0.125; otherwise ~~0.71~~1.5% of the net balance of item (a) above less the reserve corresponding to associated policy loans.

[Note: the intent of the minimum amount is to provide regulator assurance that the C3 requirements for blocks of business for which the Alternative Amount has been determined and not subjected to stochastic scenario analysis are not less than the current factor-based rules. The minimum requirement is viewed by C3 WG as a temporary measure until regulators and industry are comfortable with the process as a minimum requirement would not generally be included in a principle-based approach. It is recommended that the minimum requirement be removed after a period of 3 years following the date that the recommendations within this report first become effective.]

If the Alternative Amount is determined on a date that precedes the Valuation Date, then the Alternative Amount shall be adjusted to the Valuation Date.

The actuary shall annually re-evaluate the adequacy of the Alternative Amount. If, as of the end of any calendar year, the actuary determines the Stochastic Amount will materially exceed the Alternative Amount for the group of policies:

- i. The Alternative Amount shall be increased so the Stochastic Amount does not materially exceed the Alternative Amount, or
- ii. The exclusion shall be discontinued and the Stochastic Amount shall be held.

6. Alternative Amount Demonstration and Analysis. A demonstration supporting the exclusion from stochastic modeling must be provided in the initial exclusion year and at least once every three calendar years subsequent to the initial exclusion. Such demonstration may use a series of deterministic scenarios with varying levels of imputed adverse deviations, or other techniques, to impute what confidence level and CTE level is covered, and that the resulting Alternative Amount is consistent with the intended conservatism implicit in the determination of the Stochastic Amount, had the Stochastic Amount been determined. The level of thoroughness required in the demonstration would be greater the more material the C3 risks related to the block, and the higher the level of volatility and unpredictability of the underlying variables (e.g., products with guarantees but investing in stocks would need more testing than a participating whole life product with a 3% guarantee.) Such demonstration must be accompanied by a high level analysis of the products, the associated C3 risks and the potential C3 capital needs of the products under adversity.

I. Factor-based Amount

1. The actuary may choose, for a given group of policies, to apply the Stochastic Exclusion Test as detailed in Section 10. It will not be necessary to perform stochastic modeling for groups of policies passing the Stochastic Exclusion Test. Such groups of policies are deemed not to have material tail risk and the C3 amount will be defined as the Factor-based Amount.

2. The Factor-based Amount will be determined as the sum of the following amounts:

- a. The statutory reserve at the Valuation Date relating to such policies; and
- b. 1.0% of the net balance of item (a) above less the reserve corresponding to associated policy loans in the case of the company submitting an unqualified actuarial opinion based on asset adequacy testing and where asset and liability durations differ by no more than 0.125; otherwise 1.5% of the net balance of item (a) above less the reserve corresponding to associated policy loans.
~~0.5% of the net balance of item (a) above less associated policy loans in the case of the company submitting an unqualified actuarial opinion based on asset adequacy testing.~~

J. Non-modeled Amount

1. There may be some immaterial amounts of liabilities covered by this recommendation that are not modeled. For these products, the Non-modeled Amount is equal to the statutory value on the valuation date of the non-modeled liabilities, plus the greater of 0.5% 1.0% (1.5% if asset and liability durations differ by an amount greater than 0.125, actuarial Opinion is not based on asset adequacy analysis, or if actuarial opinion is qualified) (the current C3 after-tax factor for life insurance products) or the ratio of the sum of the modeled Stochastic Amount and Alternative Amount to the modeled liabilities, times the statutory value on the valuation date of the non-modeled liabilities.

K. Total Asset Requirement

1. ~~1.~~ The Total Asset Requirement is the greater of (a) and (b), where (a) equals the sum over all Business Segments of the Stochastic Amount, the Alternative Amount or the Factor-based Amount for each Business Segment or combination of Business Segments, plus any Non-modeled Amount related to each segment or combination of segments, and (b) is equal to the sum of the current factor based amount and corresponding reserve amount on the valuation date for all of the Company's liabilities falling within the scope of this report.

L. The Reported Amount

1. The Reported Amount is the minimum amount as of the Valuation Date for the policies falling within the scope of this report. The Reported Amount equals the Total Asset Requirement less the statutory value on the valuation date of the liabilities included in the determination of the Total Asset Requirement.
2. The Reported Amount relates to interest rate risk and market risk. The portion which is attributable to interest rate risk is to be combined with the current C3a component of the formula. The portion which is attributable to market risk is to be allocated and combined with the current C3c component of the formula.

In allocating the Reported Amount between the interest and market risk components the actuary is guided by the following:

- a. In certain situations or for certain products the Reported Amount relates in its entirety to either interest rate risk or market risk. In such cases no allocation is necessary.
- b. In certain situations or for certain products the interest rate risk or market risk may not be a material portion of the Reported Amount. In such situations the

actuary may consider allocating the entire amount to the more material portion of the two risk types comprising the Reported Amount. In doing so the actuary should consider the covariance effect of making such an allocation. The allocation of the non-material portion, through the allocation of the entire Reported Amount to one risk component, is conservative if the allocated to risk component has the lower covariance impact. The allocation of the non-material portion, through the allocation of the entire Reported Amount to one risk component, is not conservative if the allocated to risk component has the higher covariance impact. In such case the actuary will be required to document his/her assessment of the materiality of the risk and rationale for such allocation.

- c. In other situations or for other products both the interest rate risk and market risk may form a material portion of the Reported Amount. In this case allocating the Reported Amount to the component with the least covariance effect would be conservative and acceptable. Otherwise, the actuary must develop and document an appropriate basis for allocating the Reported Amount.

M. Treatment of Non-Guaranteed Elements

1. Non-Guaranteed Elements (NGE) are to be included in the models used to project future cash flows for the Stochastic Amount. Where NGEs are based on some aspect of experience, future changes in the level of NGEs can be reflected in the Cash Flow Model based on the experience assumed in each Scenario.
2. As would be the case in actual practice, the projected NGE should not be assumed to change simultaneously with the change in projected experience, but only at the date following the recognition of a change in experience on which the company would normally implement a change.
3. When determining the projected NGE for each Scenario, the actuary must take into consideration those factors that affect how the company will modify its current NGE scale, such as existence of contract guarantees, the company's past NGE practices and current NGE policies.
4. Due to the uncertainty in the future level of NGEs arising from factors such as those listed below, a Margin should be established for the projected NGE that would result in an increase in the Scenario Amount compared to the Scenario Amount that would result without a Margin.
5. The liability for dividends declared but not yet paid that has been established according to statutory accounting procedures as of the Valuation Date is reported separately from the statutory reserve. This liability may be included or not included in the Cash Flow Model at the company's option. If the dividends that give rise to the dividend liability are included in the Cash Flow Model, then the dividend liability may be included in the liabilities that are deducted from the Total Asset Requirement in calculating the RBC requirement.
6. Non-guaranteed elements that represent the payments of retained surplus, other than divisible surplus under participating contracts, may be excluded from these calculations.

Section 7. Modeling of Derivative Instruments

A. General Considerations

The appropriate costs and benefits of Derivative Instruments that are currently held by a company in support of the policies falling under the scope of the report shall be included in the projections when determining the Stochastic Amount.

The appropriate costs and benefits of anticipated future Derivative Instrument transactions ~~associated with the execution of a Clearly Defined Hedging Strategy~~ shall ~~also~~not be included in the projections. ~~if a company is following a Clearly Defined Hedging Strategy and the hedging strategy meets the requirements as defined in Section 6.E.~~

These requirements do not supersede any statutes, laws, or regulations of any state or jurisdiction related to the use of derivative instruments for hedging purposes and should not be used in determining whether a company is permitted to use such instruments in any state or jurisdiction. To the extent these requirements conflict with any applicable law, the applicable law supersedes.

B. Background

~~The analysis of the impact of the Derivative Program on cash flows is typically performed using either one of two methods as described below. Although a Derivative Program would normally be expected to reduce risk provisions, the nature of the Derivative Program and the costs to implement the strategy may result in an increase in the amount of the Reported Amount otherwise calculated.~~

~~The fundamental characteristic of the first method is that all hedging positions, both the currently held positions and those expected to be held in the future, are included in the cash flow model used to determine the Reported Amount.~~

~~The fundamental characteristic of the second method is that the effectiveness of the current Derivative Program (including currently held hedge positions) on future cash flows is evaluated, in part or in whole, outside of the cash flow model. In this case, the reduction to the Reported Amount otherwise calculated should be commensurate with the degree of effectiveness of the Derivative Program in reducing accumulated deficiencies otherwise calculated.~~

~~Regardless of the methodology used by the company, the ultimate effect of the current Derivative Program (including currently held Derivative Instruments), on the Reported Amount needs to recognize all risks, associated costs, imperfections in the hedges and hedging mismatch tolerances associated with the Derivative Program. The risks include, but are not limited to: basis, gap, price, parameter estimation, and variation in assumptions (mortality, persistency, withdrawal, annuitization, etc.). Costs include, but are not limited to: transaction, Margin (opportunity costs associated with Margin requirements) and administration. In addition, the reduction to the Reported Amount attributable to the Derivative Program may need to be limited due to the uncertainty associated with the company's ability to implement the Derivative Program in a timely and effective manner. The level of operational uncertainty varies indirectly with the amount of time that the new or revised strategy has been in effect or mock tested.~~

~~No hedging strategy is perfect. A given hedging strategy may eliminate or reduce some, but not all risks, transform some risks into others, introduce new risks or may have other imperfections. For example, a delta only hedging strategy does not adequately hedge the risks measured by the relationships between the sensitivities to equity markets and interest rates (commonly referred to as the Greeks) other than delta. Another example is that financial indices underlying typical hedging instruments typically do not perform exactly like the separate account funds, and hence the use of hedging instruments has the potential for introducing basis risk.~~

C. Specific Conditions and Requirements

~~As part of the process of choosing a methodology and assumptions for estimating the future effectiveness of the current Derivative Program (including currently held Derivative Instruments) for purposes of reducing the Reported Amount, the actuary should review actual historical hedging effectiveness. The actuary must evaluate the appropriateness of the assumptions on future trading, transaction costs, and other elements of the model, the strategy, the mix of business, and other items that could result in materially adverse results. This includes an analysis of model assumptions that, when combined with the reliance on the Derivative Program, may result in adverse results relative to those modeled. The parameters and assumptions must be adjusted (based on testing contingent on the strategy used and other assumptions) to levels that fully reflect the risk, based on historical ranges and foreseeable future ranges of the assumptions and parameters. If this is not possible by parameter adjustment, the model must be modified to reflect them at either "best estimates" or adverse estimates of the parameters.~~

~~A discontinuous hedging strategy is a hedging strategy where the relationships between the sensitivities to equity markets and interest rates (Greeks) associated with some guaranteed policyholder options embedded in some products and these same sensitivities associated with the hedging assets are subject to material discontinuities. Any hedging strategy, including a delta hedging strategy, can be a discontinuous hedging strategy if implementation of the strategy permits material discontinuities between the sensitivities to equity markets and interest rates associated with the guaranteed policyholder options embedded in the variable annuities and other in scope products and these same sensitivities associated with the hedging assets. There may be scenarios that are particularly costly to discontinuous hedging strategies, especially where those result in large discontinuous changes in sensitivities (Greeks) associated with the hedging assets. Where discontinuous hedging strategies contribute materially to a reduction in the Reported Amount, the actuary must evaluate the interaction of future trigger definitions and the discontinuous hedging strategy, in addition to the items mentioned in the previous paragraph. This includes an analysis of model assumptions that, when combined with the reliance on the discontinuous hedging strategy, may result in adverse results relative to those modeled.~~

~~The implementation of a strategy strongly dependent on the acquisition of hedging assets at specific times, which also depends on specific values of an index or other market indicators, may not happen precisely as planned.~~

~~The combination of elements of the cash flow model, including the initial actual market asset prices, prices for trading at future dates, transaction costs, and other assumptions should be analyzed by the actuary as to whether the cash flow model permits hedging strategies that make money in some scenarios without losing a reasonable amount in some other scenarios. This includes, but is not limited to:~~

- ~~1) Hedging strategies with no initial investment that never lose money in any scenario and in some scenarios make money; or~~
- ~~2) Hedging strategies that with a given amount of initial money never make less than accumulation at the one period risk free rates in any scenario but make more than this in one or more scenarios.~~

~~If the cash flow model allows for such situations, the actuary should be satisfied that the results do not materially rely directly or indirectly on the use of such strategies. In addition, the actuary should disclose the situations and provide supporting documentation as to why the actuary believes the situations are not material for determining the Reported Amount. If the results do materially rely directly or indirectly on the use of such strategies, the strategies may not be used to reduce the Reported Amount otherwise calculated.~~

~~In addition to the above, the method used to determine prices of financial instruments for trading in scenarios should be compared to actual initial market prices. If there are substantial discrepancies, the actuary should disclose the material discrepancies and provide supporting documentation as to why the model based prices are appropriate for determining the Reported Amount. In addition to comparisons to initial market prices, there should be testing of the pricing models that are used to determine subsequent prices when Scenarios involve trading financial instruments. This testing should consider historical relationships. For example, if a method is used where recent volatility in the Scenario is one of the determinants of prices for trading in that Scenario, then that model should approximate actual historic prices in similar circumstances in history.~~

~~D. Derivative Program Certification and Documentation~~

~~The actuary must provide a certification that the assumptions used in determining the impact of Derivative Programs on the calculations were reasonable for the purpose of determining the Reported Amount.~~

~~The actuary must provide a certification as to whether the Clearly Defined Hedging Strategy is fully incorporated into the cash flow model and any supplementary analysis of the impact of the Derivative Program on the Reported Amount. The actuary must document the extent to which elements of the Derivative Program (e.g., time between portfolio rebalancing) are not fully incorporated into the cash flow model and any supplementary analysis to determine the impact, if any. In addition, the actuary must provide a certification and maintain documentation to support the certification that the Derivative Program designated as the Clearly Defined Hedging Strategy meets the requirements of a Clearly Defined Hedging Strategy. This includes certification that the implementation of the Derivative Program in the stochastic cash flow model and any supplementary analysis does not include knowledge of events that occur after any action dictated by the hedging strategy (i.e. the model cannot use information about the future that would not be known in actual practice.).~~

~~A financial officer of the company (e.g., Chief Financial Officer, Treasurer or Chief Investment Officer) or a person designated by them who has direct or indirect supervisory authority over the actual trading of assets and derivatives must certify that the Derivative Program modeled is the Derivative Program being used by the company in its actual day-to-day risk mitigation efforts.~~

Section 8. Revenue Sharing Assumptions

A. Requirements

1. Projections may include income from projected future Revenue Sharing (as defined in this Report) net of applicable projected expenses ("Net Revenue Sharing Income") if the following requirements are met:
 - a. The Net Revenue Sharing Income is received by the company;¹
 - b. Signed contractual agreement or agreements are in place as of the Valuation Date and support the current payment of the Net Revenue Sharing Income; ~~and~~
 - c. The Net Revenue Sharing Income is not already accounted for directly or indirectly as a company asset; ~~and-~~
 - d. The Net Revenue Sharing Income is contractually guaranteed to the insurer and its liquidator, receiver, conservator, or statutory successor.

B. Revenue Sharing Amounts

The amount of Net Revenue Sharing Income to be used shall reflect the actuary's assessment of factors that include but are not limited to the following (not all of these factors will necessarily be present in all situations):

- a. The terms and limitations of the agreement(s), including anticipated revenue, associated expenses and any contingent payments incurred or made by either the company or the entity providing the net Revenue Sharing as part of the agreement(s);
- b. The relationship between the company and the entity providing the Net Revenue Sharing Income that might affect the likelihood of payment and the level of expenses;
- c. The benefits and risks, to both the company and the entity paying the Net Revenue Sharing Income, of continuing the arrangement;
- d. The likelihood that the company will collect the Net Revenue Sharing Income during the term(s) of the agreement(s) and the likelihood of continuing to receive future revenue after the agreement(s) has ended;
- e. The ability of the company to replace the services provided to it by the entity providing the Net Revenue Sharing Income or to provide the services itself, along with the likelihood that the replaced or provided services will cost more to provide;
- f. The ability of the entity providing the Net Revenue Sharing Income to replace the services provided to it by the company or to provide the services itself, along with the likelihood that the replaced or provided services will cost more to provide; or
- g. All expenses required or assumed to be incurred by the company in conjunction with the arrangement providing the Net Revenue Sharing Income, as well as any expenses assumed to be incurred by the company in conjunction with the assumed replacement of the services provided to it (as discussed in subsection (e) above) shall be included in the projections as a company expense. In addition, expenses incurred by either the entity providing the Net Revenue Sharing Income or an affiliate of the company shall be included in the applicable expenses that reduce the Net Revenue Sharing Income.

C. Margins

1. The amount of projected Net Revenue Sharing Income shall also reflect a Margin (which decreases the assumed Net Revenue Sharing Income) directly related to the uncertainty of

¹ As in other sections of this report, the term "the company" is used exclusively as a reference to the insurance company writing the business falling under the scope of the Report. The term "entity providing the Net Revenue Sharing Income" is self-explanatory and is

used consistently in this subsection.

the revenue, including uncertainty regarding the creditworthiness of the provider of the Net Revenue Sharing Income. The greater the uncertainty, the larger the Margin.²

2. To the extent the agreements(s) guarantees³ the payment of Net Revenue Sharing Income to the company, the net revenue may be included in full over the period for which it is guaranteed.⁴

D. Additional Requirements

The actuary is responsible for reviewing the revenue sharing agreements, verifying compliance with these requirements, and documenting the rationale for any source of Net Revenue Sharing Income used in the projections.

² Because the uncertainty would be expected to increase over time, it may be necessary to decrease the revenue by larger amounts in later projection periods.

³ Provisions such as one that gives the entity paying the Net Revenue Sharing Income the option to stop or change the level of income paid would prevent the income from being guaranteed. However, if such an option becomes available only at a future point in time, and the revenue up to that time is guaranteed, the income is considered guaranteed up to the time the option first becomes available.

⁴ If the agreement allows the company to unilaterally take control of the underlying fund fees that ultimately result in the Net Revenue Sharing Income then the revenue is considered guaranteed up until the time at which the company can take such control. Since it is unknown whether the company can perform the services associated with the revenue sharing arrangement at the same expense level, it is presumed that expenses will be higher in this situation. Therefore, the Net Revenue Sharing Income shall be reduced to account for any actual or assumed additional expenses.

A. General Considerations

1. The terms “reinsurance” and “reinsurer” in this Section include retrocession and retrocessionaire respectively.
2. The assumptions that are used by a ceding company to determine the Reported Amount for policies that are ceded to a reinsurer shall be appropriate for the ceding company and need not be the same as the assumptions used by the assuming company to determine the Reported Amount for these policies.
3. One party of a reinsurance transaction may rely on elements of the Reported Amount calculations performed by the other party. However, appropriate adjustments to these calculations must be made, if necessary, to reflect the circumstances of the first party.
4. A reinsurance agreement or amendment shall be considered in force and included in calculating the Reported Amount if:
 - a. The agreement or amendment has been duly executed by both parties no later than the “as of date” of the financial statement; or
 - b. A binding letter of intent has been duly executed by both parties no later than the “as of date” of the financial statement unless no final agreement or amendment has been executed more than 90 days after the execution date of the letter of intent; or
 - c. If neither (a) nor (b), but the company has determined after review of the relevant facts and circumstances that it is likely to have legal obligations under the agreement or amendment and including the agreement or amendment would result in a higher Reported Amount.
5. There are certain provisions of reinsurance agreements where a single deterministic valuation assumption for the related risk factor or factors will not adequately capture the risk. Examples of such provisions include stop loss reinsurance and maximum limits on benefits receivable. For these features, the company shall make provision for these risk factors by either:
 - a. Stochastically modeling the risk factor(s) directly in the cash flow model when calculating the Stochastic Amount, or
 - b. Performing a separate analysis outside the cash flow model to quantify the impact on reinsurance cash flows to and from the company. The results of this analysis shall be used to adjust prudent estimate assumptions or to determine an amount to adjust the Stochastic Amount to adequately make provision for the risks of the reinsurance feature(s).

B. Reinsurance Ceded

1. **Cash Flows for Reinsurance Ceded.** The cash flows used in calculating the Stochastic Amount shall include the effect of cash flows received from or paid to reinsurers under the terms of ceded reinsurance agreements if the reinsurance agreements are appropriate to the business and not merely constructed to exploit foreknowledge of the components of the required methodology.
2. **Assumptions for Reinsurance Ceded.** The assumptions used to project cash flows to and from reinsurers shall be consistent with other assumptions used by the ceding company in calculating the Reported Amount for the reinsured policies, and reflect the terms of the reinsurance agreement.

C. Reinsurance Assumed

1. Cash Flows for Reinsurance Assumed. The cash flows used in calculating the Stochastic Amount shall include the effect of cash flows received from and paid to ceding companies under the terms of assumed reinsurance agreements if the reinsurance agreements are appropriate to the business and not merely constructed to exploit foreknowledge of the components of the required methodology.
2. Assumptions for Reinsurance Assumed. The assumptions used to estimate cash flows to or from the ceding company should reflect the reinsurer's (i.e. the assuming company's) experience for the business segment to which the reinsured policies belong, and should reflect the terms of the reinsurance agreement.

D. Reinsurance Assumptions

1. Actions by Counterparty

- a Knowledgeable counterparties. Assume that the counterparties to a reinsurance agreement are knowledgeable about the contingencies involved in the agreement and thus likely to exercise the terms of the agreement to their respective advantage, taking into account the context of the agreement in the entire economic relationship between the parties. Items that should be considered as Non-guaranteed Elements in reinsurance cash flows shall include but not be limited to
 - (i). Any limits placed upon either party's ability to exercise contractual changes in the treaty terms;
 - (ii). The usual and customary practices associated with such agreements,
 - (iii). Past practices by the parties concerning the changing of terms in an economic environment similar to that projected;
 - (iv). The ability of the direct-writing company to modify the terms of its policies in response to changes in terms from its reinsurers; and
 - (v). Actions that might be taken by a party if the counterparty is in financial difficulty.
- b Consideration of ceding company actions. The assumptions that the ceding company uses to determine the Reported Amount shall take into account any actions that the ceding company or assuming company and, if different, the direct-writing company have taken or are likely to take that could affect the expected cash flows of the reinsured business. Examples of actions that could be taken by the direct-writing company include, but are not limited to: (i) internal replacement programs or special underwriting programs, both of which could change expected mortality rates, and (ii) changes in Non-guaranteed Elements in the reinsured policies, which could affect mortality, policyholder behavior, and possibly expense and investment assumptions. Examples of actions that could be taken by the ceding company include, but are not limited to: (i) the exercise of contractual options in a reinsurance agreement to influence the setting of Non-guaranteed Elements in the reinsured policies, and (ii) the ability to participate in claim decisions. For actions taken by the ceding company, or, where different, the direct-writing company, assumptions will be set in a manner consistent with Section 6B. Note that these assumptions are in addition to, rather than in lieu of, assumptions as to the behavior of the underlying policyholders.
- c Consideration of assuming company actions. The assumptions used to determine the Reported Amount shall take into account any actions that the assuming company has taken or is likely to take that could affect the expected cash flows of the reinsured

business. Examples of such actions include, but are not limited to, changes to the current scale of reinsurance premiums and changes to expense allowances. The ability of an assuming company to change such rates or allowances in a reinsurance

agreement may be thought of as comparable to the ability of a direct-writing company to change Non-guaranteed Elements on policies. Thus, assumptions for such actions shall be set in a manner consistent with Section 6M. Appropriate assumptions for this option may depend on the scenario being tested (analogous to changes in Cost of Insurance Charges) and take into account all likely consequences of such actions, including any potential impact on the probability of recapture by the ceding company.

- d. Treatment of ceding company recapture options. Both the ceding company and the assuming company shall take into account any ceding company option to recapture reinsured business, setting assumptions in a manner consistent with subparagraph (b) above. The right of a ceding company to recapture is comparable to policyholder surrender options for a direct-writing company. Thus, appropriate assumptions for this option may depend on the scenario being tested (analogous to interest-sensitive lapses). When a recapture is assumed, take all associated cash flows into account, including the payment or receipt of any recapture fees or other termination settlements.
 - e. Treatment of assuming company termination options. Both the ceding company and assuming company shall take into account an assuming company's right to terminate in-force reinsurance business, setting assumptions in a manner consistent with subparagraph (c) above. In many cases, the assuming company's right to terminate is limited to cases of non-payment of amounts due by the ceding company or other specific, limited circumstances. In such cases, this termination option would be expected to have insignificant value to either party and may be ignored in the calculations. However, if a reinsurance agreement contains other termination provisions with material impact, the company should set appropriate assumptions for these provisions, perhaps dependent on the particular scenario being tested.
2. Modeling when assets are not in the possession of the company.
- a. Assets held by another party. If under the terms of the reinsurance agreement, some of the assets supporting the reserve are held by the reinsurer or by another party, the company must determine whether to model such assets in order to determine projected cash flows. In some situations, it may not be necessary to model the assets held by the other party. An example would be modeling by a reinsurer of a reinsurance agreement containing provisions, such as experience refund provisions, under which the cash flows and effective investment return to the reinsurer are the same under all Scenarios. Consider the following to determine if modeling of the assets is necessary:
 - (i). The degree of linkage between the portfolio performance, and the calculation of the modified coinsurance (modco) interest and modco reserve, and
 - (ii). The sensitivity of the valuation result to the asset portfolio performance.

If the company concludes that modeling is necessary, the modeling will take into account the following:

- (i). The investment strategy of the company holding the assets, as codified in the reinsurance agreement or otherwise based on current documentation provided by that company, and
- (ii). Actions that may be taken by either party that would affect the net reinsurance cash flows (e.g., a conscious decision to alter the investment strategy within the guidelines).

If the company concludes that modeling is unnecessary, the company should document the testing and logic leading to that conclusion.

Note: Special considerations for modified coinsurance. Although the modco reserve is called a reserve, it is substantively different from other reserves. It is a fixed liability from the ceding company to the reinsurer in an exact amount, rather than an estimate of a future obligation. The modco reserve is analogous to a deposit. This concept is clearer in the economically identical situation of funds withheld. Therefore, the value of the modified coinsurance reserve will generally not have to be determined by modeling. However, the projected modified coinsurance interest may have to be modeled. In many cases, the modified coinsurance interest is determined by the investment earnings of an underlying asset portfolio, which in some cases will be a segregated asset portfolio or in others the ceding company's general account. Some agreements may use a rate not tied to a specific portfolio.

3. Credit Risk

- a. Ceded Reinsurance. If a reinsurer is known to have a financial impairment, the company shall determine a Margin for default by the reinsurer. In cases without a known financial impairment, no margin for default is required.
- b. Assumed Reinsurance. If a ceding company is known to have a financial impairment, the reinsurer shall determine whether a Margin for default by the ceding company is necessary. If the reinsurer may terminate the reinsurance upon non-payment by the ceding company, the Margin may be reduced or eliminated. In cases without a known financial impairment, no margin for default is required.
- c. In setting Margins to reflect potential uncertainty regarding the receipt of cash flows from a counterparty, the company shall take into account the ratings, Risk-Based Capital ratio or other available information bearing on the probability of default by the counterparty, together with the impact on cash flows. In determining the impact on cash flows, the company shall take into account any security or other factor limiting such impact.

[Note: C3 WG believes that absent information as to a reinsurer having a known financial impairment, it is appropriate to determine the C3 risk on the presumption that the reinsurer will be able to pay its obligations under the terms of its treaties over the projection period. Any failure in the future to do so is more properly a default risk rather than a C3 risk and should be handled as such within the existing RBC framework].

E. Treatment of Certain Reinsurance Provisions

Certain reinsurance provisions are difficult to appropriately reflect in the cash flow model with an appropriate level of conservatism. Therefore, specified treatment of these reinsurance provisions in the cash flow model is prescribed.

1. Reinsurance agreements with the following provisions:

- a. Settlements under a reinsurance agreement are made less frequently than quarterly or payments due are not payable in cash within ninety days of the settlement date; and
- b. The ceding company is required to make representations or warranties in a reinsurance agreement not reasonably related to the business reinsured or about the future performance of the business reinsured.

The assumptions used to determine the Reported Amount shall include the effect on cash flows resulting from such representations or warranties when possible. For example, if the ceding company warrants that the ceded reinsurance will be profitable to the assuming company, cash flows under scenarios that would otherwise result in a loss to the assuming company must be adjusted to reflect the warranty.

If the impact of such a representation or warranty is not possible to include in projected cash flows, the company should determine the legal consequence of breaching the representation or warranty under the agreement. The Reported Amount is the greater of the calculation assuming the breach of the representation or warranty has occurred, or the calculation assuming the breach has not occurred. For example, if the ceding company warrants that it will remain solvent during the term of the agreement, and the consequence of a breach will be immediate termination of the reinsurance, such immediate termination shall be assumed in the model if doing so will decrease the company's surplus.

2. A reinsurance agreement that does not contain provisions:

- a. Acknowledging the entire agreement between the parties with respect to the business being reinsured, or
- b. That any changes to the agreement shall be null and void unless made by amendment to the agreement signed by both parties.

In this case, each company shall use assumptions for such agreements that reflect the company's obligations under the agreement but do not reflect the obligations of the other party. For example, the ceding company will assume that it has outgoing cash flows for reinsurance premiums and other amounts due to the assuming company, but no incoming cash flows for benefit reimbursements or other amounts due from the assuming company.

3. A reinsurance agreement contains automatic or optional triggers relating to financial deterioration of one of the parties, such as a ratings downgrade or a declaration of conservatorship or insolvency.

In this case the assumptions used to determine the Reported Amount shall reflect a conservative valuation for the trigger. If the trigger results in the automatic occurrence of an event or the occurrence of the event at the option of the other party, the Reported Amount is the greatest of the calculation assuming the event caused by the trigger has occurred, or the calculation assuming the event has not occurred but will occur at some future date, or the calculation assuming the event has not occurred and will never occur. Examples of critical trigger events include termination, recapture, an increase in amounts due under the reinsurance agreement, and immediate payment of funds withheld.

Section 10. Stochastic Exclusion Test

A. Purpose of the Test

1. The Stochastic Exclusion Test identifies those blocks of policies not having material tail risk arising from interest rate movements or equity performance, i.e., not having significant variation in financial results depending upon future economic conditions.
2. The Stochastic Exclusion Test constitutes a series of deterministic scenarios which establish a range of results. If the range of results is beyond the specified tolerance for variability then the block of policies are considered to have material tail risk and do not pass the test.
3. The Stochastic Exclusion Test is passed if the Stochastic Exclusion Test Ratio relating to the block of policies tested, determined in accordance section 10B, is less than 4%. Those blocks of policies that pass the test are not considered to have material tail risk for the risks of interest rate movements or equity performance.
4. For blocks of policies which both pass the exclusion test and which meet the reserve adequacy certification requirements of section 10C, the C3 requirement may be determined as the Factor-based Amount as defined in section 10D.
5. Passing the Stochastic Exclusion Test does not preclude the actuary from determining the C3 requirements on a given block of policies in accordance with the Stochastic Amount should the Stochastic Amount relating to such block of policies result in a lower C3 requirement.

B. Stochastic Exclusion Test Ratio

1. For each test scenario described in Section 10F, determine the Test Scenario Amount. The Test Scenario Amount is the amount required to fund the future benefits and expenses.
2. The Test Scenario Amount for any test scenario is determined using a Gross Premium Valuation methodology (present value of net cash flows) with the following assumptions:
 - a. Anticipated Experience Assumptions within each scenario that are dynamically adjusted as appropriate for consistency with each tested scenario;
 - b. Starting Assets are no less than 98% and no greater than 102% of the statutory reserve relating to the policies modeled;

Drafting Note: Why not just use the reserve as a starting point (i.e. An iterative process is already used to determine starting assets in VM-20; therefore, it seems unnecessary to go through the same process here).

- c. No recognition of federal income taxes in the cashflows or discount rates;
 - d. Discount rates are the net asset earned rates each period where net asset earned rates are equal to gross asset earned rates less defaults and investment expenses.
3. As a practical measure, the actuary may alternatively use cash flow testing assumptions rather than Anticipated Experience Assumptions in the determination of the Test Scenario Amount for those blocks of policies whose reserves are not determined under a principle-based approach.
 4. The Stochastic Exclusion Test ratio is determined as the ratio of:
 - a. The excess of the highest Test Scenario Amount in each of the test scenarios, over the Test Scenario Amount in the Base Scenario; to
 - b. An amount calculated from the Base Scenario that represents the present value of

benefits and expenses for the policies, adjusted for reinsurance as appropriate to achieve consistency between the numerator and denominator.

C. Reserve Adequacy Certification Requirement

1. For those blocks of policies which pass the exclusion test and which the Qualified Actuary is able to certify that the statutory value on the valuation date of the policies included in the exclusion test are adequate, the C3 requirement may be determined as the greater of (a) and (b), where (a) is equal to the amount determined in Section 10(B)(4)(a) and (b) is equal to the Factor-based Amount as defined in section 10D.
2. The adequacy of a given block of policies is to be determined using the same methods and assumptions as applied to the block of policies in performing the annual Asset Adequacy Analysis.
3. The adequacy of a given block of policies is to be determined on a stand-alone basis for that block.
4. Certification and documentation are to be completed in accordance with Section 11.

D. Factor –based Amount

1. The Factor-based Amount is determined as the sum of the following amounts:
 - a. The statutory reserve at the Valuation Date relating to policies which have been tested for exclusion by the Stochastic Exclusion Test ; and
 - b. ~~0.5%~~1.0% of the net balance of item (a) above less the reserve corresponding to associated policy loans in the case of the company submitting an unqualified actuarial opinion based on asset adequacy testing and where asset and liability durations differ by no more than 0.125; otherwise ~~0~~1.575% of the net balance of item (a) above less the reserve corresponding to associated policy loans.

E. Stochastic Exclusion Test Timing

1. The exclusion test shall be carried out annually for a given block of policies to continue to qualify for the stochastic testing exclusion, and shall be done within the 12 month period prior to the valuation date. It would be expected that the timing of the test would be consistent from year to year and that the actuary would document both the current and prior year timing of the exclusion testing as well as rationale for any change in timing.
2. The actuary will certify that no material subsequent event has occurred after the date of the current year testing.

To the extent a material subsequent event has occurred between the date of current year testing and the actual year-end, it will be necessary to re-perform the testing subsequent to filing, using actual year-end data. If the actual RBC value (Company Action Level RBC) exceeds that estimated earlier in the blanks filing by more than 5 percent, or if the actual value triggers regulatory action, a revised filing with the NAIC and the state of domicile is required by June 15; otherwise re-filing is permitted but not required.

3. For purposes of the above, a material subsequent event is one or more circumstances which, if reflected in the exclusion testing would be anticipated to result in a failure of the exclusion test.

F. Stochastic Exclusion Test Scenarios

It is anticipated that the specific interest rate and equity return rate paths underlying each test scenario will be provided by means of a return generator and/or supplied scenarios available on the NAIC website. The scenarios are defined in terms of 90 percentile random shocks in various directions over various periods of time. The sum of the random shocks over n periods has a distribution, and the 90 percent level of that distribution is 1.28 times the square root of n. As an example, to get a 90 percent

level shock over 5 years assuming monthly shocks, the sum of the 60 shocks must be 1.28 times the square root of 60. The test scenarios are described below:

1. Scenario 1 – Pop up, high equity

Interest rate shocks that maintain the cumulative shock at the 90% level (1.282 standard errors). Equity returns that maintain the cumulative equity return at the 90% level.

For illustration, the pop-up scenario has shocks of

- 1.28 times (sqrt(1) - sqrt(0)) in period 1;
- 1.28 times (sqrt(2) - sqrt(1)) in period 2;
- 1.28 times (sqrt(3) - sqrt(2)) in period 3; and so on.

By the end of period n, the cumulative shock is -1.28 times sqrt(n).

2. Scenario 2 – Pop up, low equity

Interest rate shocks that maintain the cumulative shock at the 90% level (1.282 standard errors). Equity returns that maintain the cumulative equity return at the 10% level.

3. Scenario 3 – Pop down, high equity

Interest rate shocks that maintain the cumulative shock at the 10% level (1.282 standard errors). Equity returns that maintain the cumulative equity return at the 90% level.

4. Scenario 4 – Pop down, low equity

Interest rate shocks that maintain the cumulative shock at the 10% level (1.282 standard errors). Equity returns that maintain the cumulative equity return at the 10% level.

5. Scenario 5 – Up/down, high equity

Interest rate shocks that, for each five-year period, are consistently in the same direction. The cumulative shock for each 5-year period is at the 90% level during “up” periods and at the 10% level during “down” periods. Equity returns that maintain the cumulative equity return at the 90% level.

6. Scenario 6 – Up/down, low equity

Interest rate shocks that, for each five-year period, are consistently in the same direction. The cumulative shock for each 5-year period is at the 90% level during “up” periods and at the 10% level during “down” periods. Equity returns that maintain the cumulative equity return at the 10% level.

7. Scenario 7 – Down/up, high equity

Interest rate shocks that, for each five-year period, are consistently in the same direction. The cumulative shock for each 5-year period is at the 90% level during “up” periods and at the 10% level during “down” periods. Equity returns that maintain the cumulative equity return at the 90% level.

8. Scenario 8 – Down/up, low equity

Interest rate shocks that, for each five-year period, are consistently in the same direction. The cumulative shock for each 5-year period is at the 90% level during “up” periods and at the 10% level during “down” periods. Equity returns that maintain the cumulative equity return at the 10% level.

8.9. Scenario 9 – Base scenario

All shocks are zero.

10. Scenario 10 – Inverted yield curves

Zero shocks to long term rates and equities. Shocks to the spread between short and long rates that are consistently in the same direction for each three-year period. The shocks for the first three-year period are in the direction of reducing the spread (usually causing an inverted yield curve). Shocks for each subsequent three year period alternate in direction.

11. Scenario 11 – Volatile equity returns

Zero shocks to interest rates. Shocks to equity returns that are consistently in the same direction for each two-year period, and then switch directions.

12. Scenario 12 – Deterministic scenario for valuation

Uniform downward shocks each month for 20 years, sufficient to get down to the 80% point on the distribution of 20 year shocks. After 20 years, shocks are at a level that keeps the cumulative shock at the 80% level (or the 20% level, depending on how you look at it).

13. Scenario 13 – Delayed pop up, high equity

Interest rate shocks that are zero for the first 10 years, followed by 10 years of shocks each 1.414 (square root of 2) times those in the first 10 years of Scenario 1. This gives the same 20-year cumulative shock as scenario 1 but all the shock is concentrated in the second 10 years. After 20 years, the same as scenario 1. Equity returns that maintain the cumulative equity return at the 90% level.

14. Scenario 14 – Delayed pop up, low equity

Interest rate shocks that are zero for the first 10 years, followed by 10 years of shocks each 1.414 (square root of 2) times those in the first 10 years of Scenario 2. This gives the same 20-year cumulative shock as scenario 2 but all the shock is concentrated in the second 10 years. After 20 years, the same as scenario 1. Equity returns that maintain the cumulative equity return at the 10% level.

15. Scenario 15 – Delayed pop down, high equity

Interest rate shocks that are zero for the first 10 years, followed by 10 years of shocks each 1.414 (square root of 2) times those in the first 10 years of Scenario 3. This gives the same 20-year cumulative shock as scenario 3 but all the shock is concentrated in the second 10 years. After 20 years, the same as scenario 3. Equity returns that maintain the cumulative equity return at the 90% level.

16. Scenario 16 – Delayed pop down, low equity

Interest rate shocks that are zero for the first 10 years, followed by 10 years of shocks each 1.414 (square root of 2) times those in the first 10 years of Scenario 4. This gives the same 20-year cumulative shock as scenario 4 but all the shock is concentrated in the second 10 years. After 20 years, the same as scenario 4. Equity returns that maintain the cumulative equity return at the 10% level.

Section 11. Certification and Documentation Requirements

A. Certification

1. A Qualified Actuary shall provide a certification that the Reported Amount was calculated in a manner that meets the requirements of this report and complies with all applicable Actuarial Standards of Practice. The certification shall consist of at least the following:
 - a. A paragraph identifying the Qualified Actuary and his or her qualifications as described under the U.S. Qualification Standards;
 - b. A scope paragraph identifying the statement values of the products included in the certification and the methodology used for those statement values (e.g. Stochastic Amount, Alternative Amount, Factor-based Amount, and Non-modeled Amount);
 - c. A paragraph identifying whether a material subsequent event as defined in Section 1 OE.3 had occurred in the context of the performing the Stochastic Exclusion Test, if applicable;
 - d. A reliance paragraph describing those areas, if any, where the certifying actuary has relied on other experts. A reliance statement from each of those relied upon should accompany the certification. The reliance statements should note the information being provided and a statement as to the accuracy, completeness or reasonableness, as applicable, of the information;
 - e. A paragraph certifying that required capital was determined in accordance with the principles and requirements of the NAIC RBC Instructions;
 - f. A paragraph certifying that where the assumptions are not prescribed, and the requirements do not permit or require otherwise, the assumptions used for these calculations are Prudent Estimate Assumptions for the products, scenarios, and purpose being tested;
 - g. A paragraph, if applicable, providing an unqualified opinion based on actuarial analysis of reserves and assets supporting reserves for a given block of policies utilizing the stochastic exclusion test, using the same methods and assumptions applied to the block of policies in performing the annual Asset Adequacy Analysis;
 - h. A paragraph disclosing all material changes in the model or assumptions from that used previously and the estimated impact of such changes; and
 - i. A paragraph stating that the Qualified Actuary is not opining on the adequacy of the company's surplus or its future financial condition.
- ~~2. A financial duly authorized officer of the company (e.g., Chief Financial Officer, Treasurer, or Chief Investment Officer) or an authorized person designated by them who has direct or indirect supervisory authority over the actual trading of assets and derivatives must certify that the Clearly Defined Hedging Strategy modeled is the Derivative Program being used by the company in its actual day to day risk mitigation efforts.~~
3. All certifications shall be filed with the annual Risk-Based Capital return filing.

B. Actuarial Report

1. A Qualified Actuary shall prepare an Actuarial Report each year that documents all material decisions made, and information used, to support the certification, including assumptions, margins and methodologies used to calculate the Reported Amount. The Actuarial Report will be confidential, to the extent permitted by law, and available to regulators upon request, as authorized by the company or as required by law.

2. The Actuarial Report shall include:

- a. The Stochastic Amount, including the distribution of the Scenario Amounts and the result of applying the CTE risk level.
- b. The Alternative Amount, if any, and any necessary demonstration regarding the determination of the Alternative Amount.
- c. The Factor-based Amount, if any, including the Stochastic Exclusion Test Scenario Amount and the test ratio.
- d. The Non-modeled amount, if any.
- e. Documentation of the key modeling decisions made by the Qualified Actuary, including but not limited to:

i. Assets:

- (1.) Description including type and quality
- (2.) Investment & disinvestment assumptions
- (3.) Assets used at the start of the projection
- (4.) Source of asset data
- (5.) Asset valuation basis
- (6.) Documentation of assumptions:
 - (a) Default costs
 - (b) Prepayment functions
 - (c) Market value determination
 - (d) Yield on assets acquired
 - (e) Mapping and grouping of funds to modeled asset classes

ii. Liabilities

- (1.) Product Descriptions
- (2.) Source of Liabilities
- (3.) Grouping of Contracts
- (4.) Investment Reserves
- (5.) Reinsurance
- (6.) Tax Adjustment
- (7.) Documentation of assumptions to include:
 - (a) Premium Pattern, Persistency and Allocation
 - (b) Withdrawal, Lapse and Termination Rates
 - (c) Non-guaranteed Elements
 - (d) Expenses
 - (e) Investment / Fund Choice
 - (f) Asset Allocation, Rebalancing and Transfer Assumptions
 - (g) Revenue Sharing
 - (h) Federal Income Tax

iii. Derivative Program

- (1.) Documentation of strategy
- (2.) Identification of current positions
- (3.) Description on how strategy was incorporated into modeling:
 - (a) basis risk
 - (b) gap risk
 - (c) price risk
 - (d) assumption risk
- (4.) Document the methods and criterion used to estimate

the *a priori* effectiveness of the Derivative Program

iv. Scenarios

- ~~(1.)~~ Description of scenario generation for interest rates and equity returns
- ~~(1.)~~(2.) Disclose the number “n” of scenarios used and the methods used to determine the sampling error of the CTE (90) statistic when using “n” scenarios.
- ~~(3.)~~ Time Step of Model (e.g. Monthly, Quarterly, Annual)
- ~~(3.)~~(4.) Correlation of equity and / or fund returns
- ~~(4.)~~(5.) Processes to ensure scenarios meet calibration requirements
- (6.) Support for mapping variable accounts to proxy funds

v. Other

- ~~(1.)~~ Description of and support for any simplified approaches in the Cash Flow Models.
- ~~(1.)~~(2.) Basis for decision to aggregate Business Segments if aggregation is done.
- ~~(2.)~~(3.) Description of the use of data prior to the valuation date.

- f. Description and results of material sensitivity tests performed.
- g. A description of the internal controls and procedures used to ensure the appropriateness of the actuary’s judgment when permitted by this report and applicable Actuarial Standards of Practice.
- h. A list of the key risk measurement tracking tools that the company uses as an early warning of changes in experience between Valuation Dates.

- 3. If there is a material change in assumptions from the previous year, an executive summary shall be sent to the state of domicile communicating such change and quantifying the impact it has on the results. Such communication shall remain confidential, subject to applicable law.

[Note: The timing of when the Executive Summary is to be provided will be determined by the NAIC.]

- C. This report requires a Qualified Actuary to make various determinations, verifications and certifications. The company shall provide the Qualified Actuary with the necessary information sufficient to permit the actuary to fulfill the responsibilities set forth in this report and responsibilities arising from applicable Actuarial Standards of Practice.
- D. Except in cases of fraud or willful misconduct, the Qualified Actuary shall not be liable for damages to any person (other than the insurance company and the commissioner) for any act, error, omission, decision or conduct with respect to the actuary’s opinion, to the extent permitted by law.
- E. The qualifications to be considered a “Qualified Actuary” under this report are:
 - 1. Be a member of the American Academy of Actuaries qualified under the U.S. Qualification Standards;
 - 2. Be familiar with all appropriate standards of practice that apply to principle-based approaches;
 - 3. Not have been found by the commissioner, following appropriate notice and hearing to have:

- a. Violated any provision of, or any obligation imposed by, the insurance law or other law in the course of his or her dealings as a Qualified Actuary or an Appointed Actuary;
 - b. Been found guilty of fraudulent or dishonest practices;
 - c. Demonstrated his or her incompetence, lack of cooperation, or untrustworthiness to act as a Qualified Actuary; or
 - d. Resigned or been removed as a Qualified Actuary within the past five (5) years as a result of acts or omissions indicated in any adverse report on examination or as a result of a failure to adhere to generally acceptable actuarial standards;
4. Not failed to notify the commissioner of any action taken by a commissioner of another state similar to that under Paragraph (3) above.

Calculation Item	C3 Phase II	AG 43 (VA CARVM)	C3WG Recommendation	NAIC VM-20 1/22/09 Exposure
Accumulated Deficiency	Liabilities less statutory assets	Working Reserve less Statutory Assets	Cash surrender value over net accumulated asset amount	Working Reserve (zero) less Statutory Assets
Working Reserve	<p>CSV</p> <p>For a variable payout annuity without a Cash Surrender Value, the Working Reserve shall equal the present value, at the valuation interest rate and the valuation mortality table</p>	<p>CSV</p> <p>For a variable payout annuity without a Cash Surrender Value, the Working Reserve shall equal the present value, at the valuation interest rate and the valuation mortality table</p>	CSV	Zero
Reinvestment Strategy	Practice varies from the use of after-tax Treasury rates, after-tax swap rates to rates earned on investments.	<p>Actuary has option of:</p> <ol style="list-style-type: none"> 1) forward interest rates implied by swap curve, adjusted for future market expectations 2) 200 C3 P1 scenarios 3) stochastic interest rates corresponding to equity returns 	Company strategy	Company strategy
Disinvestment Strategy	Company strategy	Company strategy	Company strategy	Company strategy
Assumed Spreads on Reinvestments	see re-investment strategy	see re-investment strategy	Actuarial Judgment	Prescribed
Starting Assets	Approximate Statutory Reserve	Approximate Statutory Reserve	Not less than 98% of Statutory Reserve and other liabilities	Approximate Statutory Reserve but not less than 98% or not more than 102% of Reported Reserve

Calculation Item	C3 Phase II	AG 43 (VA CARVM)	C3WG Recommendation	NAIC VM-20 1/22/09 Exposure
AVR/IMR	No specified treatment	Consistent with cash flow testing	May be included	Pre-tax IMR is included in starting assets and modeled into future.
Discount Rate	Same rates as for reinvestment, adjusted for taxes	same rates at which positive cash flows are invested, reduced to reflect expected credit losses	105% of After-tax Treasury rates from model where modeling interest rates only or integrated model. Otherwise CTE90 of scenario discount rates.	105% of the pre-tax treasury rate
Non-Guaranteed Elements	No Specification	No Specification	Section 6M	Section 7.D. – consistent with C3WG
Treatment of Existing Derivatives	Include the appropriate costs and benefits of hedging instruments that are currently held by the company in support of the contracts being modeled	Include the appropriate costs and benefits of hedging instruments that are currently held by the company in support of the contracts being modeled	Include the appropriate costs and benefits of derivative instruments in force at the valuation date and allocable to the business being modeled.	Include the appropriate costs and benefits of derivative instruments in force at the valuation date and allocable to the business being modeled.

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Calculation Item	C3 Phase II	AG 43 (VA CARVM)	C3WG Recommendation	NAIC VM-20 1/22/09 Exposure
Treatment of Anticipated Future Derivatives	Future Hedges limited to CDHS. Limitations on inclusion through CTE adjustment process.	Future Hedges limited to CDHS. Limitations on inclusion through CTE adjustment process.	Includes the appropriate costs and benefits of anticipated future derivative instrument transactions associated with the execution of a CDHS. Also includes the appropriate costs and benefits of anticipated future derivative instrument transactions associated with non-hedging derivative programs (e.g. replication, income generation) undertaken as part of the investment strategy supporting the policies provided they are normally modeled as part of the company's risk assessment and evaluation processes.	Section 7.J. - consistent with C3WG
Treatment of Revenue Sharing	Item 6, page 11 Actuarial Judgment	Limits on non-contractually guaranteed net revenue sharing.	Section 8 - consistent with C3P2	Section 9.I. - Consistent with C3WG.
Reinsurance	Must be reflected consistent with other processes but no detailed requirements / specification.	Appendix 2, Net and prior to reinsurance may be required.	Section 9 - Requirements for Reinsurance	Section 8. Consistent with C3WG

Calculation Item	C3 Phase II	AG 43 (VA CARVM)	C3WG Recommendation	NAIC VM-20 1/22/09 Exposure
Tax Adjustment	"F" times the difference between tax reserves and Working Reserves at the start of the projections	Pre-tax	If necessary	None (not needed)
Aggregation	Permitted across all segments subject to actuarial judgment.	Serialim required for standard scenario.	Permitted across all segments subject to actuarial judgment.	Permitted across all segments. Some limitation through Deterministic reserve floor.
Projection time horizon	Sufficiently long so as to capture the vast majority of surplus costs (on a present value basis) from the scenarios. As a general guide, the forecast horizon should not be less than 20 years	A. 1.1)F => as many future years as needed so that no materially greater reserve value would result from longer projection period.	The Projection Period shall be sufficiently long that no materially greater Stochastic Amount would result from a longer Projection Period.	The projection period shall extend far enough into the future so that no material amount of business remains at the end of the projection period
Frequency of projections	Annual cashflow frequency is generally acceptable. Should ensure that the use of a more frequent (i.e., shorter) time step does not materially increase capital requirements.	Annual or more frequent	Annual cashflow frequency is generally acceptable. Should ensure that the use of a more frequent (i.e., shorter) time step does not materially increase capital requirements.	Requirements to be specified.

Calculation Item	C3 Phase II	AG 43 (VA CARVM)	C3WG Recommendation	NAIC VM-20 1/22/09 Exposure
Prior Period Data / Timing of Calculations	Estimated value, based on data as of a date preceding year-end, permitted for year-end annual statement. Value for RBC electronic filing based on year-end data. Revised annual statement filing required if reported Authorized Control Level Risk-Based Capital for the company exceeds that printed in the annual statement by more than 5 percent, or if the reported Risk-Based Capital triggers regulatory action.	No Specification	Up to 6 months prior to valuation date permitted subject to appropriate adjustment for differences between "as-of" date and valuation date.	Up to 3 months prior to valuation date permitted subject to appropriate adjustment for differences between "as-of" date and valuation date.
Grouping (of funds and of contracts)	Actuarial Judgment / Grouping methods must retain the characteristics needed to model all material risks and options embedded in the liabilities.	Projections may be performed for each contract in force on the date of valuation or by grouping contracts into representative cells of model plans using all characteristics and criteria having a material impact on the size of the reserve. Grouping shall be the responsibility of the actuary but may not be done in a manner that intentionally understates the resulting reserve.	Actuarial Judgment	Actuarial Judgment
Sampling	Actuarial Judgment	Actuarial Judgment (Scenarios, not liabilities.)	Actuarial Judgment	Actuarial Judgment

Calculation Item	C3 Phase II	AG 43 (VA CARVM)	C3WG Recommendation	NAIC VM-20 1/22/09 Exposure
Stochastic Scenarios	Pre-packaged scenarios; Proprietary Scenario generator subject to calibration	Pre-packaged scenarios; Proprietary Scenario generator subject to calibration	Pre-packaged scenarios; Proprietary Scenario generator subject to calibration; Proprietary Scenario Sets	Pre-packaged scenarios;
Number of scenarios	Actuarial Judgment	A1 .3) Actuarial Judgment (no material understatement of reserves)	Actuarial Judgment	Actuarial Judgment
Certification	General Certification Hedging Certification	Management Certification, Actuarial Certification, Certification of Alternative methodology and expense, revenue, fund mapping and product parameters, Certification of CDHS and E, CTE Amount (adjusted), CTE Amount (best efforts)	Consistent with C3P2	Consistent with C3WG
Documentation	Appendix 11 Confidential memorandum available to regulators upon request	Consistent with C3P2 (Appendix 8) Confidential memorandum available to regulators upon request	Consistent with C3P2 Confidential memorandum available to regulators upon request	Now in Valuation Law Manual. Requirements consistent with C3WG. Confidential memorandum available to regulators upon request

Calculation Item	C3 Phase II	AG 43 (VA CARVM)	C3WG Recommendation	NAIC VM-20 1/22/09 Exposure
Allocation	<p>C3c RBC amount is to be combined with the C1CS component for covariance purposes.</p> <p>A provision for the interest rate risk of the guaranteed fixed fund option, if any, is to be calculated and combined with the current C3a component of the formula</p>	Appendix 6, allocation of Aggregate Reserves	C3 amount will be allocated between C3c and C3a.	<p>Allocation to develop gross and net reserves at policy level required.</p> <p>Allocation between General Account and Separate Account reserves required.</p>
Simplified Methods	Alternative Method if no VAGLB's	Alternative Method if no VAGLB's	Alternative Amount, Stochastic Exclusion Test	Stochastic Exclusion, Stochastic Exclusion Test
C1 Expense Allowance Elimination for Covered Products	Yes	Not Applicable	Yes	Not Applicable
C1cs Elimination for Equities inforce at the valuation date backing Covered Products	No. Not material.	Not Applicable	Yes	Not Applicable

