NAIC NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS

Draft date: 2/2/26

Virtual Meeting

JOINT MEETING: LIFE RISK-BASED CAPITAL (E) WORKING GROUP AND THE VARIABLE ANNUITIES CAPITAL AND RESERVE (E/A) SUBGROUP
Wednesday, February 11, 2026
3:00 – 4:00 p.m. ET / 2:00 – 3:00 p.m. CT / 1:00 – 2:00 p.m. MT / 12:00 – 1:00 p.m. PT

Members of the Life Risk Based Capital (E) Working Group

Ben Slutsker, Chair	Minnesota	Jennifer Li	New Hampshire
Philip Barlow, Vice Chair	District of Columbia	Seong-min Eom	New Jersey
Sheila Travis	Alabama	William B. Carmello	New York
Thomas Reedy	California	Andy Schallhorn	Oklahoma
Wanchin Chou	Connecticut	Rachel Hemphill	Texas
Hannah Howard	Florida	Tomasz Serbinowski	Utah
Matt Cheung	Illinois		
Mike Yanacheak	Iowa		
William Leung	Missouri		
Michael Muldoon	Nebraska		

Members of the Variable Annuities Capital and Reserve (E/A) Subgroup

Peter Weber, Chair	Ohio
Matt Cheung, Vice Chair	Illinois
Thomas Reedy	California
Philip Barlow	District of Columbia
Nicole Boyd	Kansas
Fred Andersen	Minnesota
William Leung	Missouri
Seong-min Eom	New Jersey
William B. Carmello	New York
Rachel Hemphill	Texas

NAIC Support Staff: Jane Ren/Kazeem Okosun/Maggie Chang

1.	Consider Adoption of Joint 10-31-2025 Meeting Minutes of Life Risk-Based Capital (E) Working Group and Variable Annuities Capital and Reserve (E/A) Subgroup	Attachment 1
2.	Discuss Comments Received on the Re-Exposure of the Proposed Changes to C3 Phase I/Phase II Calculations/Instructions including Cover Questions • Comments Received from the American Academy of Actuaries • Comments Received from the American Council of Life Insurers • Comments Received from the Committee of Annuity Insurers • Comments Received from Jackson Waechter, FSA, MAAA, Managing Actuary of Farm Bureau Financial Service	Attachment 2
3.	Consider Re-Exposure of the Proposed Changes to C3 Phase I/Phase II Calculations and Life RBC Instructions • C-3 Phase I Instructions 20260129 • C3P2 updates 20260129	Attachment 3
4.	Discuss Comments Received on the Exposure of the Scope Clarification for VM-21 and RBC Instructions	Attachment 4
5.	Consider Re-Exposure of the Clarification for Variable Annuities in Payout Phase	Attachment 5
6.	Discuss Any Other Matters	
7.	Adjournment	

Draft: 11/17/25

Life Risk-Based Capital (E) Working Group
and Variable Annuities Capital and Reserve (E/A) Subgroup
Virtual Meeting
October 31, 2025

The Life Risk-Based Capital (E) Working Group of the Capital Adequacy (E) Task met Oct. 31, 2025, in joint session with the Variable Annuities Capital and Reserve (E/A) Subgroup of the Life Risk-Based Capital (E) Working Group and Life Actuarial (A) Task Force. The following Working Group members participated: Philip Barlow, Chair (DC); Ben Slutsker, Vice Chair (MN); Sanjeev Chaudhuri (AL); Thomas Reedy (CA); Wanchin Chou (CT); Hannah Howard (FL); Mike Yanacheak (IA); Matt Cheung (IL); Michael Muldoon (NE); Jennifer Li (NH); Seong-min Eom (NJ); William B. Carmello (NY); Rachel Hemphill (TX); and Tomasz Serbinowski (UT). The following Subgroup members participated: Peter Weber, Chair (OH); Matt Cheung, Vice Chair (IL); Thomas Reedy (CA); Philip Barlow (DC); Ben Slutsker (MN); Seong-min Eom (NJ); William B. Carmello (NY); and Rachel Hemphill (TX).

1. Discussed Comments Received from the Academy

Rick Hayes (American Academy of Actuaries—Academy) spoke to the comment letter from the Academy (Attachment Eight-A). He said the Academy seeks clarification on the rationale for excluding voluntary reserves, asset adequacy testing (AAT) reserves, and any additional standard projection amount (ASPA) from the calculation of capital. Additionally, he mentioned their recommendations and concerns with the use of stochastic equity returns in C-3 Phase I (C3PI) can be found in the comment letter.

2. Discussed Comments Received from the ACLI

Brian Bayerle (American Council of Life Insurers—ACLI) addressed the comment letter from the ACLI (Attachment Eight-B). He said the ACLI recommends making as few changes as possible to the risk-based capital (RBC) framework in the near future. He then discussed the three cover questions in response to the intended re-exposure of the proposed changes to the RBC instructions for C3PI and C-3 Phase II (C3PII). The first one is to request for including considerations and languages for the conditional tail expectation (CTE) 95 level with a 25% scalar and the CTE 98 level with a 25% scalar, in addition to the proposed CTE 90 level without a scalar as outlined in the re-exposure draft. The second one is to request a disclosure on an ongoing basis for the sensitivity of the remaining two metrics when they are not selected. The last question is on potential alternative methodologies for reflecting voluntary reserves.

Additionally, Bayerle briefly discussed the rationale behind limiting changes and further discussed the three conceptual approaches regarding the CTE levels. He said the first approach could be holding capital at the CTE 95 level with a 25% scalar, which would retain an approximate level of the existing capital requirement under the current Academy Interest Rate Generator (AIRG) measure. This metric can go in as an interim step while more information is being gathered. The second approach would be to maintain a status quo as much as possible with the current framework at the CTE 98 level with a 25% scalar. The last conceptual approach could be to use the proposed CTE 90 level without a scalar. However, the ACLI expressed its concerns about the volatility in capital that this approach may create.

3. Discussed Comments Received from the Committee of Annuity Insurers

Daren Moreira (Eversheds Sutherland LLP) spoke to the comment letter from the Committee of Annuity Insurers (CAI) (Attachment Eight-C). He said the comment letter echoes many of the same comments that were made by

the ACLI. The CAI recommends making changes to the C3 framework that are necessary to implement the generator of economic scenarios (GOES) while retaining the 25% scalar. The CAI also recommends decreasing the CTE level to CTE 95 to align with the adoption of GOES. As the GOES covers tail risks that are not captured by AIRG, a reduction from the current CTE 98 is appropriate. However, the CTE 90 level could result in significant capital volatility. Additionally, the CAI opposes excluding the asset adequacy reserves and voluntary reserves from the C3 capital calculation.

4. Discussed Comments Received from New York Life and Northwestern Mutual Life Insurance Company

Erik Anderson (New York Life Insurance Company) spoke to the comment letter from New York Life Insurance Company and Northwestern Mutual Life Insurance Company (Attachment Eight-D). He said they believe it is important that RBC requirements work in concert with reserves to avoid any double counting. They also want to ensure that the RBC requirements do not create any situations where actuaries are disincentivized from following sound reserving practices.

5. Re-Exposed Proposed Changes to the RBC Instructions for C3PI and C3PII

Cheung began by walking through the proposed changes to the RBC instructions for C3PII, which are intended for re-exposure (Attachment Eight-E). He said the proposal is structured in a way that allows voluntary reserves to be used to reduce the C3PII capital amount, where a multiplier of one-third, which is based on the NAIC model office results, is applied to the voluntary reserves. Cheung said regulators would like to hear feedback on whether one-third is considered appropriate for companies with different business mixes. Additionally, he noted that the voluntary reserve has been better defined in the proposal.

Cheung continued to discuss the proposed changes to the RBC instructions for C3PI. He said the asset adequacy reserves and voluntary reserves can be included as part of the starting assets if they are set at a moderately adverse level and can be shown to be directly attributable to the C3PI business.

He said the net asset earned rate is provided as an option that can be used for discounting when calculating the C3PI capital. Slutsker commented that it would be hard to contemplate a direct iteration approach because C3PI targets the surplus, rather than the assets that can be solved for.

Eom suggested maintaining the current approach for C3PII, while providing certain disclosure items for comparison purposes. As the GOES field test results do not show all the impact from its implementation, she wants to monitor the impact for a few years before making any changes.

Rhonda Ahrens (Thrivent Financial) commented on the impact on the C3PI capital due to flooring. Slutsker said he would like to hear more feedback on this.

Barlow and Weber jointly re-exposed the proposed changes to the RBC instructions for C3PI and C3PII, together with the cover questions raised by the ACLI, for a 60-day public comment period ending Jan. 5, 2026.

6. Adopted Proposed Changes to VM-21 Supplement Blank and Instructions

Weber walked through the proposed changes to *Valuation Manual* (VM)-21 supplement blank and instructions. Cheung made a motion, seconded by Eom, to adopt the proposed changes (Attachment Eight-F). The motion passed unanimously.

7. Exposed APF 2025-14 and RBC Proposal 2025-17-L

Cheung walked through the proposed scope clarification for VM-21 and life RBC (Attachment Eight-G). He said there is a diversity of practice regarding how to reserve for payout annuities that result from variable annuities (VA). Clarification is provided in Subsection 2 of the *Valuation Manual* Section II. VA contracts in the payout phase, regardless of how they are administered, can be reserved under VM-21 with the approval of the domiciliary commissioner. Additionally, he said that ASPA would apply if payout contracts are reserved under VM-21. Accordingly, C3PI for RBC would not apply to them. Clarification is also provided for life RBC.

Barlow and Weber jointly exposed APF 2025-14 and RBC proposal 2025-17-L for a 28-day public comment period ending Dec. 1.

8. Presented C3PII Analysis

Scott O'Neal (NAIC) said Cheung, in the previous joint meeting, expressed his interest in seeing VA model office results that would be floored at the cash surrender value and reflect a blending of the best efforts and adjusted results assuming an error factor of 10%. In response, he presented the C3PII analysis on this basis for three archetypes of VA products (Attachment Eight-H).

Having no further business, the Life Risk-Based Capital (E) Working Group and the Variable Annuities Capital and Reserve (E/A) Subgroup adjourned.

SharePoint/NAIC Support Staff Hub/Member Meetings/A CMTE/LATF/2025-3 Fall/VACR SG/10 31 Joint LRBC WG VACR SG/1031 Joint LRBC VACR Minutes.docx

September 16, 2025

Philip Barlow
Chair, Life Risk-Based Capital (E) Working Group
National Association of Insurance Commissioners

Peter Weber
Chair, Variable Annuities Capital and Reserve (E/A) Subgroup
National Association of Insurance Commissioners

Re: C3 Instructions Updates from Generator of Economic Scenarios

Dear Chairs Barlow and Weber:

On behalf of the Variable Annuity Reserves and Capital Subcommittee and the C-3 Subcommittee (the Subcommittees) of the American Academy of Actuaries,[1] we appreciate the opportunity to provide comments to the Life Risk-Based Capital (E) Working Group (LRBCWG) and to the Variable Annuities Capital and Reserve (E/A) Subgroup (VACRSG) regarding the LRBCWG/VACRSG Exposure.[2]

We appreciate the NAIC's continued leadership in updating the Generator of Economic Scenarios (GOES) and its attention to the subsequent impacts of the GOES on various capital frameworks.

In this letter, we provide comments on the proposed changes to the scalar/Conditional Tail Expectation (CTE) metric; the inclusion of Additional Standard Projection Amount (ASPA), Asset Adequacy Testing (AAT), and voluntary reserves in capital calculation; the use of stochastic equity in the capital calculation; and other items. Unless otherwise specified, our comments apply to both C3 Phase 1 and C3 Phase 2.

SCALAR AND CTE METRIC

As stated in our prior comment letter, because GOES differs materially from the existing AIRG, the Subcommittee agrees that thoughtful recalibration of the CTE confidence level and related scalars is essential to preserve consistency with current prudential objectives. Additionally, the C-3 Subcommittee is in the process of finalizing a set of recommendations[3] to align and harmonize C-3 Phase I and Phase II methodology. The current proposed set of recommendations includes the adoption of GOES, but we will refrain from commenting on the capital metric or number of scenarios to be used until the recommendations are finalized and potential field testing concluded.

[1] The American Academy of Actuaries is a 20,000-member professional association whose mission is to serve the public and the U.S. actuarial profession. For 60 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

[2] C-3 Phase I Instructions - Proposed 200 scenarios, C3P2 Updates, RBC Proposal Form.

[3] C-3 Alignment, Part II.

ASPA, AAT, AND VOLUNTARY RESERVES

We seek clarification on the rationale for excluding voluntary reserves, AAT reserves, and any ASPA from the calculation of capital. Nevertheless, we are providing comments based on our understanding of the rationale for the change.

Asset Adequacy Reserves (AAR)
AAR are established based on rigorous actuarial analysis to ensure reserves are adequate under moderately adverse conditions. These reserves would likely be established under the scenarios used in the C3 calculation, i.e., we believe that the risks that are captured in the AAR would also be captured in the C3 calculation. Therefore, we would recommend any AAR be documented in AAT workpapers, be presented in the related VM-30 reports, and be accounted for in the determination of C3 capital in order to avoid a double count of risk in reserves and capital.

Additional Standard Projection Amount
We support the exclusion of ASPA from the C3 calculation. We note that the risk that is captured in the ASPA (due to difference in assumptions) may not be captured in the C3 calculation.

Voluntary Reserves
We support the inclusion of voluntary reserves in the calculation of capital if that reserve is prepared using rigorous actuarial analysis that would support the reason for the reserve. The inclusion of voluntary reserves in the C3 calculation should be predicated on a double count of risk being reflected in both voluntary reserves and C3. If voluntary reserves are included in C3, the following should be documented in the VM-30 report and AAT workpapers:

- The rationale and calculation methodology of any voluntary reserve, similar to AAR.
- Demonstration of the double count of risk reflected in voluntary reserves and C3.

We believe that recording a reserve solely for the purpose of reducing the C3 capital metric is not appropriate. A reserve should be consistent with its definition: to prefund expected policyholder obligations under statutory accounting methods and assumptions.

USE OF STOCHASTIC EQUITY RETURNS IN C3-P1

Background of C3 Phase 1 (C3P1)

The intent of C3P1 is to address interest rate risk for annuities and single premium life policies caused by potential asset/liability mismatch. In this context, interest rate risk primarily manifests itself as either disintermediation risk or reinvestment risk. Disintermediation occurs when interest rates rise and policyholders surrender products to reinvest at higher new money rates, forcing the insurer to sell assets at a loss. Reinvestment risk occurs when interest rates decline, and insurers must reinvest proceeds from maturing assets at lower interest rates than originally anticipated.

The introduction of stochastic equity could introduce a double count in capital that is already covered by C-1 equity risk charge. The current C-1 common stock equity factor was based on the 94th percentile worst loss over 24-month periods using the low watermark method on S&P historical tail outcomes. The 2013 study[4] continues to use a two-year loss horizon and retained the same 30% factor that was originally proposed in 1993. The interim deficiencies that occur in a two-year period due to unfavorable equity returns under GOES are likely also reflected in C1.

[4] Proceedings of the NAIC - Fall 2012 (Volume II), page 850.

Proposal for Equity Returns in C3P1

In its May 1, 2025, presentation[5] to the LRBCWG, the Academy proposed a modeling methodology dependent on the type of equity exposure. The proposal considers the type of equity exposure, and whether the underlying liabilities being modeled have varying cashflows due to changes in equity returns.

The proposal is replicated in the table below.

Type of Equity Exposure	Proposal
Equity instruments to hedge predictable liability cash flows (e.g., FIA index hedge or indexed GIC)	• **Exclude stochastic equity risk from C3P1.** • Assume hedges are effective and reflect the same index hedge error margin for reserve and capital for additional conservatism.
Equity instruments in the general account (e.g., equities backing long-duration contracts such as SSC)	• **Develop a prudent estimate levelized return to avoid exacerbating capital requirement.** • Option 1—The prescribed levelized equity return equals the gross wealth factor (GWF) at specified CTE level for the projection years that reflect the average liability duration and then appending the new levelized return for the remaining years which equal to the GWF at the same CTE level at projection year 50. See Appendix for demonstration of Option 1. • Option 2—Use AG-53 compliant assumption for general account equities.[6]
Equity instruments to hedge less predictable liability cash flows (e.g., FIA with GLWB)	• **Model stochastic equity but allow hedge modeling simplification.** • Unlike VA, the liability cash flows are mostly exposed to the policyholder behavior assumption risk rather than equity risk. • Optional credit adjustment to account for double counting of risk reflected in the C1 equity risk charge and the C3 calculation.

In addition, the Academy proposed in that same May 1, 2025, presentation[7] a credit to C1 if stochastic equity is modeled in C3. Here, the first two years of projection in greatest present value of accumulated asset deficiencies (GPVAD) (surplus) in C3 is not recognized. The table below shows the credit to apply to the equity assets included in C3 testing to offset the C1 risk capital margin.

Asset category	Estimated factor credit
Common stock	30%
Other equity-like assets	TBD

The addition of equity risk in the C3P1 calculation was tested as a part of the VM-22 PBR field test; however, most of the participating companies were unable to perform the VM-22 PBR projection. For this reason, this was not rigorously tested. Stochastic equity also was not tested in the GOES field test because participants were to calculate C3P1 capital assuming the current framework.

[5] C-3 Alignment, Part II.

[6] An equity-like instrument under AG53 assumed to have higher value at projection year 10 or later than under an assumption of annual total returns, before the deduction of investment expenses, of 4% for the first 10 projection years after the valuation date followed by 5% for projection year 11 and after.

[7] C-3 Alignment, Part II.

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OTHER CHANGES

We suggest that reference be made to "scenarios" rather than "scenario generator" consistent with the view that only scenarios will be available to companies rather than the generator itself.

It would also be worth clarifying whether the same set of scenarios should be used on reserves and capital. It is not clear whether a company can use a proprietary generator for VM-20/VM-22 PBR, but would be required to use the 200 scenarios from the NAIC economic scenario generator.

Further, "Voluntary Reserve" is a defined term and should be capitalized. It would be helpful to users of these instructions to include a reference to the location of the definition.

Additionally, we support the changes regarding testing horizon considerations when testing has a longer period than 100 years.

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If you have any questions or would like to discuss these comments further, please contact Amanda Barry-Moilanen (barrymoilanen@actuary.org), the Academy's life policy project manager.

Sincerely,

Rick Hayes
Chairperson, C-3 Subcommittee
American Academy of Actuaries

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APPENDIX

Demonstration of Option 1

Assume the following:

- 30 years projection
- C3P1 metric is based on the CTE90 (it is similar to 95th percentile)
- Average liability duration = 10

The table below shows the latest GOES equity GWFs. The calculation of the levelized return is as follows:

- First 10 years: -0.7% = 0.93 ^ (1/10) - 1
- Remaining 20 years: 4.4% = (2.22/0.93) ^ (1/20) - 1

S&P 500	1 Yr	5 Yr	10 Yr	20 Yr	30 Yr
Min	0.50	0.23	0.17	0.09	0.17
1.0%	0.71	0.59	0.58	0.73	1.12
2.5%	0.77	0.71	0.77	1.07	1.60
5.0%	0.83	0.82	0.93	1.40	2.22
10.0%	0.89	0.94	1.16	1.87	3.20
25.0%	0.99	1.19	1.58	2.92	5.45
50.0%	1.10	1.50	2.16	4.50	9.37
75.0%	1.20	1.82	2.88	6.78	15.68
90.0%	1.29	2.14	3.67	9.59	23.92
95.0%	1.35	2.37	4.25	11.72	30.79
97.5%	1.40	2.57	4.86	13.85	37.57
99.0%	1.46	2.83	5.66	17.28	47.69
Max	1.81	4.14	9.45	34.11	136.61

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September 26, 2025

Philip Barlow
Chair, NAIC Life Risk-Based Capital (E) Working Group (LRBC)

Peter Weber
Chair, NAIC Variable Annuity Capital and Reserve (E/A) Subgroup (VACR)

Re: The LRBC-VACR July 2025 Generator of Economic Scenarios (GOES) Capital Exposures

Dear Chair Barlow and Chair Weber:

The American Council of Life Insurers (ACLI) appreciates the opportunity to provide feedback on Risk-Based Capital (RBC) Proposal Form 2025-14-L which aims to address the referral from the GOES (E/A) Subgroup to the Life RBC (E) Working Group to consider changes to the C-3 Phase I (C3P1) calculation, C-3 Phase II (C3P2) calculation, and other Life RBC Instructions as necessitated by the newly adopted Generator. We would also like to acknowledge the work of NAIC staff and regulators in continuing dialogue on such an important issue for year-end 2026 reporting.

Given the breadth of the exposures, we are commenting on what we perceive to be the most significant aspects. We are optimistic all other changes can be addressed in a subsequent exposure.

Following review by our membership, we have the following recommendations:

1. Implement GOES mechanics and timing:
    a. Apply the GOES scenarios to C3P1 and C3P2 calculations for 2026 and later;
    b. Allow phase-in impact of GOES for C3P1 and C3P2 over 3 years;
2. Implement targeted recalibrations to align with GOES:
    a. Retain the 25% scalar and calibrate C3P2 at CTE(95);
        i. History of scalar;
        ii. Concerns around CTE(90);

iii. Concerns around CTE(98);

b. Update the discounting methodology for C3P1 to the Net Asset Earned Rate or direct iteration approach;
c. Analyze C3P1 scenario selection methodology for potential recalibration for 2026 reporting;

3. Defer other major framework changes:
   a. Retain existing treatment of voluntary and asset adequacy reserves;
   b. Defer inclusion of stochastic equity in C3P1 until further testing has been performed; and
4. For C3P2, collect CTE(90) (no scalar) and CTE(98) (25% scalar) for C3P2 as a disclosure item.

Here, we offer expanded rationale for our latest C3P1 and C3P2 recommendations, new comments around additions to the exposure document regarding both voluntary and asset adequacy reserves and support of adding a GOES RBC disclosure at the CTE(90) level to provide clearer insights for regulators into potential impacts to minimum capital levels.

1. Implement GOES mechanics and timing

a. **Apply the GOES scenarios to C3P1 and C3P2 calculations for 2026 and later**: Given the feedback we have heard from regulators, we understand that our previous recommendation of deferral of the GOES scenarios for C3P1 may not be palatable. While we still have concerns with implementing GOES for C3P1 at this time given the American Academy of Actuaries (Academy) is developing an updated methodology, we have some suggestions below that will make this change more acceptable to industry.

b. **Allow phase-in impact of GOES for C3P1 and C3P2 over 3 years**: Given the allowance for C3P2 impacts to be phased in over 3 years for GOES, we suggest that this principle also be carried over to C3P1, so all of the changes related to GOES are applied on as consistent a basis as possible.

2. Implement targeted recalibrations to align with GOES

The original intent of this RBC update was to reflect any changes necessitated by the adoption of GOES. Therefore, at this time, changes should generally be limited to reflecting the changes necessary to accommodate differences in characteristics of the GOES generator compared to the Academy generator.

The Academy is in process of a fundamental evaluation of the C3P1 framework. If regulators wish to pursue a more fundamental revision of the C3P2 framework, that effort should move forward through a broader consultation process aligned with the Academy's efforts to review the C-3 framework holistically, rather than being attached to the near-term task of updating the RBC instructions for GOES.

As work continues on updating the C3P1 methodology, LRBC should review the appropriateness of consistency between C3P1 and C3P2, taking into account substantial differences in the underlying products or reserving methods.

a. **Retain the 25% scalar and calibrate C3P2 at CTE(95)**: Consistent with our prior letter, we suggest using CTE(95) with the 25% factor/scalar. There are several arguments for this change:

- As scenarios reflect far more extreme events such as low-for-long and jumps in the equity scenarios, reduction of the CTE level is a logical step since the CTE level no longer needs to implicitly reflect severity and risks not captured in AIRG.
- CTE(95) with the 25% scalar will still encourage hedging, which was a key concern of regulators.
- Introduction of the scalar was a critical part of the revised variable annuity framework (see *History* below);
- Using CTE(90) with no scalar may reintroduce non-economic factors into the framework and result in overly volatile and/or punitive requirements (see *Concerns around CTE(90)* below);
- GOES reflects risk and regulator priorities not reflected in Academy Interest Rate Generator (AIRG). Retaining CTE(98) may be overly punitive due to the severity of the deep tail scenarios (see *Concerns around CTE(98)* below);
- The selection of CTE(95) seeks to strike a balance between our concerns at the CTE(90) and CTE(98) level and better aligns with how companies manage capital and risk. Anchoring to a lower CTE level with a 100% scalar introduces a disparity with the level of capital companies are actually holding.
- We note our analysis is based on available CTE levels from the NAIC model office and field study; the impact of other possible CTE levels could be assessed as part of additional model office work.

i. History:

First, we offer some background on the purpose of the scalar. A decade ago, the NAIC sought to address issues with the reserve and capital framework for variable annuity products. Key to addressing this issue were the reforms made to the variable annuity reserving and capital requirements (VA Reform). The introduction of the 25% scalar in C3P2 was a critical component of the NAIC's reforms, designed to align capital requirements with prudent risk management and to reduce incentives for captive reinsurance in variable annuity products. The scalar was part of two "CTE High"/scenario proposal packages considered by regulators at the time. The first proposal suggested the use of CTE(98) in conjunction with maintaining the existing AIRG, and the second suggested the use of CTE(95) in conjunction with scenarios involving modifications to the prescribed generator that employed an alternative equity calibration with more pronounced tails; these considerations show calibration has always been tied to the generator's traits.

Following comprehensive analysis and consideration of trade-offs, including incentives for hedging and other risk management strategies, regulators selected the first proposal, deferring the consideration of scenario changes to a future project. By and large, the reforms have been effective, as the current framework better aligned capital and reserve levels with the true underlying risk reflected in the scenarios from the underlying generator used in the calculations. This revised structure of the C3P2 charge encouraged efficient use of capital markets for tail scenario hedging and allowed companies to continue offering products that are in strong demand among current and future retirees, without undue reliance on offshore solutions.

Since its inception, this framework has been through three distinct environments—low-for-long rates, a COVID-era shock, and a high-rate period—and provided the stability regulators seek from RBC. Absent the scalar, capital requirements could once again become misaligned with underlying risks, reintroducing pressures that encourage the use of captives or other structures by introducing non-economic volatility to company financials. This would not only erode the effectiveness of the prior reforms but would

also create an uneven playing field among insurers and disincentivize prudent risk management practices like hedging.

GOES is the result of the scenario analysis that was deferred during the reforms. Similar to the rationale in the second proposal at that time, since GOES now explicitly captures more tail risks, the need for additional capital using a CTE level as high as CTE(98) to sufficiently capture risks beyond historical experience within the calibration of the C3P2 formula is no longer necessary. For that reason, we believe it is appropriate to calibrate C3P2 at CTE(95) when implementing GOES and to maintain the 25% scalar/multiplier as a key component from the reform decisions**.** We continue to support these framework decisions and offer the following concerns around deviations that are being considered at this time.

ii. Concerns around CTE(90):

1. **CTE(90) binds more often at CSV which creates volatility.** A significantly higher number of scenarios used to determine capital may increase the share of scenarios floored at cash-surrender value in C3P2, mixing economic and non-economic amounts and complicating hedge-based capital management for certain hedge strategies commonly used in the industry. In rising markets, cash surrender value (CSV) floors are more likely to be binding, thus artificially inflating CTE amounts beyond an economic level and thereby reducing the incentives for maintaining these prudent risk management practices. It is conceivable that the CSV floor could still be binding further out in the tail, leading to potentially unintended consequences, but its influence should be less pronounced when using a higher CTE level and scalar significantly below 100%.
2. **Model office testing indicates CTE(90) is a methodology change that is independent of the scenario distribution and increases capital requirements.** The following exhibit is based on materials from the NAIC Summer National Meeting showing the variable annuity model office results by metric (p. 151). This data illustrates the impact of the various approaches on a distribution that has removed the non-economic volatility from the CSV floor. In all cases, CTE(90)-CTE(70) produces a significantly higher capital requirement than the iterations with the 25% scalar, indicating a fundamental change in methodology beyond the implementation of more robust scenarios. As might be anticipated from the two reform proposals, 25% of the CTE(95)-CTE(70) with the GOES scenarios produces a level of capital that is comparable to the level produced under the AIRG scenarios using CTE(98) with a 25% scalar.

Variable Annuity Model Office Results
Unfloored, Adjusted Results by Metric

AIRG	**CTE90 - CTE70**	**(CTE95 - CTE70)/4**	**(CTE98 - CTE70)/4**
New Weak ITM	7,019,983	2,573,085	3,500,443
New Strong OTM	5,762,953	2,134,213	2,880,568
Mature Strong ATM	3,990,473	1,569,426	2,288,798

GOES	**CTE90 - CTE70**	**(CTE95 - CTE70)/4**	**(CTE98 - CTE70)/4**
New Weak ITM	9,048,321	3,750,580	6,010,925
New Strong OTM	7,246,089	3,088,502	4,898,016
Mature Strong ATM	5,515,060	2,360,536	3,841,944

We recognize that this data is somewhat limited since it considers only the adjusted run. We welcome further model office testing on a best-efforts basis to determine if the conclusions remain the same and point to this need for extended testing as additional

support for maintaining the current 25% factor and re-calibrating to CTE(95) as the appropriate steps to implement GOES

3. **A backstop already exists.** The Standard Projection Amount limits overly optimistic CTE results by requiring a separate run using prescribed assumptions; this applies whether the SPA is binding (the current approach in VM-21) or not (the disclosure approach in VM-22).
4. **CTE(90) could be punitive.** The application of regulatory action levels for companies may produce unreasonable results as they translate to interest rates and GWF that ultimately drive the level of the Total Asset Requirement (TAR). As previously discussed, the interest rate model reflects significant enhancement that explicitly reflects additional risks not reflected in AIRG which would justify a lower CTE level. Regarding equities, the table below, which is based on analysis using the unfloored distribution (to avoid distortions) on a sample variable annuity block (as opposed to the NAIC model office data), shows actual 7-year month-to-month cumulative S&P based GWF using data from 1927-2025 (including the Great Depression). S&P 500 returns over this time horizon were found to have a strong relationship with the scenario reserves under both the new GOES and AIRG after performing a regression. The first two columns of this exhibit have the S&P 500 7-year GWF equivalent to the level of capital required under each capitalization level for the new GOES and AIRG. The minimum historical result is equivalent to a 0.44 GWF (or a 56% loss). This scenario was contemplated under VA Reform, with OW suggesting CTE(95) would be more appropriate if reflecting this level of severity. The 200% multiple will require recalibration to make sure the company action level is not worse than the worse-than-history or current metric. Under GOES, CTE(95) produces a slightly more severe GWF than CTE(98) with 25% scalar under the AIRG. Using CTE90 with 100% scalar could produce a significantly higher TAR at a 400% redundancy which is commonly targeted by companies under prudent risk management. CTE(95) with 25% better aligns with the practical considerations on how companies manage capital.

	S&P Cumulative Ret 7-YR		Actual 7-year m-to-m cumulative S&P price-return based GWF 1927-2025	
Capitalization Level	GOES	AIRG		
400% of 0.25*(CTE98-CTE70)	0.42	0.52	min	0.44
400% of 0.25*(CTE95-CTE70)	0.50	0.60	0.1 %-tile	0.47
100% of (CTE90-CTE70)	0.58	0.70	1 %-tile	0.54
200% of (CTE90-CTE70)	0.41	0.52	3% - tile	0.67
300% of (CTE90-CTE70)	0.29	0.39	5% - tile	0.75
400% of (CTE90-CTE70)	0.20	0.29	10% - tile	0.92

5. **Removing the scalar is a major framework change.** It would force significant updates to C3P2 risk-management practices, could constrain retirement product offerings, and may require price increases to maintain capitalization, even though the underlying risk and capitalization when compared to current levels is unchanged.

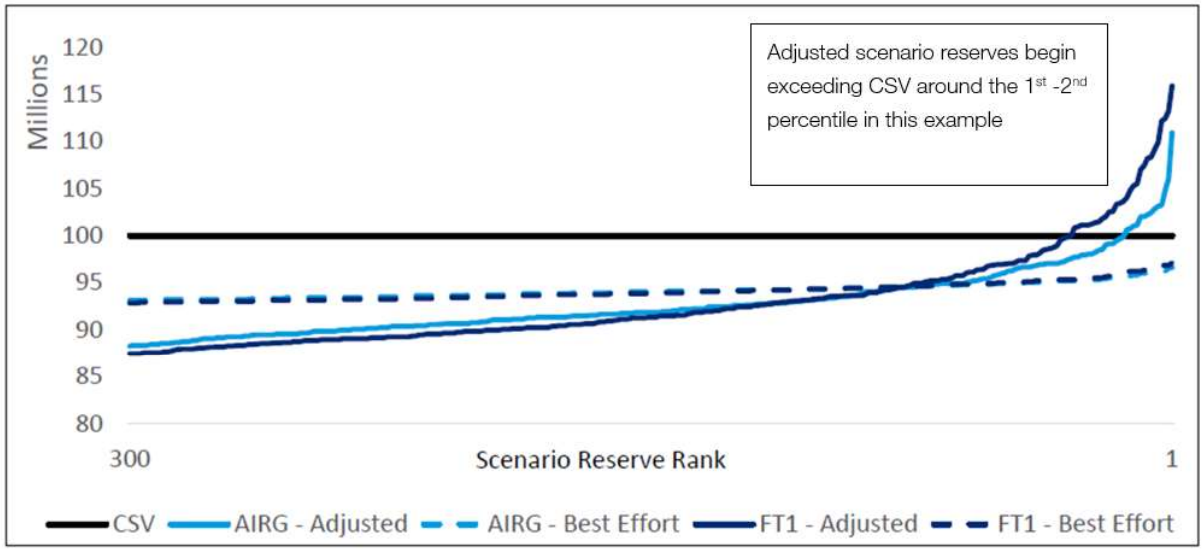
iii. Concerns Around CTE(98):

While CTE(98) would address the concerns around CTE(90), using this CTE level under GOES appears too punitive (see model office results in #2 above) given the increased severity of the deep tail scenarios and historical connection between the severity of the tails in the generator and C3P2 CTE level. In addition, the GWF reflecting the latest GOES equity model changes show that the minimum returns are generally below the target. While there has been significant work to improve the equity returns, this difference could still result in overstating the impact of the worst scenarios at the CTE(98) level. For example, VM-21 model office results comparing the Field Test scenarios to AIRG demonstrated large increases in scenario reserves under GOES for the scenarios in the 1st percentile and below.

Revised Equity GWFs vs. Acceptance Criteria

	Targets					Simulated					Ratio (Simulated/Targets)				
Percentiles	1 Yr	5 Yr	10 Yr	20 Yr	30 Yr	1 Yr	5 Yr	10 Yr	20 Yr	30 Yr	1 Yr	5 Yr	10 Yr	20 Yr	30 Yr
0	0.46	0.25	0.22	0.25	0.29	0.41	0.24	0.06	0.14	0.14	0.90	0.96	0.27	0.54	0.48
1	0.70	0.58	0.60	0.79	1.15	0.70	0.56	0.56	0.79	1.08	1.00	0.96	0.93	1.00	0.94
5	0.82	0.80	0.91	1.36	2.20	0.82	0.79	0.90	1.34	2.19	1.00	0.98	0.99	0.99	0.99
10	0.88	0.93	1.12	1.81	3.08	0.88	0.92	1.13	1.79	3.15	1.00	0.99	1.00	0.99	1.02
25	0.99	1.18	1.54	2.81	5.26	0.98	1.19	1.56	2.82	5.32	0.99	1.01	1.01	1.00	1.01
50	1.09	1.48	2.15	4.47	9.23	1.09	1.49	2.16	4.52	9.26	1.00	1.01	1.00	1.01	1.00
75	1.19	1.82	2.89	6.93	15.88	1.20	1.82	2.88	6.84	15.44	1.01	1.00	1.00	0.99	0.97
90	1.28	2.15	3.71	10.09	25.20	1.29	2.14	3.67	9.73	24.42	1.01	1.00	0.99	0.96	0.97
99	1.45	2.82	5.64	18.18	53.74	1.46	2.82	5.54	18.33	51.35	1.01	1.00	0.98	1.01	0.96
100	1.76	4.20	8.98	42.03	140.72	1.84	4.40	10.58	42.77	214.87	1.05	1.05	1.18	1.02	1.53

Unfloored CTE70 scenario reserves



b. **Update the discounting methodology for C3P1 to the Net Asset Earned Rate approach** We recommend the C3P1 discounting methodology be updated to the NAER or direct iteration methodology. This approach is more consistent with principle-based reserves and C3P2, and it aligns with the Academy recommendation and actual company reinvestment strategies from both a weighted average life and spread perspective. Further, discounting at the 1-Year Treasury, given the inclusion of low-for-long interest rates in the GOES scenarios, may exacerbate increases to capital requirements. For example, applying a greater than 100% multiple to risk free rates when they are negative is unlikely to capture reasonable behavior of spreads in that environment.

c. **Analyze C3P1 scenario selection methodology for potential recalibration for 2026 reporting**: The special weight was developed based on numerous combination runs from the 200 scenarios under original AIRG scenarios. Regulators should examine the special weights under GOES to see if it still works rather than just carrying it over, with potential changes for 2026 reporting.

3. **Defer other major framework changes**

a. **Retain existing treatment of voluntary and asset adequacy reserves for C3P1 and C3P2:**

We strongly oppose the proposal to exclude asset adequacy reserves (AAT) and voluntary reserves from capital calculations for C3P1 and C3P2. These capital calculations are based on model runs that calculate a total asset requirement that comprises both reserves and capital. Implementing the GOES scenarios only increases the robustness of this calculation and should increase comfort in the resulting total asset requirement. The exclusion of AAT and voluntary reserves from the C-3 capital calculation will result in companies holding assets greater than the total asset requirement (CTE(70) reserves + capital charge to get to TAR + AAT/voluntary reserves). This proposed change would distort financial reporting, create inconsistency across companies, and could put pressure on company actuaries to avoid establishing additional reserves that are warranted to fulfill policyholder obligations.

This concern is especially acute for C3P1, which is already undergoing significant redevelopment. Making such a change in isolation, without considering the broader reform underway, risks unintended consequences.

b. Defer inclusion of stochastic equity in C3P1 until further testing has been performed: ACLI recommends maintaining the current framework - excluding stochastic equity—for 2026 reporting. Unlike C3P2 separate account products, where equity risk is not otherwise captured, C3P1 general account products already reflect equity exposure through the 30% C1 charge. Including stochastic equity in C3P1 would therefore double count this risk and overstate required capital. The Academy has also flagged the need for further analysis to prevent potential double counting with the existing C1 equity charge. Any proposal to introduce stochastic equity into C3P1 should be field tested and accompanied by a broader review of the C1 framework—an effort beyond the scope of implementing GOES. By consequence, we recommend application of C3P1 to equity-indexed products be deferred.

4. For C3P2, collect CTE(90) (no scalar) and CTE(98) (25% scalar) for C3P2 as a disclosure item

GOES is a material overhaul of scenario modeling for reserves and capital. We recommend observing its impact within the RBC framework with ACLI's recommendations before undertaking significant structural changes, especially given the holistic C-3 framework review being proposed by the Academy. However, to inform future decisions without destabilizing the framework now, we support collecting CTE(90) with no scalar and CTE(98) with a 25% scalar on a disclosure-only basis to study behavior under GOES for both C3P1 and C3P2. This will provide regulators the information they are seeking to assess company solvency while deferring additional changes until the impact of GOES can be fully assessed.

Thank you once again for the consideration of our comments and we look forward to continuing the discussion soon.

Sincerely,

cc: Jane Ren, NAIC; Ben Slutsker, Vice Chair – LRBC; Matt Cheung, Vice Chair - VACR

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September 26, 2025

Philip Barlow
Chair, Life RBC (E) Working Group
National Association of Insurance Commissioners

Peter Weber
Chair, Variable Annuities Capital and Reserve (E/A) Subgroup
National Association of Insurance Commissioners

Re: LRBC and VACR May 2025 Generator of Economic Scenarios (GOES) Exposure

Dear Chairs Barlow and Weber:

On behalf of the Committee of Annuity Insurers (the "CAI"),[1] we are submitting this letter in response to Risk-Based Capital (RBC) RBC Proposal Form 2025-14-L put forward by the Life RBC (E) Working Group ("LRBC") to consider changes to the C3 Phase II capital calculation in connection with the implementation of the Generator of Economic Scenarios ("GOES") economic scenario generator adopted by the NAIC (the "Proposal"). We appreciate the opportunity to submit these comments.

The CAI recognizes and appreciates the efforts made by the GOES (E/A) Subgroup and the LRBC to develop the Proposal. However, given the substantial changes already introduced by GOES and planned refinements for year 2 of implementation, the CAI urges the LRBC to limit changes to the C-3 framework to those necessary to implement GOES as originally intended.

With respect to the multiplier, the CAI recommends that LRBC refrain from immediately altering the multiplier used in the C3 Phase II capital metric, which is in line with the ACLI and American Academy of Actuaries recommendations, as it has been proven to work well over a host of economic environments. Instead, a period of continued capital calculations at the 400% RBC (25% scalar) would allow regulators to evaluate the implications of any change to the multiplier under GOES in a controlled, non-disruptive manner. If, following this evaluation, regulators determine that a change in the multiplier may be appropriate, such a change could then be pursued in a data-driven and consultative manner.

[1] The Committee of Annuity Insurers is a coalition of life insurance companies formed in 1981 to address legislative and regulatory issues relevant to the annuity industry and to participate in the development of federal policy with respect to securities, regulatory and tax issues affecting annuities. A list of the CAI's member companies is attached. The CAI's current 32 member companies represent approximately 80% of the annuity business in the United States.

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We note that the current scalar of 25% was developed during the process for creating the VM-21 principles based reserving framework for variable annuities in recognition of the meaningfulness of the RBC ratio in judging the financial health of a company and in identifying weakly capitalized insurers. That has not changed. Put simply, regulatory prudence dictates that a C3 charge should remain in place until a company's variable annuity portfolio is funded at a level consistent with the capitalization target of a financially sound U.S. life insurer that offers tail risk products. That target remains a 400% Company Action Level RBC ratio. Accordingly, retaining the scalar at 25% ensures that all reserves — including voluntary and asset adequacy reserves established by actuaries to reflect emerging risks — continue to work in tandem with the C-3 charge, so that funding levels reach the standards expected of a strong insurer.

The CAI also opposes the proposal to exclude asset adequacy reserves and voluntary reserves from the C-3 capital calculation. Voluntary and asset adequacy reserves are a valuable safeguard in the capital framework. They reflect professional actuarial judgment and strengthen policyholder protection under moderately adverse conditions. Excluding these reserves from C-3 would effectively double count risk, leading to overstated capital requirements or discouraging prudent reserving practices.

With respect to the Conditional Tail Expectation (CTE) confidence level, the CAI recommends decreasing the CTE level to CTE(95) to align with the adoption of GOES. The GOES scenarios include tail risks that were not captured by the previous Academy Interest Rate Generator (AIRG), including low-for-long interest rates, negative interest rates and lower returns on equity. Accordingly, a reduction in the current CTE(98) confidence level is appropriate. However, our members have substantial concerns that reducing the CTE level to CTE(90) could result in significant capital volatility (as demonstrated during VM-21 field testing).

Our member companies, who have product portfolios encompassing a wide range of variable annuity (VA) contracts including traditional VAs and other VAs such as registered index-linked annuities (RILAs or ILVAs) and market value adjusted annuities (MVAs), have expressed concern that altering the multiplier or moving to CTE(90) could introduce significant capital volatility and, as a result, strongly disincentivize the hedging programs they employ. The current metric appropriately assesses the impact of deep tail events, with capital charges that remain well above the cash surrender value (CSV) floor—thereby reducing the risk of sharp capital spikes during market stress. A methodology that approaches or breaches the CSV floor could trigger unnecessary, abrupt and material changes in required capital. This, in turn, could force inappropriate changes to a company's internal metrics and prudent risk management practices. Further, it may even negatively affect issuer credit ratings if rating agencies perceive deterioration in capital ratios. Even the prospect of such volatility could force issuers to widen spreads/increase fees across their VA portfolios, or redesign or terminate offerings of their portfolios of VA contracts, ultimately to the detriment of consumers.

If the LRBC wants to explore a possible multiplier change or a larger reduction of the CTE level, a more prudent approach would be to collect data on a confidential basis at the CTE(90) level over a full market cycle, enabling regulators to fully assess whether these updates would align with the intended capital calibration under GOES.

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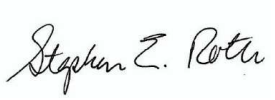
Conclusion

We appreciate this opportunity to comment on the Proposal. Together with other interested organizations like the American Academy of Actuaries and the American Council of Life Insurers, the CAI stands ready to provide the NAIC with any information that may further its consideration of the concerns expressed herein.

Sincerely,

THE COMMITTEE OF ANNUITY INSURERS



Stephen E. Roth
Eversheds Sutherland (US) LLP

CC: Ben Slutsker, Vice Chair, Life RBC (E) Working Group
Matt Cheung, Vice Chair, Variable Annuities Capital and Reserve (E/A) Subgroup
Jane Ren, Advisor, NAIC
Kazeem Okuson, Sr. Life RBC Analyst, NAIC
Daren Moreira, Eversheds Sutherland (US) LLP

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Genworth Financial
Global Atlantic Financial Group
Guardian Insurance & Annuity Co., Inc.
Jackson National Life Insurance Company
John Hancock Life Insurance Company
Lincoln Financial Group
Massachusetts Mutual Life Insurance Company
Metropolitan Life Insurance Company
Nationwide Life Insurance Companies
New York Life Insurance Company
Northwestern Mutual Life Insurance Company
Pacific Life Insurance Company
Protective Life Insurance Company
Prudential Insurance Company of America
Sammons Financial Group
Security Benefit Life Insurance Company
Symetra Financial Corporation
Talcott Resolution
Thrivent
TIAA
TruStage
USAA Life Insurance Company

The Committee of Annuity Insurers was formed in 1981 to participate in the development of federal policies with respect to annuities. The member companies of the Committee represent approximately 80% of the annuity business in the United States.

BY E-MAIL

September 26, 2025

Philip Barlow
Chair, NAIC Life Risk-Based Capital (E) Working Group (LRBC)

Peter Weber
Chair, NAIC Variable Annuity Capital and Reserve (E/A) Subgroup (VACR)

Attention: Kazeem Okosun (kokosun@naic.org)

Re: Proposal 2025-14-L: GOES Implementation (Treatment of Voluntary and AAT Reserves in C-3 Phase I)

Dear Chairs Barlow and Weber,

New York Life and Northwestern Mutual appreciate the continued efforts of the NAIC and its working groups to implement the new Generator of Economic Scenarios (GOES) across relevant reserving and capital calculations. The extension of GOES to C-3 capital calculations is an important part of this journey, and we appreciate the opportunity to comment on the proposed changes to RBC instructions.

With respect to the current proposal, we strongly oppose the exclusion of voluntary reserves and asset adequacy (AAT) reserves from C-3 Phase I capital calculations. Voluntary and AAT reserves play an important role in state-based solvency regulation, providing the Appointed Actuary with a critical tool to ensure reserves are adequate to safeguard policyholders.

Excluding these reserves when calculating RBC would have the following adverse impacts:

- **Double counting**: For insurers that hold voluntary or AAT reserves, being required to calculate C-3 capital as if those reserves did not exist would result in double counting. This duplicative treatment would impose capital requirements for risks that are already captured in reserves, creating an unnecessary and inappropriate redundancy.

- **Disincentive for prudent reserving**: Insurers that appropriately strengthen their reserves would see no recognition of that prudence in capital requirements. Meanwhile, insurers that avoid strengthening reserves would effectively be rewarded. This may discourage insurers from holding appropriately conservative reserves. Furthermore, this could deter the Appointed Actuary from establishing additional reserves in situations where it would be appropriate and prudent to do so.

- **Non-level playing field**: The concerns noted above – duplicative reserve/capital requirements and disincentives for establishing appropriately conservative reserves – would disadvantage more prudent companies and diminish the usefulness of RBC as a consistent regulatory tool.

RBC requirements should work in concert with reserves to appropriately reflect risk exposure. Furthermore, RBC requirements should promote – not penalize – sound reserving practices.

We are grateful for your time and attention to our comments. We welcome the opportunity to discuss this letter at your convenience.

Sincerely,

Erik Anderson
Senior Vice President and Chief Actuary
New York Life Insurance Company

Jason Klawonn
Vice President and Chief Actuary
The Northwestern Mutual Life Insurance Company

cc: Jane Ren, NAIC; Ben Slutsker, Vice Chair – LRBC; Matt Cheung, Vice Chair – VACR

Line (35)
Enter the interest rate risk component from the Cash Flow Modeling for C-3 RBC Requirements Variable Annuities and Similar Products (see Line (37)). The interest rate risk component should be entered on a pre-tax basis using the enacted maximum corporate income tax rate.

Line (36)
Total

interest

rate risk.

Equals

Line (34)

plus Line

(35). Line

(37)

Cash Flow Modeling for C-3 RBC Requirements for Variable Annuities and Similar Products:

Overview

The amount reported on Line (35) and Line (37) is calculated using the 7-step process defined below. This calculation applies to all policies and contracts that have been valued following the requirements of AG-43 or VM-21. For contracts whose reserve was determined using the Alternative Methodology (VM-21 Section 7) see step 3 while all other contracts follow steps 1 and 2, then all contracts follow steps 4 - 7.

Step 1 CTE90: The first step is to determine CTE90 by applying the one of the two methodologies described in paragraph A below.

Step 2 C-3 RBC: using the formulas in paragraph B, determine the C-3 RBC amount based on the amount

calculated in step (1). Floor this amount at $0. Step 3: Determine the C-3 RBC using the Alternative

Methodology for any business subject to that requirement as described in paragraph C.

Step 4: As described in paragraph D below, the C-3 RBC amount is the sum of the amounts determined in steps 2 and 3 above, but not less than zero. The Total Asset Requirement is the Reserve based on the requirements of VM-21 prior to the application of any phase-in, plus the C-3 RBC amount.

Step 5: For a company that has elected a Phase-in for reserves following VM-21 Section 2.B., the C-3 RBC amount is to be phased-in over the same time period following the requirements in paragraph E below.

Step 6: Apply the smoothing rules (if applicable) to the C-3 RBC amount in step (4) or (5) as applicable.

Step 7: Divide the amount from Step 4, 5, or 6 (as appropriate) by (1-enacted maximum federal corporate income tax rate). Split this amount into an interest rate risk portion and a market risk portion, as described in paragraph F.
The interest rate portion of the risk should be included in

Line (35) and the market risk portion in Line (37). The C-3

RBC is calculated as follows:

A. CTE (90) is calculated as follows: Except for policies and contracts subject to the Alternative Methodology (See C. below), apply the CTE methodology described in NAIC Valuation Manual VM-21 and calculate the CTE (90) as the numerical average of the 10% largest values of the Scenario Reserves, as defined by Section 4 of VM-21. In performing this calculation, the process and methods used to calculate the Scenario Reserves use the requirements of VM-21 and should be the same as used for the reserve calculations. The effect of Federal Income Tax should be handled following one of the following two methods:

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1. If using the Macro Tax Adjustment (MTA): The modeled cash flows will ignore the effect of Federal Income Tax. As a result, for each individual scenario, the numerical value of the scenario reserve used in this calculation should be identical to that for the same scenario in the Aggregate Reserve calculation under VM-21. Federal Income Tax is reflected later in the formula in paragraph B.1.

2. If using Specific Tax Recognition (STR): At the option of the company, CTE After-Tax (90) (CTEAT (90)) may be calculated using an approach in which the effect of Federal Income Tax is reflected in the projection of Accumulated Deficiencies, as defined in Section 4.A. of VM-21, when calculating the Scenario Reserve for each scenario. To reflect the effect of Federal Income Tax, the company should find a reasonable and consistent basis for approximating the evolution of tax reserves in the projection, taking into account restrictions around the size of the tax reserves (e.g., that tax reserve must equal or exceed the cash surrender value for a given contract). The Accumulated Deficiency at the end of each projection year should also be discounted at a rate that reflects the projected after-tax discount rates in that year. In addition, the company should add the Tax Adjustment as described below to the calculated CTEAT (90) value.

3. A company that has elected to calculate CTEAT (90) using STR may not switch back to using MTA in the projection of Accumulated Deficiencies without prominently disclosing that change in the certification and supporting memorandum. The company should also disclose the methodology adopted, and the rationale for its adoption, in the documentation required by paragraph J below.

4. Application of the Tax Adjustment: Under the U.S. IRC, the tax reserve is defined. It can never exceed the statutory reserve nor be less than the cash surrender value. If a company is using STR and if the company's actual tax reserves exceed the projected tax reserves at the beginning of the projection, a tax adjustment is required.

   The CTEAT (90) must be increased on an approximate basis to correct for the understatement of modeled tax expense. The additional taxable income at the time of claim will be realized over the projection and will be approximated using the duration to worst, i.e., the duration producing the lowest present value for each scenario. The method of developing the approximate tax adjustment is described below.

   The increase to CTEAT (90) may be approximated as the corporate tax rate times f times the difference between the company's actual tax reserves and projected 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 ~~Scenario Greatest Present Value~~ scenario reserve is determined 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. If the Alternative Method is used, f is approximated as 0.5.

B. Determination of RBC amount using stochastic modeling:

1. If using the MTA: Calculate the RBC Requirement by the following formula in which the statutory reserve is the actual reserve reported in the Annual Statement. In the second term – i.e., the difference between statutory reserves and tax reserves multiplied by the Federal Income Tax Rate – may not exceed the portion of the company's non- admitted deferred tax assets attributable to the same portfolio of contracts to which VM-21 is applied in calculating statutory reserves:

   ((CTE (90) – SR – 1/[3] x (Voluntary Reserves)) x (1 – Federal Income Tax Rate) – (Statutory Reserve – Tax Reserve) x Federal Income Tax Rate

2. If the company elects to use the STR: The

   C-3 RBC is determined by the following

   formula: (CTEAT (90) – SR -1/[3] x

   Voluntary Reserves)

For the purposes of this calculation, the SR is the CTE70 (best efforts) + E × max[0, CTE70 (adjusted) – CTE70 (best efforts)], before consideration of the Additional Standard Projection Amount, Asset Adequacy Reserves, or Voluntary Reserves. Voluntary reserve means any reserve that is not required by AG-43, VM-21, or VM-30 (e.g., asset adequacy reserves). If the determination of asset adequacy reserves depends on inclusion of the reserve in cashflow testing, they are not considered voluntary reserves for this purpose. They include other amounts required by a state in which the company is doing business.

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The Additional Standard Projection Amount is calculated using the methodology outlined in Section 6 of VM-21.¶

C. Determination of C-3 RBC using Alternative Methodology: This calculation applies to all policies and contracts that have been valued following the requirements of AG-43 or VM-21, for which the reserve was determined using the Alternative Methodology (VM-21 Section 7). The C-3 RBC amount is determined by applying the methodology as defined in Appendix 2 to these instructions.

D. The C-3 RBC amount is the sum of the amounts determined in paragraphs B and C above, but not less than zero. The TAR is defined as the Reserve determined according to VM-21 plus the C-3 RBC amount. All values are prior to any consideration of Phase-in allowances for either reserve or C-3 RBC. The RBC values are post-tax.

E. Phase in: A company that has elected to phase-in the effect of the new economic scenario requirements following VM-21 Section 2.C shall phase in the effect on C-3 RBC using the following steps:

- 1. Begin with the C-3 RBC amount from step 7 for Dec. 31, 2025 LR027 Line (37) instructions for all business within the scope of the Variable Annuities modeling requirements as of 12/31/25. Add to this the amount of C-3 RBC computed in the same manner as the 2025 value for any reinsurance ceded that is expected to be recaptured in 2026 and in the scope of the Variable Annuities modeling requirements. This amount is 2025 RBC.
- 2. Determine the C-3 RBC amount as of 12/31/25 using paragraphs A, B, C, and D for the same inforce business as in 1. This amount is 2025 RBC New.
- Determine the phase-in amount (PIA) as the excess of 2025 RBC New over 2025 RBC.
- For 12/31/2026, compute the C-3 RBC following paragraphs A –D above, then subtract PIA times (2/3).
- For 12/31/2027, compute the C-3 RBC following paragraphs A – D above, then subtract PIA times (1/3).

F. The amount determined in paragraphs D or E. above for the contracts shall be divided by (1-enacted maximum federal corporate income tax rate) to arrive at a pre-tax amount. This pre-tax amount shall be split into a component for interest rate risk and a component for market risk. Neither component may be less than zero. The provision for the interest rate risk, if any, is to be reported in Line (35). The market risk component is reported in Line (37).

The amount reported in Line (37) is to be combined with the C-1cs component for covariance purposes.

G. The way grouping (of funds and of contracts), sampling, number of scenarios, and simplification methods are handled is the responsibility of the company. However, all these methods are subject to Actuarial Standards of Practice, supporting documentation and justification, and should be identical to those used in calculating the company's statutory reserves following VM-21.

H. Certification of the work done to set the C-3 RBC amount for Variable Annuities and Similar products are the same as are required for reserves as part of VM-31. The certification should specify that the actuary is not opining on the adequacy of the company's surplus or its future financial condition.

The certification(s) should be submitted by hard copy with any state requiring an RBC hard copy.

I. An actuarial memorandum should be constructed documenting the methodology and assumptions upon which the required capital for the variable annuities and similar products is determined. Since the starting point for the C-3 RBC calculation is the cash flow modeling used for the reserves, the documentation requirements for reserves (VM-31) should be followed for the C-3 RBC. The reserve report may be incorporated by reference, with this C-3 RBC memorandum focused on identifying differences and items unique to the C-3 RBC process, or at the company's option, the documentation of C-3 RBC may be merged into the VA Report with the differences for C-3 RBC discussed in a separate section of the Memorandum as outlined in VM-31.

These differences that would need to be identified either in the RBC Actuarial Memorandum or the VA Report will typically include:

* The basis for considering federal income tax,
* Whether or not smoothing was applied, and the effect of that smoothing,
* Whether or not a phase in was used, and the impact on the reported values,
* If the company elects to calculate CTEAT (90) using STR whereby the effect of Federal Income Tax is reflected in the projection of Accumulated Deficiencies, the company should still disclose in the memorandum the Total Asset Requirement and C-3 RBC that would be obtained if the company had elected to use the MTA method.
* Documentation of the alternative methodology calculations, if applicable, and
* Documentation of how the C-3 RBC values were allocated to the interest and market risk components.

This actuarial memorandum will be confidential and available to regulators upon request.

The lines on the alternative calculations page will not be required for 2019 or later.

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A company should decide whether or not to smooth the C-3 RBC calculated in paragraph D or E above to determine the amount in Line (37). For any business reinsured under a coinsurance agreement that complies with all applicable reinsurance reserve credit "transfer of risk" requirements, the ceding company shall reduce the reserve in proportion to the business ceded while the assuming company shall use a reserve consistent with the business assumed.¶
¶
A company may choose to smooth the C-3 RBC calculated in paragraph D or E above. A company is required to get approval from its domestic regulator prior to changing its decision about smoothing from the prior year. In addition, a company that has elected to smooth the risk-based capital is required to get approval from its domestic regulator prior to smoothing if it has experienced a material change in its Clearly Defined Hedging Strategy from the prior. For this purpose, a company's Clearly Defined Hedging Strategy is considered to have experienced a material change if any of the items outlined in VM-21 Section 1.D.2 in the current year differs from that in the prior year.¶
¶
To implement smoothing, use the following steps. If a company does not qualify to smooth or a decision has been made not to smooth, go to paragraph G.¶
Determine the C-3 RBC amount calculated in paragraph D or E above¶
Determine the aggregate reserve for the contracts covered by the Variable Annuity Stochastic modeling ... [2]
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The total of all annual statement reserves representing exposure to C–3 risk on Line (36) should equal the following:

Exhibit 5, Column 2, Line 0199999
– Page 2, Column 3, Line 6
+ Exhibit 5, Column 2, Line 0299999
+ Exhibit 5, Column 2, Line 0399999
+ Exhibit 7, Column 1, Line 14
+ Separate Accounts Page 3, Column 3, Line 1 plus Line 2 after deducting (a) funds in unitized separate accounts with no underlying guaranteed minimum return and no unreinsured guaranteed living benefits; (b) non-indexed separate accounts that are not cash flow tested with guarantees less than 4%; (c) non-cash-flow-tested experience rated pension reserves/liabilities; and (d) guaranteed indexed separate accounts using a Class II investment strategy.
– Non policyholder reserves reported on Exhibit 7
+ Exhibit 5, Column 2, Line 0799997
+ Schedule S, Part 1, Section 1, Column 12
– Schedule S, Part 3, Section 1, Column 14

APPENDIX 2 – ALTERNATIVE METHOD FOR GMDB RISKS

{Drafting Note: the following is copied from the American Academy of Actuaries June 2005 Report to the NAIC Capital Adequacy Task Force
This Appendix describes the Alternative Method for GMDB exposure in significant detail; how it is to be applied and how the factors were developed. Factor tables have been developed using the Conditional Tail Expectation ("CTE") risk measure at two confidence levels: 65% and 90%. The latter is determined on an "after tax" basis and is required for the RBC C3 Phase II standard for Total Asset Requirement ("TAR"). The former is a pre-tax calculation and should assist the Variable Annuity Reserve Working Group ("VARWG") in formulating a consistent "alternative method" for statutory reserves.

General

1. It is expected that the Alternative Method ("AltM") will be applied on a policy-by-policy basis (i.e., seriatim). If the company adopts a cell-based approach, only materially similar contracts should be grouped together. Specifically, all policies comprising a "cell" must display substantially similar characteristics for those attributes expected to affect risk-based capital (e.g., definition of guaranteed benefits, attained age, policy duration, years-to-maturity, market-to-guaranteed value, asset mix, etc.).

2. The Alternative Method determines the TAR as the sum of the Cash Surrender Value and the following three (3) provisions, collectively referred to as the *Additional Asset Requirement* ("AAR"):
   - Provision for amortization of the outstanding (unamortized) surrender charges – "Charge Amortization" or "CA";
   - Provision for fixed dollar expenses/costs net of fixed dollar revenue – "Fixed Expenses" or "FE"; and
   - Provision for claims (in excess of account value) under the guaranteed benefits net of available spread-based revenue ("margin offset") – "Guaranteed Cost" or "GC".

   All of these components reflect the impact of income taxes and are explained in more detail later in this Appendix.
   The Risk-Based Capital amount (C-3 RBC) is determined in aggregate for the block of policies as the TAR less the reserve determined based on Section 7 of VM-21. Note the following regarding income taxes:
   The company determines the CA and FE amounts by projecting the inforce data and incorporating a 21% tax rate and a post-tax discount rate of 4.54% (= 5.75% x [1-21%]).

   In determining the GC amounts, a "look-up" function is used which provides a GMDB Cost Factor "f" and Base Margin Offset Factor "g". These factors ("f" and "g") represent CTE90 factors on a post-tax basis where a 35% tax rates and 3.74% (= 5.75% x (1-35%)) discount rate has been used. The company needs to multiply these factors by (.79/.65) to adjust the factors for a 21% tax rate basis. It is noted that this adjustment overstates the impact of the lower tax rate as the impact of the higher discount rate has not been reflected.

3. The total AAR (in excess of cash surrender value) is the sum of the AAR calculations for each policy or cell. The result for any given policy (cell) may be negative, zero or positive.

4. For variable annuities without guarantees, the Alternative Method for capital uses the methodology which applied previously to all variable annuities. The charge is 11% of the difference between fund balance and cash surrender value if the current surrender charge is based on fund balance. If the current surrender charge is based on fund contributions, the charge is 2.4% of the difference for those contracts for which the fund balance exceeds the sum of premiums less withdrawals and 11% for those for which that is not the case. In all cases, the result is to be multiplied by 0.79 to adjust for Federal Income Tax. For in-scope contracts, such as many payout annuities with no cash surrender value and no performance guarantees, there is no capital charge.

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5. For variable annuities with death benefit guarantees, the AAR for a given policy is equal to: $R \times (CA + FE) + GC$ where:
   CA (Charge Amortization) = Provision for amortization of the outstanding (unamortized) surrender charges
   FE (Fixed Expense) = Provision for fixed dollar expenses/costs net of fixed dollar revenue
   GC (Guaranteed Cost) = Provision for claims (in excess of account value) under the guaranteed benefits net of available spread-based revenue ("margin offset")

The components *CA*, *FE* and *GC* are calculated separately. *CA* and *FE* are defined by deterministic "single-scenario" calculations which account for asset growth, interest, inflation and tax at prescribed rates. Mortality is ignored. However, the actuary determines the appropriate "prudent best estimate" lapses/withdrawal rates for the calculations. The components *CA*, *FE* and *GC* may be positive, zero or negative. $R=h(\circ)$ is a "scaling factor" that depends on certain risk attributes $\tilde{\theta}$ for the policy and the product portfolio.

6. The "Alternative Method" factors and formulas for GMDB risks (component *GC*) have been developed from stochastic testing using the 10,000 "Pre-packaged" scenarios (March 2005). The pre-packaged scenarios have been fully documented under separate cover – see http://www.actuary.org/pdf/life/c3supp_march05.pdf at the American Academy of Actuaries' website.

7. The model assumptions for the AltM Factors (component GC) are documented in the section of this Appendix entitled *Component GC*.

8. The table of *GC* factors that has been developed assumes male mortality at 100% of the MGDB 94 ALB table, and uses a 5-year age setback for female annuitants. Companies using the Alternative Method may use these factors, or may use the procedure described in Methodology Note C3-05 in the report "Recommended Approach for Setting Risk- Based Capital Requirements for Variable Annuities and Similar Products Presented by the American Academy of Actuaries' Life Capital Adequacy Subcommittee to the National Association of Insurance Commissioners' Capital Adequacy (E) Task Force (June 2005)" to adjust for the actuary's Prudent Best Estimate of mortality. If the company does not have a Prudent Best Estimate mortality assumption, the company may use the procedure described in Methodology Note C3-05 to adjust to the 2012 IAM as modified in VM-21 Section 11.C. Once a company uses the modified method for a block of business, the option to use the unadjusted table is no longer available for that part of its business.

9. There are five (5) major steps in using the *GC* factors to determine the "*GC*" component of the AAR for a given policy/cell:

    a) Classifying the asset exposure;
    b) Determining the risk attributes;
    c) Retrieving the appropriate nodes from the factor grid;
    d) Interpolating the nodal factors, where applicable (optional);
    e) Applying the factors to the policy values.

Categorizing the asset value for the given policy or cell involves mapping the entire exposure to one of the eight (8) prescribed "fund classes". Alternative Method factors are
provided for each asset class.
The second step requires the company to determine (or derive) the appropriate attributes for the given policy or cell. These attributes are needed to calculate the required values and access the factor tables:

- Product form ("Guarantee Definition"), *P*.
- Adjustment to guaranteed value upon partial withdrawal ("GMDB Adjustment"), *A*.
- Fund class, *F*.
- Attained age of the annuitant, *X*.
- Policy duration since issue, *D*.
- Ratio of account value to guaranteed value, $\frac{}{}$.
- Total account charges, *MER*.

Other required policy values include:

- Account value, *AV*.
- Current guaranteed minimum death benefit, *GMDB*.

- Net deposit value (sum of deposits less sum of withdrawals), *NetDeposits*[2].
- Net spread available to fund guaranteed benefits ("margin offset"), α.

The next steps – retrieving the appropriate nodes from the factor grid and interpolation – are explained in the section entitled *Component GC* of this Appendix. Tools are provided to assist the company in these efforts (see Appendix 9), but their use is not mandatory. This documentation is sufficiently detailed to permit the company to write its own lookup and extraction routines. A calculation example to demonstrate the application of the various component factors to sample policy values is shown in the section *Component GC* of this Appendix.

10. The total account charges should include all amounts assessed against policyholder accounts, expressed as a level spread per year (in basis points). This quantity is called the Management Expense Ratio ("MER") and is defined as the average amount (in dollars) charged against policyholder funds in a given year divided by average account value. Normally, the MER would vary by fund class and be the sum of investment management fees, mortality & expense charges, guarantee fees/risk premiums, etc. The spread available to fund the GMDB costs ("margin offset", denoted by α) should be net of spread-based costs and expenses (e.g., net of maintenance expenses, investment management fees, trail commissions, etc.), but may be increased for Revenue Sharing as can be reflected in modeling (i.e., had the Alternative Method not been elected) by adhering to the requirements set forth in section 6 of the *Modeling Methodology*. The section of this Appendix on *Component GC* describes how to determine *MER* and α. 'Time-to-maturity' is uniquely defined in the factor modeling by $T = 95 - X$. (This assumes an assumed maturity age of 95 and a current attained age of X.) Net deposits are used in determining benefit caps under the GMDB Roll-up and Enhanced Death Benefit ("EDB") designs.

11. The GMDB definition for a given policy/cell may not exactly correspond to those provided. In some cases, it may be reasonable to use the factors/formulas for a different product form (e.g., for a "roll-up" GMDB policy near or beyond the maximum reset age or amount, the company should use the "return-of-premium" GMDB factors/formulas, possibly adjusting the guaranteed value to reflect further resets, if any). In other cases, the company might determine the RBC based on two different guarantee definitions and interpolate the results to obtain an appropriate value for the given policy/cell. However, if the policy form (definition of the guaranteed benefit) is sufficiently different from those provided and there is no practical or obvious way to obtain a good result from the prescribed factors/formulas, the company must select one of the following options:
    a) Model the "C3 Phase II RBC" using stochastic projections according to the approved methodology;
    b) Select factors/formulas from the prescribed set such that the values obtained conservatively estimate the required capital; or
    c) Calculate company-specific factors or adjustments to the published factors based on stochastic testing of its actual business. This option is described more fully in the section of this Appendix on *Component GC*.

12. The actuary must decide if existing reinsurance arrangements can be accommodated by a straight-forward adjustment to the factors and formulas (e.g., quota-share reinsurance without caps, floors or sliding scales would normally be reflected by a simple pro-rata adjustment to the "gross" *GC* results). For more complicated forms of reinsurance, the company will need to justify any adjustments or approximations by stochastic modeling. However, this modeling need not be performed on the whole portfolio but can be undertaken on an appropriate set of representative policies. See the section of this Appendix on *Component GC*.

[2] Net deposits are required only for certain policy forms (e.g., when the guaranteed benefit is capped as a multiple of net policy contributions).

Component *CA*

Component *CA* provides for the amortization of the unamortized surrender charges using the actual surrender charge schedule applicable to the policy. Over time, the surrender charge is reduced and a portion of the charges in the policy are needed to fund the resulting increase in surrender value. This component can be interpreted as the "amount needed to amortize the unamortized surrender charge allowance for the *persisting* policies plus an implied borrowing cost". By definition, the amortization for non-persisting lives in each time period is exactly offset by the collected surrender charge revenue (ignoring timing differences and any waiver upon death). The company must project the unamortized balance to the end of the surrender charge period and discount the year-by-year amortization under the following assumptions. All calculations should reflect the impact of income taxes.

- Net asset return (i.e., after fees) as shown in Table 1 below. These rates roughly equate to an annualized 5th percentile return over a 10-year horizon3. The 10-year horizon was selected as a reasonable compromise between the length of a typical surrender charge period and the longer testing period usually needed to capture all the costs on "more expensive" portfolios (i.e., lower available spread, lower AV/GV ratio, older ages, etc.). Note, however, that it may not be necessary to use these returns if surrender charges are a function of deposits/premiums.
- Income tax and discount rates (after-tax) as defined in Table 9 of this Appendix.
- The "Dynamic Lapse Multiplier" calculated at the valuation date (a function of Account Value (AV) — Guaranteed Value (GV) ratio) is assumed to apply in each future year. This factor adjusts the lapse rate to reflect the antiselection present when the guarantee is in-the-money. Lapse rates may be lower when the guarantees have more value.
- Surrender charges and free partial withdrawal provisions should be reflected as per the contract specifications.
- "Prudent best estimate" lapse and withdrawal rates. Rates may vary according to the attributes of the business being valued, including, but not limited to, attained age, policy duration, etc.
- For simplicity, mortality may be ignored in the calculations.

Unlike the GC component, which requires the actuary to map the entire contract exposure to a single "equivalent" asset class, the *CA* calculation separately projects each fund (as mapped to the 8 prescribed categories) using the net asset returns in Table 2-1.

Table 2-1: Net Asset Returns for "CA" Component

Asset Class/Fund	Net Annualized Return
Fixed Account	Guaranteed Rate
Money Market and Fixed Income	0%
Balanced	–1%
Diversified Equity	–2%
Diversified International Equity	–3%
Intermediate Risk Equity	–5%
Aggressive or Exotic Equity	–8%

[3] A 5th percentile return is consistent with the CTE90 risk measure adopted in the C3 Phase II RBC methodology.

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Component *FE*

Component *FE* establishes a provision for fixed dollar costs (i.e., allocated costs, including overhead *and* those expenses defined on a "per policy" basis) less any fixed dollar revenue (e.g., annual administrative charges or policy fees). The company must project fixed expenses net of any "fixed revenue" to the earlier of contract maturity or 30 years and discount the year-by-year amounts under the following assumptions. All calculations should reflect the impact of income taxes.

- Income tax and discount rates (after-tax) as defined in Table 9 of this Appendix.
- The "Dynamic Lapse Multiplier" calculated at the valuation date (a function of MV—GV ratio) is assumed to apply in each future year. This factor adjusts the lapse rate to reflect the antiselection present when the guarantee is in-the-money. Lapse rates may be lower when the guarantees have more value.
- Per policy expenses are assumed to grow with inflation starting in the second projection year. The ultimate inflation rate of 3% per annum is reached in the 8th year after the valuation date. The company must grade linearly from the current inflation rate ("CIR") to the ultimate rate. The CIR is the higher of 3% and the inflation rate assumed for expenses in the company's most recent asset adequacy analysis for similar business.
- "Prudent best estimate" for policy termination (i.e., total surrender). Rates may vary according to the attributes of the business being valued, including, but not limited to, attained age, policy duration, etc. Partial withdrawals should be ignored as they do not affect survivorship.
- For simplicity, mortality may be ignored in the calculations.

Component *GC*

The general format for *GC* may be written as: $GC = GV \times f(\tilde{\theta}) - AV \times \hat{g}(\tilde{\theta}) \times h(\hat{\theta})$ where *GV* = current guaranteed minimum death benefit, *AV* = current account value and $= \frac{\alpha}{\hat{\alpha}} \times g(\tilde{\theta})$. The functions $f(\circ)$, $g(\circ)$, and $h(\circ)$ depend on the risk attributes of the policy $\tilde{\theta}$ and product portfolio $\hat{\theta}$. $h(\circ) = R$ was introduced in the "General" section as a "scaling factor". α is the company-determined net spread ("margin offset") available to fund the guaranteed benefits and $\hat{\alpha} = 100$ basis points is the margin offset assumed in the development of the "Base" tabular factors. The functions $f(\circ)$, $g(\circ)$, and $h(\circ)$ are more fully described later in this section.

Rearranging terms for *GC*, we have $GC = f(\tilde{\theta}) \times [GV - AV \times z(\tilde{\theta})]$. Admittedly, $z(\tilde{\theta})$ is a complicated function that depends on the risk attribute sets $\tilde{\theta}$ and $\hat{\theta}$, but conceptually we can view $AV \times z(\tilde{\theta})$ as a shock to the current account value (in anticipation of the adverse investment return scenarios that typically comprise the CTE(90) risk measure for the AAR) so that the term in the square brackets is a "modified net amount at risk". Accordingly, $f(\tilde{\theta})$ can be loosely interpreted as a factor that adjusts for interest (i.e., discounting) and mortality (i.e., the probability of the annuitant dying).

In practice, $f(\circ)$, $g(\circ)$, and $h(\circ)$ are not functions in the typical sense, but values interpolated from the factor grid. The factor grid is a large pre-computed table developed from stochastic modeling for a wide array of combinations of the risk attribute set. The risk attribute set is defined by those policy and/or product portfolio characteristics that affect the risk profile (exposure) of the business: attained age, policy duration, AV/GV ratio, fund class, etc.

Fund Categorization

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The following criteria should be used to select the appropriate factors, parameters and formulas for the exposure represented by a specified guaranteed benefit. When available, the volatility of the long-term annualized total return for the fund(s) – or an appropriate benchmark – should conform to the limits presented. This calculation should be made over a reasonably long period, such as 25 to 30 years.

Where data for the fund or benchmark are too sparse or unreliable, the fund exposure should be moved to the next higher volatility class than otherwise indicated. In reviewing the asset classifications, care should be taken to reflect any additional volatility of returns added by the presence of currency risk, liquidity (bid-ask) effects, short selling and speculative positions.

All exposures/funds must be categorized into one of the following eight (8) asset classes:

1. Fixed Account
2. Money Market
3. Fixed Income
4. Balanced
5. Diversified Equity
6. Diversified International Equity
7. Intermediate Risk Equity
8. Aggressive or Exotic Equity

Fixed Account. The fund is credited interest at guaranteed rates for a specified term or according to a 'portfolio rate' or 'benchmark' index. The funds offer a minimum positive guaranteed rate that is periodically adjusted according to company policy and market conditions.

Money Market/Short-Term. The fund is invested in money market instruments with an average remaining term-to-maturity of less than 365 days.

Fixed Income. The fund is invested primarily in investment grade fixed income securities. Up to 25% of the fund within this class may be invested in diversified equities or high- yield bonds. The expected volatility of the fund returns will be lower than the Balanced fund class.

Balanced. This class is a combination of fixed income securities with a larger equity component. The fixed income component should exceed 25% of the portfolio and may include high yield bonds as long as the total long-term volatility of the fund does not exceed the limits noted below. Additionally, any aggressive or 'specialized' equity component should not exceed one-third (33.3%) of the total equities held. Should the fund violate either of these constraints, it should be categorized as an equity fund. These funds usually have a long- term volatility in the range of 8% – 13%.

Diversified Equity. The fund is invested in a broad-based mix of U.S. and foreign equities. The foreign equity component (maximum 25% of total holdings) must be comprised of liquid securities in well-developed markets. Funds in this category would exhibit long-term volatility comparable to that of the S&P500. These funds should usually have a long-term volatility in the range of 13% – 18%.

Diversified International Equity. The fund is similar to the Diversified Equity class, except that the majority of fund holdings are in foreign securities. These funds should usually have a long-term volatility in the range of 14% – 19%.

Intermediate Risk Equity. The fund has a mix of characteristics from both the Diversified and Aggressive Equity Classes. These funds have a long-term volatility in the range of 19% – 25%.

Aggressive or Exotic Equity. This class comprises more volatile funds where risk can arise from: (a) underdeveloped markets, (b) uncertain markets, (c) high volatility of returns, (d) narrow focus (e.g., specific market sector), etc. The fund (or market benchmark) either does not have sufficient history to allow for the calculation of a long-term expected volatility, or the volatility is very high. This class would be used whenever the long-term expected annualized volatility is indeterminable or exceeds 25%.

THE SELECTION OF AN APPROPRIATE INVESTMENT TYPE SHOULD BE DONE AT THE LEVEL FOR WHICH THE GUARANTEE APPLIES. FOR GUARANTEES APPLYING ON A DEPOSIT-BY-DEPOSIT BASIS, THE FUND SELECTION IS STRAIGHTFORWARD. HOWEVER, WHERE THE GUARANTEE APPLIES ACROSS DEPOSITS OR FOR AN ENTIRE CONTRACT, THE APPROACH CAN BE MORE COMPLICATED. IN SUCH INSTANCES, THE APPROACH IS TO IDENTIFY FOR EACH POLICY WHERE THE "GROUPED FUND HOLDINGS" FIT WITHIN THE CATEGORIES LISTED AND TO CLASSIFY THE ASSOCIATED ASSETS ON THIS BASIS.

A seriatim process is used to identify the "grouped fund holdings", to assess the risk profile of the current fund holdings (possibly calculating the expected long-term volatility of the funds held with reference to the indicated market proxies), and to classify the entire "asset exposure" into one of the specified choices. Here, "asset exposure" refers to the underlying assets (separate and/or general account investment options) on which the guarantee will be determined. For example, if the guarantee applies separately for each deposit year within the contract, then the classification process would be applied separately for the exposure of each deposit year.

In summary, mapping the benefit exposure (i.e., the asset exposure that applies to the calculation of the guaranteed minimum death benefits) to one of the prescribed asset classes is a multi-step process:

1. Map each separate and/or general account investment option to one of the prescribed asset classes. For some funds, this mapping will be obvious, but for others it will involve a review of the fund's investment policy, performance benchmarks, composition and expected long-term volatility.
2. Combine the mapped exposure to determine the expected long-term "volatility of current fund holdings". This will require a calculation based on the expected long-term volatilities for each fund and the correlations between the prescribed asset classes as given in Table 2-2.
3. Evaluate the asset composition and expected volatility (as calculated in step 2) of current holdings to determine the single asset class that best represents the exposure, with due consideration to the constraints and guidelines presented earlier in this section.

In step 1., the company should use the fund's actual experience (i.e., historical performance, inclusive of reinvestment) only as a guide in determining the expected long-term volatility. Due to limited data and changes in investment objectives, style and/or management (e.g., fund mergers, revised investment policy, different fund managers, etc.), the company may need to give more weight to the expected long-term volatility of the fund's benchmarks. In general, the company should exercise caution and not be overly optimistic in assuming that future returns will consistently be less volatile than the underlying markets.

In step 2., the company should calculate the "volatility of current fund holdings" (σ for the exposure being categorized) by the following formula using the volatilities and correlations in Table 2.

$$\sigma = \sqrt{\sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \rho_{ij} \sigma_i \sigma_j}$$

where $w_i = \frac{AV_i}{\sum_k AV_k}$ is the relative value of fund *i* expressed as a proportion of total contract value, ρ_{ij} is the correlation between asset classes *i* and *j* and σ_i is the volatility of asset class *i* (see Table 2). An example is provided at the end of this section.

Table 2-2: Volatilities and Correlations for Prescribed Asset Classes

ANNUAL VOLATILITY		FIXED ACCOUNT	MONEY MARKET	FIXED INCOME	BALANCED	DIVERSE EQUITY	INTL EQUITY	INTERM EQUITY	AGGR EQUITY
1.0%	FIXED ACCOUNT	**1**	0.50	0.15	0	0	0	0	0
1.5%	MONEY MARKET	0.50	**1**	0.20	0	0	0	0	0
5.0%	FIXED INCOME	0.15	0.20	**1**	0.30	0.10	0.10	0.10	0.05
10.0%	BALANCED	0	0	0.30	**1**	0.95	0.60	0.75	0.60
15.5%	DIVERSE EQUITY	0	0	0.10	0.95	**1**	0.60	0.80	0.70
17.5%	INTL EQUITY	0	0	0.10	0.60	0.60	**1**	0.50	0.60
21.5%	INTERM EQUITY	0	0	0.10	0.75	0.80	0.50	**1**	0.70
26.0%	AGGR EQUITY	0	0	0.05	0.60	0.70	0.60	0.70	**1**

As an example, suppose three funds (Fixed Income, diversified U.S. Equity and Aggressive Equity) are offered to clients on a product with a contract level guarantee (i.e., across all funds held within the policy). The current fund holdings (in dollars) for five sample contracts are shown in Table 2-3.

TABLE 2-3: FUND CATEGORIZATION EXAMPLE

	1	2	3	4	5
MV Fund X (Fixed Income):	5,000	4,000	8,000	-	5,000
MV Fund Y (Diversified Equity):	9,000	7,000	2,000	5,000	-
MV Fund Z (Aggressive Equity):	1,000	4,000	-	5,000	5,000
Total Market Value:	15,000	15,000	10,000	10,000	10,000
Total Equity Market Value:	10,000	11,000	2,000	10,000	5,000
Fixed Income % (*A*):	33%	27%	80%	0%	50%
Fixed Income Test (*A*>75%):	No	No	Yes	No	No
Aggressive % of Equity (B):	10%	36%	n/a	50%	100%
Balanced Test (*A*>25% & *B*<33.3%):	Yes	No	n/a	No	No
Volatility of Current Fund Holdings:	10.9%	13.2%	5.3%	19.2%	13.4%
Fund Classification:	**Balanced**	**Diversified***	**Fixed Income**	**Intermediate**	**Diversified**

* Although the volatility suggests "Balanced Fund", the Balanced Fund criteria were not met. Therefore, this 'exposure' is moved "up" to Diversified Equity. For those funds
classified as Diversified Equity, additional analysis would be required to assess whether they should be instead

designated as "Diversified International Equity". As an example, the "Volatility of Current Fund Holdings" for

policy #1 is calculated as $\sqrt{A+B}$ where:

$$A = \left(\frac{5}{15}\times 0.05\right)^2 + \left(\frac{9}{15}\times 0.155\right)^2 + \left(\frac{1}{15}\times 0.26\right)^2$$

$$B = 2\cdot\left(\frac{5}{15}\cdot\frac{9}{15}\right)(0.1\times 0.05\times 0.155) + 2\cdot\left(\frac{5}{15}\cdot\frac{1}{15}\right)(0.05\times 0.05\times 0.26) + 2\cdot\left(\frac{9}{15}\cdot\frac{1}{15}\right)(0.7\times 0.155\times 0.26)$$

So, the volatility for contract #1 = $\sqrt{0.0092+0.0026}$ = 0.109 or 10.9%.

Derivation of Total Equivalent Account Charges (MER) and Margin Offset (α)

The total equivalent account charge ("MER") is meant to capture *all* amounts that are deducted from policyholder funds, not only those that are commonly expressed as spread-based fees. The MER, expressed as an equivalent annual basis point charge against account value, should include (but not be limited to) the following: investment management fees, mortality & expense charges, administrative loads, policy fees and risk premiums. In light of the foregoing, it may be necessary to estimate the "equivalent MER" if there are fees withdrawn from policyholder accounts that are not expressed as basis point charges against account value.

The margin offset, α, represents the total amount available to fund the guaranteed benefit claims and amortization of the unamortized surrender charge allowance after considering most other policy expenses (including overhead). The margin offset, expressed as an equivalent annual basis point charge against account value, may include the effect of Revenue Sharing in the same manner as would be done for modeling as described in section 6 of the Modeling Methodology, except as may be thereby permitted, should be deemed "permanently available" in all future scenarios. However, the margin offset should not include per policy charges (e.g., annual policy fees) since these are included in *FE*. It is often

helpful to interpret the margin offset as $\alpha = MER - X + RS$, where *X* is the sum of:

- Investment management expenses and advisory fees;
- Commissions, bonuses (dividends) and overrides;
- Maintenance expenses, other than those included in *FE*; and
- Unamortized acquisition costs not reflected in *CA*.

And *RS* is the Revenue Sharing to the extent permitted as described above.

Product Attributes and Factor Tables

The tabular approach for the *GC* component creates a multi-dimensional grid (array) by testing a very large number of combinations for the policy attributes. The results are expressed as factors. Given the seven (7) attributes for a policy (i.e., *P*, *A*, *F*, *X*, *D*, $\frac{AV}{GV}$, *MER*), two factors are returned for $f(\circ)$ and $g(\circ)$. The factors are determined by looking up (based on a "key") into the large, pre-computed multi-dimensional tables and using multi-dimensional linear interpolation.

The policy attributes for constructing the test cases and the lookup keys are given in Table 2-4.

As can be seen, there are 6 ξ 2 ξ 8 ξ 8 ξ 5 ξ 7 ξ 3 = 80,640 "nodes" in the factor grid. Interpolation is only permitted across the last four (4) dimensions: Attained Age (*X*), Policy Duration (*D*), AV—GV Ratio ($\frac{AV}{GV}$) and MER. The "MER Delta" is calculated based on the difference between the actual MER and that assumed in the factor testing (see Table 10), subject to a cap (floor) of 100 bps (−100 bps). Functions are available to assist the company in applying the Alternative Method for GMDB risks. These functions perform the factor table lookups and associated multi-dimensional linear interpolations. Their use is not mandatory. Based on the information in this document, the company should be able to write its own lookup and retrieval routines. Interpolation in the factor tables is described further later in this section.

Table 2-4: Nodes of the Factor Grid

Policy Attribute	Key: Possible Values & Description
Product Definition, *P*.	0 : 0 Return-of-premium. 1 : 1 Roll-up (3% per annum). 2 : 2 Roll-up (5% per annum). 3 : 3 Maximum Anniversary Value (MAV). 4 : 4 High of MAV and 5% Roll-up. 5 : 5 Enhanced Death Benefit (excl. GMDB)
GV Adjustment Upon Partial Withdrawal, *A*.	0 : 0 Pro-rata by market value. 1 : 1 Dollar-for-dollar.
Fund Class, *F*.	0 : 0 Fixed Account. 1 : 1 Money Market. 2 : 2 Fixed Income (Bond). 3 : 3 Balanced Asset Allocation. 4 : 4 Diversified Equity. 5 : 5 International Equity. 6 : 6 Intermediate Risk Equity. 7 : 7 Aggressive / Exotic Equity.
Attained Age (Last Birthday), *X*.	0 : 35 4 : 65 1 : 45 5 : 70 2 : 55 6 : 75 3 : 60 7 : 80
Policy Duration (years-since-issue), *D*.	0 : 0.5 1 : 3.5 2 : 6.5 3 : 9.5 4 : 12.5
Account Value-to-Guaranteed Value Ratio, *Y*.	0 : 0.25 4 : 1.25 1 : 0.50 5 : 1.50 2 : 0.75 6 : 2.00 3 : 1.00
Annualized Account Charge Differential from Table 2-10 Assumptions (“MER Delta”)	0 : −100 bps 1 : +0 2 : +100

A test case (i.e., a node on the multi-dimensional matrix of factors) can be uniquely identified by its key, which is the concatenation of the individual ‘policy attribute’ keys, prefixed by a leading ‘1’. For example, the key ‘12034121’ indicates the factor for a 5% roll-up GMDB, where the GV is adjusted pro-rata upon partial withdrawal, balanced asset allocation, attained age 65, policy duration 3.5, 75% AV/GV ratio and “equivalent” annualized fund based charges equal to the ‘base’ assumption (i.e., 250 bps p.a.).

The factors are contained in the file “C3-II GMDB Factors 100%Mort CTE(90) (2005-03-29).csv”, a comma-separated value text file. Each “row” represents the factors/parameters
for a test policy as identified by the lookup keys shown in Table 2-4. Rows are terminated by new line and line feed characters.

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Each row consists of 5 entries, described further below.

1	2	3	4	5
Test Case Identifier (Key)	Base GMDB Cost Factor	Base Margin Offset Factor	Scaling Adjustment (Intercept)	Scaling Adjustment (Slope)

GMDB Cost Factor. This is the term $f(\tilde{\theta})$ in the formula for *GC*. The parameter set $\tilde{\theta}$ is defined by $(P, A, F, X, D, \varphi, MER)$. Here, φ is the AV/GV ratio for the benefit exposure (e.g., policy) under consideration. The values in the factor grid represent CTE(90) of the sample distribution[4] for the present value of guaranteed benefit cash flows (in excess of account value) in all future years (i.e., to the earlier of contract maturity and 30 years), normalized by guaranteed value.

Base Margin Offset Factor. This is the term $g(\tilde{\theta})$ in the formula for *GC*. The parameter set $\tilde{\theta}$ is defined by $(P, A, F, X, D, \varphi, MER)$. Here, φ is the AV/GV ratio for the benefit exposure (e.g., policy) under consideration. The values in the factor grid represent CTE(90) of the sample distribution for the present value of margin offset cash flows in all future years (i.e., to the earlier of contract maturity and 30 years), normalized by account value. Note that the Base Margin Offset Factors assume $\hat{\alpha} = 100$ basis points of "margin offset" (net spread available to fund the guaranteed benefits).
All else being equal, the margin offset α has a profound effect on the resulting AAR. In comparing the Alternative Method against models for a variety of GMDB portfolios, it became clear that some adjustment factor would be required to "scale" the results to account for the diversification effects[5] of attained age, policy duration and AV/GV ratio. The testing examined $W_1 = \frac{\alpha}{MER} = 0.20$ and $W_2 = \frac{\alpha}{MER} = 0.60$, where α = available margin offset and *MER* = total "equivalent" account based charges, in order to understand the interaction between the margin ratio ("*W*") and AAR.

Based on this analysis, the *Scaling Factor* is defined as:

$$h(\hat{\theta}) = R = \beta_0 + \beta_1 \times W$$

β_0 and β_1 are respectively the intercept and slope for the linear relationship, defined by the parameter set $\hat{\theta}(P, F, \hat{\varphi})$. Here, $\hat{\varphi}$ is 90% of the aggregate AV/GV for the *product form* (i.e., not for the individual policy or cell) under consideration. In calculating the *Scaling Factor* directly from this linear function, the margin ratio "*W*" must be constrained[6] to the range $[0.2, 0.6]$.
It is important to remember that $\hat{\varphi} = 0.90 \times \frac{\sum AV}{\sum GV}$ for the product form being evaluated (e.g., all 5% Roll-up policies). The 90% factor is meant to reflect the fact that the cost (payoff structure) for a basket of otherwise identical put options (e.g., GMDB) with varying degrees of in-the-moneyness (i.e., AV/GV ratios) is more left-skewed than the cost for a

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4 Technically, the sample distribution for "present value of net cost" = PV[GMDB claims] – PV[Margin Offset] was used to determine the scenario results that comprise the CTE90 risk measure.
Hence, the "GMDB Cost Factors" and "Base Margin Offset Factors" are calculated from the same scenarios.

5 By design, the Alternative Methodology does not directly capture the diversification benefits due to a varied asset profile and product mix. This is not a flaw of the methodology, but a consequence of the structure. Specific assumptions would be required to capture such diversification effects. Such assumptions might benefit one company and could grossly over- or under- estimate the ensuing reduction in required capital.

6 The scaling factors were developed by testing "margin ratios" $W_1 = 0.2$ and $W_2 = 0.6$. Using values outside this range could give anomalous results.

single put option at the "weighted average" asset-to-strike ratio.

To appreciate the foregoing comment, consider a basket of two 10-year European put options as shown in Table 2-5. These options are otherwise identical except for their "market-to- strike price" ratios. The option values are calculated assuming a 5% continuous risk-free rate and 16% annualized volatility. The combined option value of the portfolio is $9.00, equivalent to a single put option with S = $180.92 and X = $200. The market-to-strike (i.e., AV/GV) ratio is 0.905, which is less than the average $AV/GV = 1 = \frac{\$75+\$125}{\$100+\$100}$.

Table 2-5: Equivalent Single European Put Option

	Equivalent Single Put Option	Put Option A ("in-the-money")	Put Option B ("out-of-the-money")
Market value (*AV*)	$180.92	$75	$125
Strike price (*GV*)	$200.00	$100	$100
Option Value	$9.00	$7.52	$1.48

Scaling Adjustment (Intercept). The scaling factor $h(\hat{\theta}) = R$ is a linear function of W, the ratio of margin offset to MER. This is the intercept β_0 that defines the line.

Scaling Adjustment (Slope). The scaling factor $h(\hat{\theta}) = R$ is a linear function of W, the ratio of margin offset to MER. This is the slope β_1 that defines the line.

Table 2-6 shows the "Base Cost" and "Base Margin Offset" values from the factor grid for some sample policies. As mentioned earlier, the Base Margin Offset factors assume 100 basis points of "available spread". The "Margin Factors" are therefore scaled by the ratio $\frac{\alpha}{100}$, where α = the actual margin offset (in basis points per annum) for the policy being valued. Hence, the margin factor for the 7th sample policy is exactly half the factor for node 12044121 (the 4th sample policy in Table 6). That is, 0.02160 = 0.5 × 0.04319.

Table 2-6: Sample Nodes on the Factor Grid

KEY	GMDB TYPE	GV ADJUST	FUND CLASS	AGE	POLICY DUR	AV/GV	MER (bps)	OFFSET	COST FACTOR	MARGIN FACTOR
10132031	ROP	$-for-$	Balanced Allocation	55	0.5	1.00	250	100	0.01073	0.04172
10133031	ROP	$-for-$	Balanced Allocation	60	0.5	1.00	250	100	0.01619	0.03940
10134031	ROP	$-for-$	Balanced Allocation	65	0.5	1.00	250	100	0.02286	0.03634
12044121	5% Rollup	Pro-rata	Diverse Equity	65	3.5	0.75	250	100	0.18484	0.04319
12044131	5% Rollup	Pro-rata	Diverse Equity	65	3.5	1.00	250	100	0.12931	0.03944
12044141	5% Rollup	Pro-rata	Diverse Equity	65	3.5	1.25	250	100	0.08757	0.03707
12044121	5% Rollup	Pro-rata	Diverse Equity	65	3.5	0.75	250	50	0.18484	0.02160

Interpolation in the Factor Tables

Interpolation is only permitted across the last four (4) dimensions of the risk parameter set $\tilde{\theta}$: Attained Age (X), Policy Duration (D), AV—GV Ratio (λ) and MER. The "MER Delta" is calculated based on the difference between the actual MER and that assumed in the factor testing (see Table 2-10), subject to a cap (floor) of 100 bps (–100 bps). In general, the calculation for a single policy will require *three* applications of multi-dimensional linear interpolation between the $16 = 2^4$ factors/values in the grid:

(1) To obtain the *Base Factors* $f(\tilde{\theta})$ and $g(\tilde{\theta})$

(2) To obtain the *Scaling Factor* $h(\tilde{\theta}) = R.$

Based on the input parameters, the supplied functions (see Appendix 9) will automatically perform the required lookups, interpolations and calculations for $h(\tilde{\theta}) = R.$, including the constraints imposed on the margin ratio W. Use of the tools noted in Appendix 9 is not mandatory.

Multi-dimensional interpolation is an iterative extension of the familiar two-dimensional linear interpolation for a discrete function $V(x)$:

$$\tilde{V}(x_k + \delta) = (1 - \xi) \times V(x_k) + \xi \times V(x_{k+1})$$

and

$$\xi = \frac{\delta}{x_{k+1} - x_x}$$

In the above formulation, $\tilde{V}(x)$ is assumed continuous and x_k and x_{k+1} are defined values ("nodes") for $V(x)$. By definition, $x_k \leq (x_k + \delta) \leq x_{k+1}$ so that $0 \leq \xi \leq 1$. In effect, multi-dimensional interpolation repeatedly applies simple linear interpolation one dimension at a time until a single value is obtained.

Multi-dimensional interpolation across all four dimensions is not required. However, simple linear interpolation for *AV—GV* Ratio (δ) is mandatory. In this case, the company must choose nodes for the other three (3) dimensions according to the following rules:

Risk Attribute (Dimension)	Node Determination
Attained Age	Use next higher attained age.
Policy Duration	Use nearest.
MER Delta	Use nearest (capped at +100 & floored at –100 bps.

For example, if the actual policy/cell is attained age 62, policy duration 4.25 and MER Delta = +55 bps, the company should use the nodes defined by attained age 65, policy duration 3.5 and MER Delta = +100.

Table 2-7 provides an example of the fully interpolated results for a 5% Roll-up "Pro Rata" policy mapped to the Diversified Equity class (first row).

While Table 2-7 does not demonstrate how to perform the multi-dimensional interpolation, it does show the required 16 nodes from the *Base Factors*. The margin offset is assumed to be 100 basis points.

Table 2-7: Base Factors for a 5% Rollup GMDB Policy, Diversified Equity

Key	Age	Policy Dur	Policy Av/Gv	Mer (Bps)	Base Cost Factor	Base Margin Factor
INTERPOLATED	62	4.25	0.80	265	0.15010	0.04491
12043121	60	3.5	0.75	250	0.14634	0.04815
12043122	60	3.5	0.75	350	0.15914	0.04511
12043131	60	3.5	1.00	250	0.10263	0.04365
12043132	60	3.5	1.00	350	0.11859	0.04139
12043221	60	6.5	0.75	250	0.12946	0.04807
12043222	60	6.5	0.75	350	0.14206	0.04511
12043231	60	6.5	1.00	250	0.08825	0.04349
12043232	60	6.5	1.00	350	0.10331	0.04129
12044121	65	3.5	0.75	250	0.18484	0.04319
12044122	65	3.5	0.75	350	0.19940	0.04074
12044131	65	3.5	1.00	250	0.12931	0.03944
12044132	65	3.5	1.00	350	0.14747	0.03757
12044221	65	6.5	0.75	250	0.16829	0.04313
12044222	65	6.5	0.75	350	0.18263	0.04072
12044231	65	6.5	1.00	250	0.11509	0.03934
12044232	65	6.5	1.00	350	0.13245	0.03751

The interpolations required to compute the *Scaling Factor* are slightly different from those needed for the *Base Factors*. Specifically, the user should *not* interpolate the intercept and slope terms for each surrounding node, but rather interpolate the *Scaling Factors* applicable to each of the nodes.

Table 2-8 provides an example of the *Scaling Factor* for the sample policy given earlier in Table 2-7 (i.e., a 5% Roll-up "Pro Rata" policy mapped to the Diversified Equity class) as well as the nodes used in the interpolation. The aggregate AV/GV for the product portfolio (i.e., all 5% Roll-up policies combined) is 0.75; hence, 90% of this value is 0.675 as shown under "Adjusted Product AV/GV". As before, the margin offset is 100 basis points per annum.

Table 2-8: Interpolated Scaling Factors for a 5% Rollup GMDB Policy, Diversified Equity

Key	Age	Policy Dur	Adjusted Product Av/Gv	Mer (Bps)	Intercept	Slope	Scaling Factor
INTERPOLATED	62	4.25	0.675	265	n/a	n/a	0.871996
12043111	60	3.5	0.50	250	0.855724	0.092887	0.892879
12043112	60	3.5	0.50	350	0.855724	0.092887	0.882263
12043121	60	3.5	0.75	250	0.834207	0.078812	0.865732
12043122	60	3.5	0.75	350	0.834207	0.078812	0.856725
12043211	60	6.5	0.50	250	0.855724	0.092887	0.892879
12043212	60	6.5	0.50	350	0.855724	0.092887	0.882263
12043221	60	6.5	0.75	250	0.834207	0.078812	0.865732
12043222	60	6.5	0.75	350	0.834207	0.078812	0.856725
12044111	65	3.5	0.50	250	0.855724	0.092887	0.892879
12044112	65	3.5	0.50	350	0.855724	0.092887	0.882263
12044121	65	3.5	0.75	250	0.834207	0.078812	0.865732
12044122	65	3.5	0.75	350	0.834207	0.078812	0.856725
12044211	65	6.5	0.50	250	0.855724	0.092887	0.892879
12044212	65	6.5	0.50	350	0.855724	0.092887	0.882263
12044221	65	6.5	0.75	250	0.834207	0.078812	0.865732
12044222	65	6.5	0.75	350	0.834207	0.078812	0.856725

Adjustments to GC for Product Variations & Risk Mitigation/Transfer

In some cases, it may be necessary for the company to make adjustments to the published factors due to:

1. A variation in product form wherein the definition of the guaranteed benefit is materially different from those for which factors are available (see Table 2-9); and/or
2. A risk mitigation / management strategy that cannot be accommodated through a straight-forward and direct adjustment to the published values.

Any adjustments to the published factors must be fully documented and supported through stochastic modeling. Such modeling may require stochastic simulations but would not ordinarily be based on full inforce projections. Instead, a representative "model office" should be sufficient. In the absence of material changes to the product design, risk management program and Alternative Method (including the published factors), the company would not be expected to redo this modeling each year.

Note that minor variations in product design do not necessarily require additional effort. In some cases, it may be reasonable to use the factors/formulas for a different product form (e.g., for a "roll-up" GMDB policy near or beyond the maximum reset age or amount, the company should use the "return-of-premium" GMDB factors/formulas, possibly adjusting the guaranteed value to reflect further resets, if any). In other cases, the company might determine the RBC based on two different guarantee definitions and interpolate the results to obtain an appropriate value for the given policy/cell. Likewise, it may be possible to adjust the Alternative Method results for certain risk transfer arrangements without significant additional work (e.g., quota-share reinsurance without caps, floors or sliding scales would normally be reflected by a simple pro-rata adjustment to the "gross" *GC* results).

However, if the policy design is sufficiently different from those provided and/or the risk mitigation strategy is non-linear in its impact on the AAR, and there is no practical or obvious way to obtain a good result from the prescribed factors/formulas, the company must justify any adjustments or approximations by stochastic modeling. Notably this modeling need not be performed on the whole portfolio but can be undertaken on an appropriate set of representative policies.

The remainder of this section suggests a process for adjusting the published "Cost" and "Margin Offset" factors due to a variation in product design (e.g., a "step-up" option at every 7th anniversary whereby the guaranteed value is reset to the account value, if higher). Note that the "Scaling Factors" (as determined by the slope and intercept terms in the factor table) would not be adjusted.

The steps for adjusting the published *Cost* and *Margin Offset* factors for product design variations are:

1. Select a policy design in the published tables that is similar to the product being valued. Execute cashflow projections using the documented assumptions (see Tables 2-9 and 2-10) and the scenarios from the prescribed generators for a set of representative cells (combinations of attained age, policy duration, asset class, AV/GV ratio and MER). These cells should correspond to nodes in the factor grid. Rank (order) the sample distribution of results for the present value of net cost[7]. Determine those scenarios which comprise CTE(90).

2. Using the results from step 1., average the present value of cost for the CTE(90) scenarios and divide by the current guaranteed value. For a the J^{th} cell, denote this value by F_J. Similarly, average the present value of margin offset revenue for the same subset of scenarios and divide by account value. For the J^{th} cell, denote this value by G_J.

[7] Present value of net cost = PV[guaranteed benefit claims in excess of account value] – PV[margin offset]. The discounting includes cashflows in all future years (i.e., to the earlier of contract maturity and the end of the horizon).

3. Extract the corresponding factors from the published grid. For each cell, calibrate to the published tables by defining a "model adjustment factor" (denoted by asterisk) separately for the "cost" and "margin offset" components:

$$F_J^* = \frac{f(\tilde{\theta})}{F_J} \text{ and } G_J^* = \frac{\hat{g}(\tilde{\theta})}{G_J}$$

4. Execute "product specific" cashflow projections using the documented assumptions and scenarios from the prescribed generators for the same set of representative cells. Here, the company should model the actual product design. Rank (order) the sample distribution of results for the present value of net cost. Determine those scenarios which comprise CTE(90).

5. Using the results from step 4., average the present value of cost for the CTE(90) scenarios and divide by the current guaranteed value. For a the J^{th} cell, denote this value by $\bar{F}_J$. Similarly, average the present value of margin offset revenue for the same subset of scenarios and divide by account value. For a the J^{th} cell, denote this value by $\bar{G}_J$.

6. To calculate the AAR for the specific product in question, the company should implement the Alternative Method as documented, but use $\bar{F}_J \times F_J^*$ in place of $f(\tilde{\theta})$ and instead of $\bar{G}_J \times G_J^*$ use $\hat{g}(\tilde{\theta})$. The company must use the "Scaling Factors" for the product evaluated in step 1. (i.e., the product used to calibrate the company's cashflow model).

Assumptions for the Alternative Method Published GMDB Factors

This subsection reviews the model assumptions used to develop the Alternative Method factors. Each node in the factor grid is effectively the modeled result for a given "cell".

Table 2-9: Model Assumptions & Product Characteristics

Account Charges (MER)	Vary by fund class. See Table 2-10 later in this section.
Base Margin Offset	100 basis points per annum
GMDB Description	1. ROP = return of premium ROP. 2. ROLL = 5% roll-up, capped at 2.5 ξ premium, frozen at age 80. 3. MAV = annual ratchet (maximum anniversary value), frozen at age 80. 4. HIGH = Higher of 5% roll-up and annual ratchet frozen at age 80. 5. EDB = ROP + 40% Enhanced Death Benefit (capped at 40% of deposit).
Adjustment to GMDB Upon Partial Withdrawal	"Pro-Rata by Market Value" and "Dollar-for-Dollar" are tested separately.
Surrender Charges	Ignored (i.e., zero). Reflected in the "CA" component of the AAR.
Single Premium/Deposit	$100,000. No future deposits; no intra-policy fund rebalancing.
Base Policy Lapse Rate	• Pro-rata by MV: 10% p.a. at all policy durations (before dynamics) • Dollar-for-dollar: 2% p.a. at all policy durations (no dynamics)
Partial Withdrawals	• Pro-rata by MV: None (i.e., zero) • Dollar-for-dollar: Flat 8% p.a. at all policy durations (as a % of AV).

	No dynamics or anti-selective behavior.
Mortality	100% of MGDB 94 ALB.
Gender/Age Distribution	100% male. Methodology accommodates different attained ages and policy durations. A 5-year age setback will be used for female annuitants.
Max. Annuitization Age	All policies terminate at age 95.
Fixed Expenses, Annual Fees	Ignored (i.e., zero). Reflected in the "FE" component of the AAR.
Income Tax Rate	21%
Discount Rate	4.54% (after-tax) effective = 5.75% pre-tax.
Dynamic Lapse Multiplier (Applies only to policies where GMDB is adjusted "pro-rata by MV" upon withdrawal)	*U*=1, *L*=0.5, *M*=1.25, *D*=1.1 ■ Applied to the 'Base Policy Lapse Rate' (not withdrawals).

Notes on GMDB Factor Development

- The roll-up is continuous (not simple interest, not stepped at each anniversary) and is applied to the previous roll-up guaranteed value (i.e., not the contract guaranteed value under HIGH).
- The Enhanced Death Benefit ("EDB") is floored at zero. It pays out 40% of the gain in the policy upon death at time *t*: $B_t = MIN[0.40 \times Deposit, 0.40 \times MAX(0, AV_t - Deposit)]$. The test policy also has a 100% return-of-premium GMDB, but the EDB Alternative Factors will be net of the GMDB component. That is, the EDB factors are 'stand-alone' and applied *in addition to* the GMDB factors.
- The "Base Policy Lapse Rate" is the rate of policy termination (total surrenders). Policy terminations (surrenders) are assumed to occur throughout the policy year (not only on anniversaries).
- Partial withdrawals (if applicable) are assumed to occur at the end of each time period (quarterly).
- Account charges ("MER") represent the total amount (annualized, in basis points) assessed against policyholder funds (e.g., sum of investment management fees, mortality and expense charges, risk premiums, policy/administrative fees, etc.). They are assumed to occur throughout the policy year (not only on anniversaries).

Table 2-10: Account-Based Fund Charges (bps per annum)

Asset Class / Fund	Account Value Charges (MER)
Fixed Account	0
Money Market	110
Fixed Income (Bond)	200
Balanced	250
Diversified Equity	250
Diversified International Equity	250
Intermediate Risk Equity	265
Aggressive or Exotic Equity	275

Calculation Example

Continuing the previous example (see Tables 2-7 and 2-8) for a 5% Roll-up GMDB policy mapped to Diversified Equity, suppose we have the policy/product parameters as specified in Table 2-11.

Table 2-11: Sample Policy Results for 5% Roll-up GMDB, Diversified Equity

Parameter	Value	Description
Deposit Value	$100.00	Total deposits adjusted for partial withdrawals.
Account Value	$98.43	Total account value at valuation date, in dollars.
GMDB	$123.04	Current guaranteed minimum death benefit, in dollars.
Attained Age	62	Attained age at the valuation date (in years).
Policy Duration	4.25	Policy duration at the valuation date (in years).
GV Adjustment	Pro-Rata	GMDB adjusted pro-rata by MV upon partial withdrawal.
Fund Class	Diversified Equity	Contract exposure mapped to Diversified Equity as per the Fund Categorization instructions in the section of this Appendix on Component GC.
MER	265	Total charge against policyholder funds (bps).
ProductCode	2	Product Definition code as per lookup key in Table 4.
GVAdjust	0	GV Adjustment Upon Partial Withdrawal as per key in Table 2-4.

FundCode	4	Fund Class code as per lookup key in Table 2-4.
PolicyMVGV	0.800	Contract account value divided by GMDB.
AdjProductMVGV	0.675	90% of the aggregate AV/GV for the Product portfolio.
RC	150	Margin offset (basis points per annum).

Using the usual notation, $GC = GV \times f(\tilde{\theta}) - AV \times \hat{g}(\tilde{\theta}) \times h(\hat{\theta})$.

$f(\tilde{\theta})$ = 0.150099 = GetCostFactor(2, 0, 4, 62, 4.25, 0.8, 265)

$\hat{g}(\tilde{\theta})$ = 0.067361 = GetMarginFactor(2, 0, 4, 62, 4.25, 0.8, 265, 150)

$h(\hat{\theta})$ = 0.887663 = GetScalingFactor(2, 0, 4, 62, 4.25, 0.675, 265, 150)

Hence, *GC* = \$12.58 = (123.04 × 0.150099) – (98.43 × 0.067361 × 0.887663). As a normalized value, this quantity is 12.78% of account value, 10.23% of guaranteed value and 51.1% of the current net amount at risk (Net amount at risk = GV – AV).

Note that $\hat{g}(\tilde{\theta}) = \frac{\alpha}{\tilde{\alpha}} \times g(\tilde{\theta}) = \frac{150}{100} \times 0.044907$ where $g(\tilde{\theta})$ is "per 100 basis points" of available margin offset.

$g(\tilde{\theta})$ = 0.044907 = GetMarginFactor(2, 0, 4, 62, 4.25, 0.8, 265, 100)

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Appendix 1a – Cash Flow Modeling for C-3 RBC Methodology

General Approach

1. The underlying asset and liability model(s) are those used for year-end Asset Adequacy Analysis cash flow testing, or a consistent model.

2. Run the 200 scenario subset selected from the 10,000 scenarios for interest rates produced from the NAIC economic scenario generator, using significance values based on the 20-year US treasury rates.

3. The statutory capital and surplus position, S(t), should be captured for every scenario for each calendar year-end of the testing horizon. The capital and surplus position is equal to statutory assets less statutory liabilities for the portfolio including asset adequacy reserves and voluntary reserves to the extent allowed under measurement consideration #2 below.

4. For each scenario, the C-3 measure is the most negative of the series of present values S(t)*pv(t), where pv(t) is the accumulated discount factor for t years using [105 percent of the after-tax one-year US Treasury rates/ the NAER on additional invested assets] for that scenario. [The NAER on additional invested assets should follow the approach in VM-21 Section 4.B.3.] In other words:

$$pv(t) \quad \prod_{1}^{t} 1/(1+i_t)$$

5. Rank the scenario-specific C-3 measures in descending order, with scenario number 1's measure being the positive capital amount needed to equal the very worst present value measure.

6. Taking the weighted average of a subset of the scenario specific C-3 scores derives the final C-3 after-tax factor. The C-3 scores are multiplied by the following series of weights:

---------- Weighting Table----------

Scenario Rank:	17	16	15	14	13	12	11	10	9	8	7	6	5
Weight:	0.02	0.04	0.06	0.08	0.10	0.12	0.16	0.12	0.10	0.08	0.06	0.04	0.02

The sum of these products is the C-3 charge for the product.

7. If multiple asset/liability portfolios are tested and aggregated, an aggregate C-3 charge can be derived by first summing the S(t)'s from all the portfolios (by scenario) and then following Steps 2 through 6 above. An alternative method is to calculate the C-3 score by scenario for each product, sum them by scenario, then order them by rank and apply the above weights.

8. Phase in: A company may elect to phase-in the effect of the new economic scenario requirements on C-3 RBC, using the following steps:
   - 1. Begin with the C-3 RBC amount from step 7 for the Dec. 31, 2025 instructions for all business within the scope of the modeling requirements as of 12/31/25. Add to this the amount of C-3 RBC computed in the same manner as the 2025 value for any reinsurance ceded that is expected to be recaptured in 2026 and in the scope of the modeling requirements. This amount is 2025 RBC.
   - 2. Determine the C-3 RBC amount as of 12/31/25 using steps 2 - 7 for the same inforce business as in 1. This amount is 2025 RBC New.
   - Determine the phase-in amount (PIA) as the excess of 2025 RBC New over 2025 RBC.
   - For 12/31/2026, compute the C-3 RBC following steps 2 – 7 above, then subtract PIA times (2/3).
   - For 12/31/2027, compute the C-3 RBC following steps 2 – 7 above, then subtract PIA times (1/3).

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Single Scenario C-3 Measurement Considerations

1. GENERAL METHOD - This approach incorporates interim values, consistent with the approach used for bond, mortgage and mortality RBC factor quantification. The approach establishes the risk measure in terms of an absolute level of risk (e.g., solvency) rather than volatility around an expected level of risk. It also recognizes reserve conservatism, to the degree that such conservatism has not been used elsewhere.

2. INITIAL ASSETS = RESERVES - Consistent with appointed actuary practice, the cash flow models are run with initial assets equal to reserves; that is, no surplus assets are used. Asset adequacy reserves that are held and can be shown to be directly attributable to this business and are based on a cashflow testing model consistent with the C-3 calculation under moderately adverse conditions may be included in these reserves. Voluntary reserves that address risks that are both 1) not reflected in the initial calculated reserve and 2) are reflected in the cashflow testing model at a moderately adverse level may be included in these reserves. [One third] of any other voluntary reserves attributable to this business may be included in these reserves. Voluntary reserve means any reserve that is not required by VM-A, VM-C, VM-20, VM-22, or VM-30 (e.g., asset adequacy reserves). If the determination of asset adequacy reserves depends on inclusion of the reserve in cashflow testing, they are not considered voluntary reserves for this purpose. They include other amounts required by a state in which the company is doing business.

3. AVR - Existing AVR-related assets should not be included in the initial assets used in the C-3 modeling. These assets are available for future credit loss deviations over and above expected credit losses. These deviations are covered by C-1 risk capital. Similarly, future AVR contributions should not be modeled. However, the expected credit losses should be in the cash flow modeling. (Deviations from expected are covered by both the AVR and the C-1 risk capital.)

4. IMR - IMR assets should be used for C-3 modeling. (Also see #9 – Disinvestment Strategy.)

5. INTERIM MEASURE - Retained statutory surplus (i.e., statutory assets less statutory liabilities) is used as the year-to-year interim measure.

6. TESTING HORIZONS - Surplus adequacy should be tested over a period that extends to a point at which contributions to surplus on a closed block are immaterial in relationship to the analysis. If some products are being cash flow tested for Asset Adequacy Analysis over a longer period than the 100 years generated by the economic scenario generator, the scenario rates should be held constant at the year 100 level for all future years. A consistent testing horizon is important for all lines if the C-3 results from different lines of business are aggregated.

7. TAX TREATMENT - The tax treatment should be consistent with that used in Asset Adequacy Analysis. Appropriate disclosure of tax assumptions may be required.

8. REINVESTMENT STRATEGY - The reinvestment strategy should be that used in Asset Adequacy Analysis modeling.

9. DISINVESTMENT STRATEGY - In general, negative cash flows should be handled just as they are in the Asset Adequacy Analysis. The one caveat is, since the RBC scenarios are more severe, models that depend on borrowing need to be reviewed to be confident that loans in the necessary volume are likely to be available under these circumstances at a rate consistent with the model's assumptions. If not, adjustments need to be made.

   If negative cash flows are handled by selling assets, then appropriate modeling of contributions and withdrawals to the IMR need to be reflected in the modeling.

10. STATUTORY PROFITS RETAINED - The measure is based on a profits retained model, anticipating that statutory net income earned one period is retained to support capital requirements in future periods. In other words, no stockholder dividends are withdrawn, but policyholder dividends, excess interest, declared rates, etc., are modeled realistically and assumed, paid or credited.

11. LIABILITY and ASSET ASSUMPTIONS - The liability and asset assumptions should be those used in Asset Adequacy Analysis modeling. Disclosure of these assumptions may be required.

12. SENSITIVITY TESTING - Key assumptions shall be stress tested (e.g., lapses increased by 50 percent) to evaluate sensitivity of the resulting C-3 requirement to the various assumptions made by the actuary. Disclosure of these results may be required.

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Appendix 1b - Frequently Asked Questions for Cash Flow Modeling for C-3 RBC

1. Where can the scenario generator be found?

   The scenario generator is the Conning GEMS Economic Scenario Generator. Outputs may be found at the following website: https://naic.conning.com/scenariofiles.

2. The results may include sensitive information in some instances. How can it be kept confidential?

   As provided for in Section 8 of the Risk-Based Capital (RBC) For Insurers Model Act, all information in support of and provided in the RBC reports (to the extent the information therein is not required to be set forth in a publicly available annual statement schedule), with respect to any domestic or foreign insurer, which is filed with the commissioner constitute information that might be damaging to the insurer if made available to its competitors, and therefore shall be kept confidential by the commissioner. This information shall not be made public or be subject to subpoena, other than by the commissioner and then only for the purpose of enforcement actions taken by the commissioner under the Risk-Based Capital (RBC) For Insurers Model Act or any other provision of the insurance laws of the state.

3. The definition of the annuities category talks about "debt incurred for funding an investment account…" Could you give a specific description of what is intended?

   One example is a situation where an insurer is borrowing under an advance agreement with a federal home loan bank, under which agreement collateral, on a current fair value basis, is required to be maintained with the bank. This arrangement has many of the characteristics of a GIC, but is classified as debt.

4. The instructions specify that assumptions consistent with those used for Asset Adequacy Analysis testing be used for C-3 RBC, but my company cash flow tests a combination of universal life and annuities for that analysis and using the same assumptions will produce incorrect results. What was intended in this situation?

   Where this situation exists, assumptions should be used for the risk-based capital work that are consistent with those used for the Asset Adequacy Cash Flow Testing. In other words, the assumptions used should be appropriate to the annuity component being evaluated for RBC and consistent with the overall assumption set used for Asset Adequacy Analysis.

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Deleted: a Microsoft Excel spreadsheet. By entering the Treasury yield curve at the date for which the testing is done, it will generate the sets of 50 or 12 scenarios. It requires Windows 95 or higher. This spreadsheet and instructions are available on the NAIC Web site at (http://www.naic.org/cmte_e_lrbc.htm). It is also available on diskette from the American Academy of Actuaries

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ANNUAL STATEMENT BLANK – LIFE/FRATERNAL

VM-21 SUPPLEMENT

Variable Annuity Reserves Valued According to VM-21 or AG 43 by Product Type

For The Year Ended December 31, 20__

(To Be Filed by April 1)

Deleted: VARIABLE ANNUITIES

PART 3A

	Prior Year	Current Year
	1	2
	Reported Reserve in Excess of Cash Surrender Value	Reported Reserve in Excess of Cash Surrender Value
1. Post-Reinsurance-Ceded Reserve		
1.1 Variable Annuities		
a. Without Guaranteed Living Benefits		
b. With Guaranteed Minimum Accumulation Benefits		
c. With Guaranteed Minimum Withdrawal, or Income, Benefits – Accumulation Phase		
d. With Guaranteed Minimum Withdrawal, or Income, Benefits – Withdrawal Phase		
1.2 Index-Linked Variable Annuities		
a. Without Guaranteed Living Benefits		
b. With Guaranteed Minimum Withdrawal, or Income, Benefits – Accumulation Phase		
c. With Guaranteed Minimum Withdrawal, or Income, Benefits – Withdrawal Phase		
1.3 Immediate Variable Annuities		
a. With a Guaranteed Annuity Payout Floor		
1.4 Aggregate Write-Ins for Other Products		
2. Total Post-Reinsurance-Ceded Reserve (Sum of Lines 1.1 through 1.4)		
3. Pre-Reinsurance-Ceded Reserve		
3.1 Variable Annuities		
a. Without Guaranteed Living Benefits		
b. With Guaranteed Minimum Accumulation Benefits		
c. With Guaranteed Minimum Withdrawal, or Income, Benefits – Accumulation Phase		
d. With Guaranteed Minimum Withdrawal, or Income, Benefits – Withdrawal Phase		
3.2 Index-Linked Variable Annuities		
a. Without Guaranteed Living Benefits		
b. With Guaranteed Minimum Withdrawal, or Income, Benefits – Accumulation Phase		
c. With Guaranteed Minimum Withdrawal, or Income, Benefits – Withdrawal Phase		
3.3 Immediate Variable Annuities		
a. With a Guaranteed Annuity Payout Floor		
3.4 Aggregate Write-Ins for Other Products		
4. Total Pre-Reinsurance-Ceded Reserve (Sum of Lines 3.1 through 3.4)		
5. Total Reserves Ceded (Line 4 minus Line 2)		
DETAILS OF WRITE-INS		
1.1001		
1.1002		
1.1003		
1.1098. Summary of remaining write-ins for Line 1.4 from overflow page		
1.1099 Totals (Lines 1.1001 through 1.1003 plus 1.1098) (Line 1.4 above)		
3.1001		
3.1002		
3.1003		
3.1098. Summary of remaining write-ins for Line 3.4 from overflow page		
3.1099 Totals (Lines 3.1001 through 3.1003 plus 3.1098) (Line 3.4 above)		

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VM-21 SUPPLEMENT

Variable Annuity Reserves Valued According to VM-21 or AG 43 by Product Type

For The Year Ended December 31, 20__

(To Be Filed by April 1)

PART 3B

	Current Year								
	SECTION A						SECTION B		
	1	2	3	4	5	6	7	8	9
	Cash Surrender Value	CTE70 (adjusted)	CTE70 (best efforts)	Additional Standard Projection Amount	Stochastic Reserve	Number of Contracts	Cash Surrender Value	Alternative Method Reserve	Number of Contracts
1. Post-Reinsurance-Ceded Reserve									
1.1 Variable Annuities									
a. Without Guaranteed Living Benefits						XXX			XXX
b. With Guaranteed Minimum Accumulation Benefits						XXX	XXX	XXX	XXX
c. With Guaranteed Minimum Withdrawal, or Income, Benefits – Accumulation Phase						XXX	XXX	XXX	XXX
d. With Guaranteed Minimum Withdrawal, or Income, Benefits – Withdrawal Phase						XXX	XXX	XXX	XXX
1.2 Index-Linked Variable Annuities									
a. Without Guaranteed Living Benefits						XXX			XXX
b. With Guaranteed Minimum Withdrawal, or Income, Benefits – Accumulation Phase						XXX	XXX	XXX	XXX
c. With Guaranteed Minimum Withdrawal, or Income, Benefits – Withdrawal Phase						XXX	XXX	XXX	XXX
1.3 Immediate Variable Annuities									
a. With a Guaranteed Annuity Payout Floor						XXX	XXX	XXX	XXX
1.4 Aggregate Write-Ins for Other Products						XXX			XXX
2. Total Post-Reinsurance-Ceded Reserve Components (Sum of Lines 1.1 through 1.4)						XXX			XXX
3. Pre-Reinsurance-Ceded Reserve									
3.1 Variable Annuities									
a. Without Guaranteed Living Benefits						XXX			XXX
b. With Guaranteed Minimum Accumulation Benefits						XXX	XXX	XXX	XXX
c. With Guaranteed Minimum Withdrawal, or Income, Benefits – Accumulation Phase						XXX	XXX	XXX	XXX
d. With Guaranteed Minimum Withdrawal, or Income, Benefits – Withdrawal Phase						XXX	XXX	XXX	XXX
3.2 Index-Linked Variable Annuities									
a. Without Guaranteed Living Benefits						XXX			XXX
b. With Guaranteed Minimum Withdrawal, or Income, Benefits – Accumulation Phase						XXX	XXX	XXX	XXX
c. With Guaranteed Minimum Withdrawal, or Income, Benefits – Withdrawal Phase						XXX	XXX	XXX	XXX
3.3 Immediate Variable Annuities									
a. With a Guaranteed Annuity Payout Floor						XXX	XXX	XXX	XXX
3.4 Aggregate Write-Ins for Other Products						XXX			XXX
4. Total Pre-Reinsurance-Ceded Reserve Components (Sum of Lines 3.1 through 3.4)									
5. Total Reserve Component Ceded (Line 4 minus Line 2)						XXX			XXX
DETAILS OF WRITE-INS									
1.1001.						XXX			XXX
1.1002.						XXX			XXX
1.1003.						XXX			XXX
1.1098.Summary of remaining write-ins for Line 1.4 from overflow page						XXX			XXX
1.1099 Totals (Lines 1.1001 through 1.1003 plus 1.1098) (Line 1.4 above)						XXX			XXX
3.1001.									
3.1002.									
3.1003.									
3.1098.Summary of remaining write-ins for Line 3.4 from overflow page									
3.1099 Totals (Lines 3.1001 through 3.1003 plus 3.1098) (Line 3.4 above)									

VM-21 SUPPLEMENT

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Variable Annuity Reserves Valued According to VM-21 or AG 43 by Product Type

This Supplement provides information on the reserves required to be calculated by Section VM-21 of the *Valuation Manual* (VM-21) or AG 43. Business valued by the requirements of VM-21 or AG 43 should be reported in Part 3A and Part 3B. Part 3A and Part 3B are intended to aid regulators in the analysis of reserves broken down into various benefit categories for both the prior and current year.

VM-21 SUPPLEMENT – PART 3A

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Variable Annuity Reserves Valued According to VM-21 or AG 43 by Product Type

Part 3A of this Supplement breaks out, by product type, the prior year and current year reported reserves on a Post-Reinsurance-Ceded basis as defined in Section 3 of VM-21 and a Pre-Reinsurance-Ceded basis as defined in Section 5.

Section 3 of VM-21 requires that the Post-Reinsurance-Ceded Reserve be determined in aggregate. Each of the products reported in the lines should be determined as the sum of the policy reserves using the policy reserves determined following the allocation process of VM-21 Section 13. A similar process should be used for each of the Pre-Reinsurance-Ceded Reserves.

Columns 1 & 2 – Reported Reserves in Excess of Cash Surrender Value (CSV)

Provide the reported reserve in excess of the CSV, for the prior year and current year for each line item. Post-Reinsurance-Ceded Reserve is net of reinsurance ceded. Pre-Reinsurance-Ceded Reserve should be prior to any reinsurance ceded and include reinsurance assumed. Sections 3 and 5 in VM-21 further describe the required reserve and treatment of reinsurance. The reported reserve for the current year should reflect all contracts in force as of the end of the current year. The reported reserve for the prior year should reflect all contracts in force as of the end of the prior year.

For purposes of this supplement, a Guaranteed Living Benefit (GLB) is defined in VM-01.

Each contract/certificate shall be included in one and only one line for each pre-reinsurance-ceded and post-reinsurance ceded.

For purposes of this supplement, Variable Annuities (VAs) Without Guaranteed Living Benefits includes VAs Without Living or Death Benefits, as well as VAs with Death Benefits only.

Drafting note: Alternate language options for determining Accumulation and Withdrawal Phases:

Option 1 - For purposes of this supplement, the accumulation phase is the period during which the contract owner or certificate holder deposits purchase payments into the deferred annuity. This phase ends when the benefit base is locked in at the start of the withdrawal phase. The withdrawal phase is the period during which the contract owner or certificate holder locks in the benefit base and withdraws income from the deferred annuity.

Option 2 - For purposes of this supplement, a policy is in the withdrawal phase if, in the contract year immediately preceding that during the valuation date, it withdrew a non-zero amount not in excess of the GMWB's guaranteed annual withdrawal amount or the GMIB's dollar-for-dollar maximum withdrawal amount. Otherwise, the policy is considered to be in accumulation phase.

VM-21 SUPPLEMENT – PART 3B

Deleted: RESERVES

Variable Annuity Reserves Valued According to VM-21 or AG 43 by Product Type

Part 3B of this Supplement provides details underlying the Current Year amounts shown in Part 3A.

Section A: Columns 1 through 6 are to be completed for all VM-21 reserves not determined using the Alternative Reserve Methodology described in Section 7 of VM-21.

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Section B: Columns 7 through 9 are to be completed if the reserves in Column 8 (Alternative Methodology Reserves) are calculated according to Section 7 of VM-21.

Where the amounts to be reported are calculated on an aggregate basis (i.e., CTE70 (adjusted), CTE70 (best efforts) and the Additional Standard Projection Amount), use the methodology described in section 13 of VM-21 to allocate amounts to the product categories. The choice of reasonable risk metric for allocation may, but is not required to, vary between the columns. For example, if a company has a block of GMWBs and a block with simple GMDB only and they have a CDHS, an allocation based on reasonable risk metrics may allocate more of the CTE70 (adjusted) to the GMWB block, compared to CTE70 (best efforts).

Columns 1 & 7 – Cash Surrender Value

Report the Post-Reinsurance-Ceded and Pre-Reinsurance-Ceded Cash Surrender Value for each product type. The CSV is defined in VM-01 of the *Valuation Manual*.

Column 2 – CTE70 (adjusted)

Report the unfloored Post-Reinsurance-Ceded and Pre-Reinsurance-Ceded CTE70 scenario reserves by product type using the required VM-21 "adjusted" methodology as described in VM-21 Section 4. Report the amount in excess of cash surrender value whether it is positive or negative; do not floor the amount at zero if it is negative.

Column 3 – CTE70 (best efforts)

Report the unfloored Post-Reinsurance-Ceded and Pre-Reinsurance-Ceded CTE70 scenario reserves by product type using the required VM-21 "best efforts" methodology as described in VM-21 Section 4. Report the amount in excess of cash surrender value whether it is positive or negative; do not floor the amount at zero if it is negative.

Column 4 – Additional Standard Projection Amount

Report the Post-Reinsurance-Ceded and Pre-Reinsurance-Ceded Additional Standard Projection Amount for each product type. Report the amount whether it is positive or negative; do not floor the amount at zero if it is negative. The Additional Standard Projection Amount is defined in Section 6 of VM-21.

Column 5 – Stochastic Reserve

Report the Post-Reinsurance-Ceded and Pre-Reinsurance-Ceded Stochastic Reserve for each product type. Report the amount in excess of cash surrender value whether it is positive or negative; do not floor the amount at zero if it is negative. The Stochastic Reserve calculation is defined in Section 4 of VM-21.

Columns 6 & 9 – Number of Contracts

Report the number of individual contracts and certificates in a group contract by product type and by the required VM-21 methodology as described in Section A and Section B above. The number of individual contracts and certificates in a group contract should be prior to any reinsurance ceded and include reinsurance assumed.

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Column 8 – Alternative Method Reserve

Report the Post-Reinsurance-Ceded and Pre-Reinsurance-Ceded Alternative Method Reserve for each product type. Report the amount whether it is positive or negative; do not floor the amount at zero if it is negative. The Alternative Method Reserve calculation is defined in Section 7 of VM-21.

Capital Adequacy (E) Task Force

RBC Proposal Form

☐ Capital Adequacy (E) Task Force
☐ Catastrophe Risk (E) Subgroup
☒ Variable Annuities Capital. & Reserve (E/A) Subgroup
☐ Health RBC (E) Working Group
☐ P/C RBC (E) Working Group
☐ Economic Scenarios (E/A) Subgroup
☒ Life RBC (E) Working Group
☐ Longevity Risk (A/E) Subgroup
☐ RBC Investment Risk & Evaluation (E) Working Group

DATE:	9/24/2025
CONTACT PERSON:	Jane Ren
TELEPHONE:	212-386-1942
EMAIL ADDRESS:	jren@naic.org
ON BEHALF OF:	Variable Annuities Capital and Reserve Subgrp
NAME:	Matt Cheung, Vice Chair
TITLE:	Chief Life Actuary
AFFILIATION:	Illinois
ADDRESS:	115 S. Lasalle St, 13th Floor Chicago IL, 60603

FOR NAIC USE ONLY

Agenda Item # 2025-17-L
Year 2026

DISPOSITION

ADOPTED:
☐ TASK FORCE (TF) _____
☐ WORKING GROUP (WG) _____
☐ SUBGROUP (SG) _____

EXPOSED:
☐ TASK FORCE (TF) _____
☐ WORKING GROUP (WG) _____
☐ SUBGROUP (SG) _____

REJECTED:
☐ TF ☐ WG ☐ SG _____

OTHER:
☐ DEFERRED TO _____
☐ REFERRED TO OTHER NAIC GROUP
☐ (SPECIFY) _____

IDENTIFICATION OF SOURCE AND FORM(S)/INSTRUCTIONS TO BE CHANGED

☐ Health RBC Blanks
☐ Health RBC Instructions
☐ Health RBC Formula
☐ Property/Casualty RBC Blanks
☐ Property/Casualty RBC Instructions
☐ Property/Casualty RBC Formula
☐ Life and Fraternal RBC Blanks
☒ Life and Fraternal RBC Instructions
☐ Life and Fraternal RBC Formula
☐ OTHER _____

DESCRIPTION/REASON OR JUSTIFICATION OF CHANGE(S)

This proposal clarifies that for LR027 in the Life and Fraternal RBC blanks, companies that reserve for payout annuities resulting from variable annuities under VM-21 (which requires domiciliary commissioner approval) should exclude such reserves from the Interest Rate Risk and Market Risk calculation.

APPENDIX 1 – CASH FLOW MODELING FOR C-3 RBC

The total C-3 component is the sum of (a), (b), (c) and (d), but not less than half the C-3 component based on current factors and instructions.

- For this C-3 calculation, "Certain Annuities" means products with the characteristics of deferred and immediate annuities, structured settlements, guaranteed separate accounts (excluding guaranteed indexed separate accounts following a Class II investment strategy) and GICs (including synthetic GICs and funding agreements). Debt incurred for funding an investment account is included if cash flow testing of the arrangement is required by the insurer's state of domicile for asset adequacy analysis. Variable annuity products are not to be included, including guaranteed fixed options within such products **and payout annuities resulting from variable annuities reserved for under VM-21**, as they are separately tested under the requirements for Variable Annuities and Similar Products. See Appendix 1b for further discussion.

The RBC instructions already extend C3P2 to all policies and contracts valued with AG-43/VM-21, so no further change is needed there.

Additional Staff Comments:

** **This section must be completed on all forms.** **Revised 2-2023**

APPENDIX 1 – CASH FLOW MODELING FOR C-3 RBC

This appendix is applicable for all companies who do Cash Flow Testing for C-3 RBC for Certain Annuities and Single Premium Life products.

The method of developing the C-3 component for these products is building on the work of the asset adequacy modeling but using interest scenarios designed to help approximate the 95th percentile C-3 risk.

The C-3 component is to be calculated as the sum of four amounts, but subject to a minimum. The calculation is:

(a) For Certain Annuities or Single Premium Life Insurance products other than equity-indexed products, whether written directly or assumed through reinsurance, that the company tests for asset adequacy analysis using cash flow testing, an actuary should calculate the C-3 requirement based on the same cash flow models and assumptions used and same "as-of" date as for asset adequacy, but with a different set of interest scenarios and a different measurement of results. A weighted average of a subset of the scenario-specific results is used to determine the C-3 requirement. The result is to be divided by (1-enacted maximum federal corporate income tax rate) to put it on a pre-tax basis for LR027 Interest Rate Risk and Market Risk Column (2) Line (33).

If the "as-of" date of this testing is not Dec. 31, the ratio of the C-3 requirement to reserves on the "as-of" date is applied to the year-end reserves, similarly grouped, to determine the year-end C-3 requirement for this category.

(b) Equity-indexed products are to use the existing C-3 RBC factors, not the results of cash flow testing.

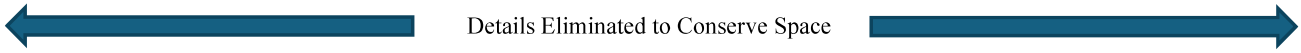
(c) For all other products (either non-cash-flow-tested or those outside the product scope defined above) the C-3 requirements are calculated using current existing C-3 RBC factors and instructions.

(d) For callable/pre-payable assets (including IOs and similar investments other than those used for testing in component a) above, the after-tax C-3 requirement is 50.0% of the excess, if any, of book/adjusted carrying value above current call price. The calculation is to be done on an asset-by-asset basis. For callable/pre-payable assets used for testing in component a) above as well as those used in C-3P2 testing, the C-3 factor requirement is zero.

The total C-3 component is the sum of (a), (b), (c) and (d), but not less than half the C-3 component based on current factors and instructions.

- For this C-3 calculation, "Certain Annuities" means products with the characteristics of deferred and immediate annuities, structured settlements, guaranteed separate accounts (excluding guaranteed indexed separate accounts following a Class II investment strategy) and GICs (including synthetic GICs and funding agreements). Debt incurred for funding an investment account is included if cash flow testing of the arrangement is required by the insurer's state of domicile for asset adequacy analysis. Variable annuity products are not to be included, including guaranteed fixed options within such products and payout annuities resulting from variable annuities reserved for under VM-21, as they are separately tested under the requirements for Variable Annuities and Similar Products. See Appendix 1b for further discussion.

- The company may use either a standard 50 scenario set of interest rates or an alternative, but more conservative, 12 scenario set (for part a, above). It may use the smaller set for some products and the larger one for others. Details of the cash flow testing for C-3 RBC methodology are contained in Appendix 1a.



Life Actuarial (A) Task Force/ Health Actuarial (B) Task Force
Amendment Proposal Form*

1. Identify yourself, your affiliation, and a very brief description (title) of the issue.

   Identification:
   Matt Cheung, Illinois Department of Insurance

   Title of the Issue:
   Clarify that variable annuities in payout phase, either after annuitization or account value depletion, can be reserved for as a variable annuity under VM-21 with domiciliary commissioner approval. If reserved for under VM-21, the Standard Projection Amount requirements apply to these contracts.

2. Identify the document, including the date if the document is "released for comment," and the location in the document where the amendment is proposed:

   - 2026 Valuation Manual, Section II Reserve Requirements Subsection 2: Annuity Products
   - 2026 Valuation Manual, VM-21 Requirements Section 6.C.9

3. Show what changes are needed by providing a red-line version of the original verbiage with deletions and identify the verbiage to be deleted, inserted, or changed by providing a red-line (turn on "track changes" in Word®) version of the verbiage. (You may do this through an attachment.)

   See attached.

4. State the reason for the proposed amendment? (You may do this through an attachment.)

   There is a diversity of practice currently of how variable annuities in payout are reserved for, and this APF serves to clarify that they can either be treated as variable annuities (which is the same treatment they had prior to annuitization/account value depletion, with domiciliary commissioner approval), or as fixed annuities.

Dates: Received	Reviewed by Staff	Distributed	Considered
9/25/2025	JR		
Notes: APF 2025-14			

Subsection 2: Annuity Products

A. This subsection establishes reserve requirements for all contracts classified as annuity contracts as defined in SSAP No. 50 in the AP&P Manual.

B. Minimum reserve requirements for variable annuity (VA) contracts and similar business, specified in VM-21, Requirements for Principle-Based Reserves for Variable Annuities, shall be those provided by VM-21. The minimum reserve requirements of VM-21 are considered PBR requirements for purposes of the *Valuation Manual,* and therefore are applicable to VM-G.

C. Minimum reserve requirements for non-variable annuity contracts issued prior to 1/1/2026 are those requirements as found in VM-A, VM-C, and VM-V as applicable, with the exception of the minimum requirements for the valuation interest rate for single premium immediate annuity contracts, and other similar contracts, issued after Dec. 31, 2017, including those fixed payout annuities emanating from host contracts issued on or after Jan. 1, 2017, and on or before Dec. 31, 2017. The maximum valuation interest rate requirements for those contracts and fixed payout annuities are defined in VM-V, Statutory Maximum Valuation Interest Rates for Formulaic Reserves.

Minimum reserve requirements for non-variable annuity contracts issued on 1/1/2026 and later are those requirements as found in VM-22, with the exception of Preneed Annuities, Guaranteed Investment Contracts, Synthetic Guaranteed Investment Contracts, Funding Agreements, and other Stable Value Contracts which shall follow the requirements found in VM-A, VM-C, and VM-V. Minimum reserve requirements for fixed payout annuities resulting from the exercise of settlement options or annuitizations of host contracts, as well as fixed income payment streams attributable to guaranteed living benefits associated with deferred annuity contracts with guaranteed living benefits once the contract funds are exhausted, are those requirements as found in VM-22, with the exception that, with the permission of the domiciliary commissioner, the company may use the same maximum valuation interest rate used to value payment streams in accordance with the guidance applicable to the host contract. The minimum reserve requirements of VM-22 are considered PBR requirements for purposes of the *Valuation Manual,* and therefore are applicable to VM-G.

VA contracts in payout phase, regardless of how they are administered, can be reserved for under VM-21 with domiciliary commissioner approval.

VM-21: Requirements for Principles-Based Reserves for Variable Annuities

Section 6: Requirements for the Additional Standard Projection Amount

C. Prescribed Assumptions

9. Mortality

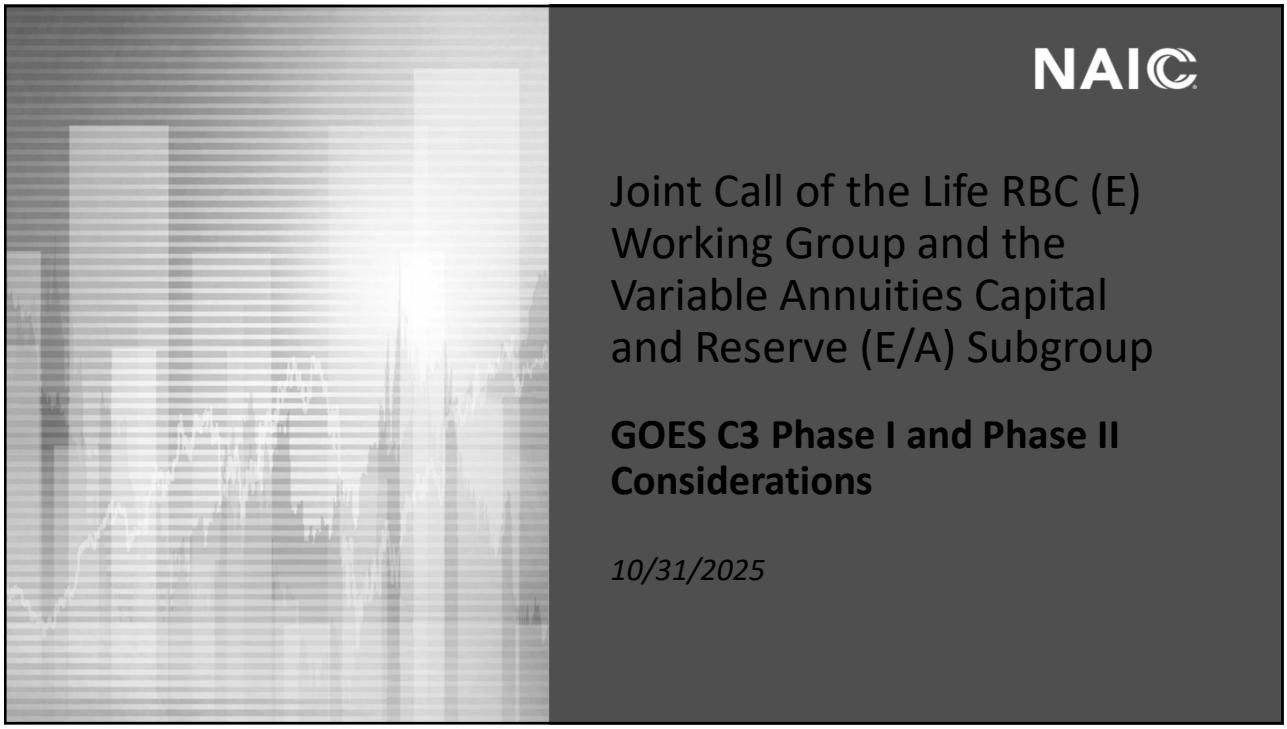
The mortality rate for a contract holder with age x in year (2012 + n) shall be calculated using the following formula, where q_x denotes mortality from the 2012 IAM Basic Mortality Table multiplied by the appropriate factor (F_x) from Table 6.9 and $G2_x$ denotes mortality improvement from Projection Scale G2:

$$q_x^{2012+n} = q_x^{2012}(1 - G2_x)^n * F_x$$

Table 6.9

Attained Age (x)	F_x for VA with GLB and VA in payout phase		F_x for VA without GLB and with roll-up GDB		F_x for All Other	
	Male	Female	Male	Female	Male	Female
<=52	100%	95%	160%	150%	110%	105%
53	99%	95%	160%	152%	110%	106%
54	98%	95%	160%	154%	110%	107%
55	97%	95%	160%	156%	110%	108%
56	96%	95%	160%	158%	110%	109%
57	95%	95%	160%	160%	110%	110%
58	93.5%	93.5%	160%	160%	109%	109%
59	92%	92%	160%	160%	108%	108%
60	90.5%	90.5%	160%	160%	107%	107%
61	89%	89%	160%	160%	106%	106%
62	88%	88%	160%	160%	105%	105%
63	89%	88%	160%	159%	105%	104%
64	90%	88%	160%	158%	105%	103%
65	91%	88%	160%	157%	105%	102%
66	92%	88%	160%	156%	105%	101%
67	93%	88%	160%	155%	105%	100%
68	95%	90%	160%	154%	107%	101.5%
69	97%	92%	160%	153%	109%	103%
70	99%	94%	160%	152%	111%	104.5%
71	101%	96%	160%	151%	113%	106%
72	103%	98%	160%	150%	115%	108%
73	103.5%	99.5%	158%	149%	115%	109%
74	104%	101%	156%	148%	115%	110%
75	104.5%	102.5%	154%	147%	115%	111%
76	104.5%	103.5%	152%	146%	115%	112%
77	105%	105%	150%	145%	115%	113%
78	106.5%	106.5%	147%	143%	115%	113.5%
79	108%	108%	144%	141%	115%	114%
80	109.5%	109.5%	141%	139%	115%	114.5%
81	111%	111%	138%	137%	115%	114.5%
82	113%	113%	135%	135%	115%	115%
83	113%	113%	132%	132%	114.5%	114.5%
84	113%	113%	129%	129%	114%	114%
85	113%	113%	126%	126%	113.5%	113.5%
86	113%	113%	123%	123%	113.5%	113.5%
87	113%	113%	120%	120%	113%	113%
88	113%	113%	119%	119%	113%	113%
89	113%	113%	118%	118%	113%	113%
90	113%	113%	117%	117%	113%	113%
91	113%	113%	113%	116%	113%	113%
92	113%	113%	115%	115%	113%	113%
93	112.5%	112.5%	114%	114%	112.5%	112.5%
94	112%	112%	113%	113%	112%	112%
95	111.5%	111.5%	112%	112%	111.5%	111.5%
96	111%	111%	111%	111%	111%	111%
97	110%	110%	110%	110%	110%	110%

98	109%	109%	109%	109%	109%	109%
99	108%	108%	108%	108%	108%	108%
100	107%	107%	107%	107%	107%	107%
101	106%	106%	106%	106%	106%	106%
102	105%	105%	105%	105%	105%	105%
103	103.0%	103.0%	103.0%	103.0%	103.0%	103.0%
104	101.0%	101.0%	101.0%	101.0%	101.0%	101.0%
>=105	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%



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Limitations

- The NAIC took steps to review the quantitative results for reasonableness. However, the accuracy and reliability of the results are ultimately dependent on the quality of participant submissions.
- For the 2024 GOES Field Test, standard templates were not used to collect results. This made the data across participants sometimes challenging to compare and some participants had to be removed from the analysis due to these challenges. Sometimes adjustments to the data were made in order to achieve comparability across the participants. This was more of a factor with the C3 Phase II results compared to the C3 Phase I results.
- The field test analytics (average C3 Factors, range of impacts, etc.) can be strongly dependent on a subset of the participants results.

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Scenarios Used in Analysis

Field Test Run	Scenario Sets	Inforce Assets and Liabilities
Baseline **Already exists; no new runs needed.**	Scenario set(s) the company used for 12/31/23 statutory reporting of reserves and RBC	As of 12/31/23
Field Test 1 (FT1)	2024 GOES Field Test scenarios as of 12/31/23	As of 12/31/23
Current Revised GOES Scenarios	2024 GOES Field Test calibration with revisions to the: 1) initial yield curve fitting methodology; 2) a dynamic generalized fractional floor (DGFF); and 3) a revised equity calibration with 1st percentile gross wealth factors (GWFs) that more closely align with acceptance criteria. Scenarios produced as of 12/31/23.	As of 12/31/23

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Referral to Life RBC (E) Working Group

The GOES (E/A) Subgroup has been working to implement a new economic scenario generator for use in statutory reserve and capital calculations for life insurance and annuities. It is planned that the new economic scenario generator will be effective for C3 Phase I and C3 Phase II for year-end 2026. To facilitate the implementation of the new economic scenario generator, the GOES (E/A) Subgroup requests that the Life Risk-Based Capital (E) Working Group:

1. Implement the necessary changes to the Life Risk-Based Capital Blanks and Instructions,
2. Coordinate with the Variable Annuities Capital and Reserve (E/A) Subgroup on recommended changes to the C3 Phase II calculation,
3. Consider changes to the required number of scenarios for the C3 Phase I calculation, if necessary, and,
4. Consider changes to the capital metric for the C3 Phase I calculation, if necessary.

The Subgroup appreciates the Working Group's assistance on this issue and looks forward to the response.

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C3 Phase I Background

Calculation Details

- Cash flow models that are used for asset adequacy analysis (or other consistent models) are used. The greatest present value of a deficiency at any point in the projection is calculated for each scenario.
- 50 or 12 interest rate scenarios generated from an older version of the Academy Interest Rate Generator (AIRG) are used in the calculations. The 50 or 12 scenarios are selected from a larger 200 set and are meant to contain the most adverse scenarios so that a tail measure metric can be calculated with a smaller number of scenarios.
- This version of the AIRG has a 6.55% interest rate mean reversion parameter (MRP) which does not change, compared with the current version of the AIRG which has a dynamic MRP that resets annually based on a weighted average of past interest rate levels.
- From the 50-scenario set, a weighted average centered around the 95th percentile scenario is determined, and that is the C3 RBC amount.
- In the C3 Phase I RBC worksheet, the scenario level and final results are also shown as a "C3 Factor" percentage, which is the capital amount divided by the statutory reserve at the start of the projection.

Product Scope

- **Deferred and Immediate Annuities**
- **Guaranteed Separate Accounts***
- **Guaranteed Investment Contracts**
- **Single Premium Life**
- **Excludes Indexed and Variable Products**

C3 Phase I Metric →

(a) For the 50 scenario set, the C-3 scores are multiplied by the following series of weights:

Weighting Table

Scenario Rank:	17	16	15	14	13	12	11	10	9	8	7	6	5
Weight:	0.02	0.04	0.06	0.08	0.10	0.12	0.16	0.12	0.10	0.08	0.06	0.04	0.02

* excluding guaranteed indexed separate accounts following a Class II investment strategy

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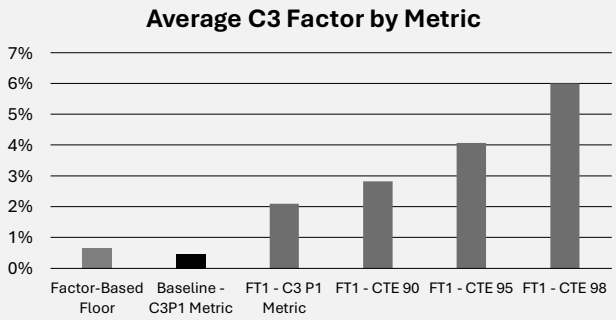
2024 GOES Field Test C3 Phase I Results by Metric

- **13/16** company model segments had "factor-based floor" amounts greater or equal to their model determined C3 factors for the Baseline run using the current weighted average metric, compared to **11/16** company model segments had "factor-based floor" amounts greater or equal to their model determined C3 factors using the 2024 GOES FT1 scenarios. However, the average model determined C3 factor increased from **0.483%** to **2.098%** due to outlier model segments.
- The average C3 factor using CTE 90 increased to **2.821%** using the GOES 2024 FT1 scenarios compared to the **2.098%** for the current metric, but still **11/16** company model segments had "factor-based floor" amounts greater or equal to their model determined C3 factors and the CTE 90 metric.



Statistics	Factor-Based Floor	C3 Phase I Metric		CTE90		CTE 95		CTE 98	
		B1	FT1	B1	FT1	B1	FT1	B1	FT1
25th Percentile	0.467%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.038%
Median	0.697%	0.000%	0.360%	0.079%	0.134%	0.079%	0.723%	0.397%	2.060%
75th Percentile	0.874%	0.398%	2.648%	1.928%	3.209%	1.002%	3.612%	2.814%	5.102%
Average Factor*	**0.666%**	**0.483%**	**2.098%**	**0.801%**	**2.821%**	**0.660%**	**4.072%**	**1.833%**	**6.000%**
Count	16	19	19	12	18	11	16	12	18

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*simple average

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Referral to Variable Annuities Capital and Reserve (E/A) SG

The GOES (E/A) Subgroup has been working to implement a new economic scenario generator for use in statutory reserve and capital calculations for life insurance and annuities. It is planned that the new economic scenario generator will be effective for C3 Phase II for year-end 2026. One of the goals of the project to implement the GOES has been to consider whether changes to reserve and/or capital metrics are necessary in light of the new scenarios. To facilitate the implementation of the new economic scenario generator, the GOES (E/A) Subgroup requests that the Variable Annuities Capital and Reserve (E/A) Subgroup:

1. Consider changes to the capital metric for the C3 Phase II calculation, if necessary, and,
2. Coordinate with the Life Risk-Based Capital (E) Working Group on any changes to the C3 Phase II metric and any related changes to the Life Risk-Based Capital Blanks and Instructions.

The GOES (E/A) Subgroup appreciates the Variable Annuities Capital and Reserve (E/A) Subgroup's assistance on this issue and looks forward to the response.

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C3 Phase II Background

Calculation Details

- CTE 98 is determined one of two ways:
  - If using the Macro Tax Adjustment (MTA), federal income tax is ignored in the modeled cash flows. As a result, for each individual scenario, the numerical value of the scenario reserve used in this calculation should be identical to that for the same scenario in the Aggregate Reserve calculation under VM-21.
  - If using Specific Tax Recognition, CTE After-tax (CTEAT) 98 is calculated using a model that is directly reflective of tax cashflows.
- From there, the C3 RBC Amount is:
  - If using the MTA:
    - 25% x ((CTE (98) + Additional Standard Projection Amount – Statutory Reserve) x (1 – Federal Income Tax Rate) – (Statutory Reserve – Tax Reserve) x Federal Income Tax Rate
  - If using STR:
    - 25% x (CTEAT (98) + Additional Standard Projection Amount – Statutory Reserve)

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2024 GOES Field Test C3 Phase II Results by Metric

Statistics	Baseline CTE98/Baseline CTE70 -1	FT1 CTE 70/Baseline CTE70 -1	FT1_CTE90/FT1_CTE70-1	FT1_CTE95/FT1_CTE70-1	FT1_CTE98/FT1_CTE70-1
25th Percentile	0.50%	0.05%	0.22%	0.85%	1.38%
Median	1.48%	0.21%	0.69%	1.59%	3.14%
75th Percentile	2.91%	0.33%	1.35%	2.39%	3.66%
Weighted Average	**1.63%**	**0.55%**	**0.76%**	**1.58%**	**2.53%**

- The table above shows summarized 2024 GOES Field Test data across 8 model segments from six different field test participants. The averages shown were weighted by baseline CTE 70 amount.
- The CTE 70 and CTE 98 amounts include the cash value.
- The Baseline CTE 98 was **1.63% greater** than the Baseline CTE 70 amount.
- Comparing the CTE 70 from FT1 to that of the Baseline, the ratio of the FT1 CTE 70 was **0.55%** greater.
- Alternative metrics were compared to the FT1 CTE 70 amount, with the following results:
  - FT1 CTE 90 was **0.76% greater**
  - FT1 CTE 95 was **1.58% greater**
  - FT1 CTE 98 was **2.53% greater**

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Variable Annuity Model Office Results by Metric

- Unfloored, VM-21 adjusted model office results are shown for three different cohorts:
  - New Business, Weak Guarantee, In-the-money
  - New Business, Strong Guarantee, Out-the-money
  - Mature Business, Strong Guarantee, At-the-money
- The potential capital metrics (CTE90, CTE 95, and CTE 98) were higher using the Current Revised GOES scenarios compared to those produced using the AIRG. The differences got wider with higher confidence levels.
- When comparing the potential capital metrics to their respective CTE 70 amount (AIRG or Revised GOES Scenarios), CTE 95 for the Revised GOES Scenarios was more consistent with the current CTE 98 metric used with the AIRG.

Unfloored, Adjusted Results by Metric

New Weak ITM	CTE70	CTE90	CTE90/CTE70	CTE95	CTE95/CTE70	CTE98	CTE98/CTE70
AIRG	86,782,233	93,802,216	8.09%	97,074,573	11.86%	100,784,003	16.13%
Current Revised GOES Scenarios	85,327,307	94,375,628	10.60%	100,329,626	17.58%	109,371,008	28.18%
Revised Scenarios vs AIRG	-1.68%	0.61%		3.35%		8.52%	

New Strong OTM	CTE70	CTE90	CTE90/CTE70	CTE95	CTE95/CTE70	CTE98	CTE98/CTE70
AIRG	84,951,284	90,714,237	6.78%	93,488,137	10.05%	96,473,555	13.56%
Current Revised GOES Scenarios	83,804,603	91,050,692	8.65%	96,158,612	14.74%	103,396,668	23.38%
Revised Scenarios vs AIRG	-1.35%	0.37%		2.86%		7.18%	

Mature Strong ATM	CTE70	CTE90	CTE90/CTE70	CTE95	CTE95/CTE70	CTE98	CTE98/CTE70
AIRG	92,803,482	96,793,955	4.30%	99,081,186	6.76%	101,958,674	9.87%
Current Revised GOES Scenarios	92,455,849	97,970,909	5.97%	101,897,993	10.21%	107,823,623	16.62%
Revised Scenarios vs AIRG	-0.37%	1.22%		2.84%		5.75%	

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Variable Annuity Model Office Results by Metric

Unfloored, Adjusted Results by Metric **in Excess of Cash Value**

New Weak ITM	CTE70	CTE90	CTE90/CTE70	CTE95	CTE95/CTE70	CTE98	CTE98/CTE70
AIRG	0	0	NA	3,074,573	NA	6,784,003	NA
Current Revised GOES Scenarios	0	375,628	NA	6,329,626	NA	15,371,008	NA
Revised Scenarios vs AIRG	NA	NA		105.87%		126.58%	

CSV	94,000,000

New Strong OTM	CTE70	CTE90	CTE90/CTE70	CTE95	CTE95/CTE70	CTE98	CTE98/CTE70
AIRG	0	0	NA	0	NA	2,473,555	NA
Current Revised GOES Scenarios	0	0	NA	2,158,612	NA	9,396,668	NA
Revised Scenarios vs AIRG	NA	NA		NA		279.89%	

CSV	94,000,000

Mature Strong ATM	CTE70	CTE90	CTE90/CTE70	CTE95	CTE95/CTE70	CTE98	CTE98/CTE70
AIRG	0	0	NA	0	NA	2,004,674	NA
Current Revised GOES Scenarios	0	0	NA	1,943,993	NA	7,869,623	NA
Revised Scenarios vs AIRG	NA	NA		NA		292.56%	

CSV	99,954,000

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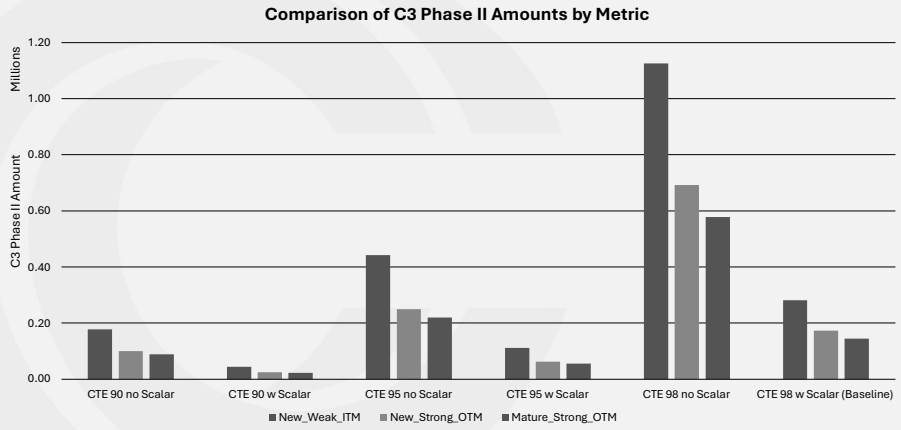
C3 Phase II Amounts Reflecting CSV Floor & CDHS



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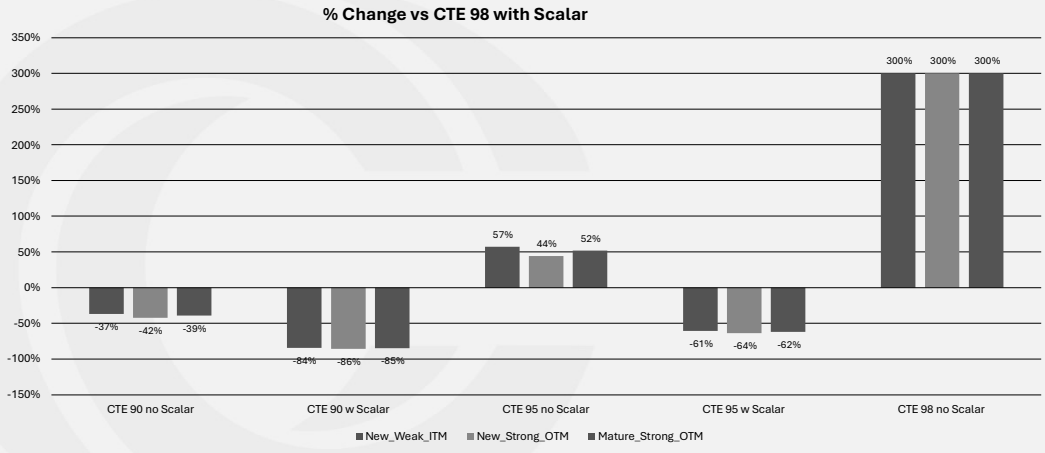
Change (%) when Compared with the Current Metric



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January 5, 2025

Philip Barlow
Chair, Life Risk-Based Capital (E) Working Group
National Association of Insurance Commissioners

Peter Weber
Chair, Variable Annuities Capital and Reserve (E/A) Subgroup
National Association of Insurance Commissioners

Re: C-3 Phase I and Phase II Updates

Dear Chair Barlow and Weber:

On behalf of the Variable Annuity Reserves and Capital Subcommittee and the C-3 Subcommittee (the Subcommittees) of the American Academy of Actuaries,[1] we appreciate the opportunity to provide comments to the Life Risk-Based Capital (E) Working Group and Variable Annuities Capital and Reserve (E/A) Subgroup regarding the LRBCWG/VACRSG exposures.[2]

We appreciate the NAIC's continued leadership in implementing the generator of economic scenarios (GOES) and the corresponding review of the impacts to current capital frameworks.

In this letter, we provide our consolidated observations and comments, based on feedback from Academy volunteers. Unless otherwise specified, our comments apply to both C-3 Phase I and C3 Phase II.

CONSIDERATIONS REGARDING CTE LEVELS AND SCALAR APPROACHES FOR C-3 PHASE II

Exposure Question: Include considerations and languages for the CTE (95) level with a 25% scalar as well as the CTE (98) level with a 25% scalar

CTE 95 with a 25% Scalar

The Subcommittees noted the following considerations regarding use of CTE 95 metric with a 25% scalar:

[1] The American Academy of Actuaries is a 20,000-member professional association whose mission is to serve the public and the U.S. actuarial profession. For 60 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States

[2] C-3 Phase I Instructions 20251023 v2, C3P2 Updates, Cover questions

- The GOES scenario calibration appears to address some of the left-tail deficiencies of the Academy Interest Rate Generator (AIRG); therefore, a high CTE level may no longer be as necessary to achieve regulatory sufficiency.
- CTE 95 includes more scenarios than CTE 98 and therefore may produce greater stability, reducing year-over-year volatility driven by scenario migration, assumption changes, and model updates.
- While the 25% scalar implicitly assumes companies target 400% RBC ratios, this may not align with all companies' target capitalization levels. A formula without a scalar is better suited to differentiate at the level of weakly capitalized companies (near 100%). Reflection of a scalar makes RBC better suited to differentiate between more well-capitalized companies (near 400%).
- CTE 95 remains deep enough in the tail to continue supporting hedging incentives.

CTE 98 with a 25% Scalar

For a CTE 98 metric with a 25% scalar, the Subcommittees noted the following:

- The metric would maintain continuity with the current framework, therefore isolating the impact of the GOES implementation and improving comparability to historical C-3 Phase II results.
- However, maintaining CTE 98 may lead to higher capital requirements relative to those produced with the AIRG, given that GOES already strengthened tail calibration.
- The CTE 98 metric is based on only 2% of scenarios, increasing the likelihood of volatility from scenario-level changes.
- As with CTE 95, the assumed 400% RBC target embedded in the scalar may warrant reconsideration.

Additionally, it was suggested that disclosures highlight the fact that assumption and modeling updates have magnified effects in deeper-tail CTE metrics.

CTE 90 Without a Scalar

The Subcommittees also noted the following considerations for a CTE 90 metric with no scalar:

- CTE 90 with 100% of no scalar may be more conceptually aligned with a Company Action Level (CAL) framework, avoiding assumptions about target capital levels.
- CTE 90 provides the greatest scenario stability due to the larger number of contributing scenarios.
- Hedging implications may be more complex under a lower CTE level, particularly if hedging the CTE 90-based standard does not reduce Total Asset Requirement (TAR) under the new GOES.
- Cash Surrender Value (CSV) floors come into play more often at CTE 90 vs CTE 98 and therefore may lead to non-economic and non-intuitive results.

RECOMMENDATIONS ON DISCLOSURE ITEMS

Exposure Question: Provide disclosures for the sensitivity of the remaining two metrics that are not going to be selected for the C3 Phase II out of the three, i.e. CTE (90) without a scalar, CTE (95) with a 25% scalar and CTE (98) with a 25% scalar.
We generally support providing disclosure information to assist regulators' evaluation, but the views of the Subcommittees varied regarding its scope and implementation.

- Summary disclosures may help regulators develop a more data-driven methodology, particularly given the limited testing conducted on prior GOES calibrations.
- Disclosure should ideally include unsmoothed and unfloored results for each metric (CTE 90, CTE 95 with scalar, CTE 98 with scalar) to avoid complexity from applying smoothing across multiple measures.
- Additional helpful elements may include:
    - Number of scenarios floored at CSV in the tail metric;
    - Block of business characteristics consistent with model office summaries, that would explain the drivers of CTE changes;
    - Qualitative statements on whether hedging strategies would change under alternate CTE measures. We suggest including quantitative impacts if available. For example, indicate whether the company's hedging approach is primarily driven by GAAP results or by statutory accounting metrics.

CONSIDERATIONS REGARDING ALTERNATE METHODOLOGIES FOR VOLUNTARY RESERVES (VR) AND MINIMUM REQUIRED CAPITAL

Exposure Question: Consider alternative methodologies to reflect voluntary reserves as well as additional suggestions to get the minimum required capital calibrated while addressing the target capital

Comments on Voluntary Reserves

Our feedback is aligned with prior comments[3] that VR can be included if they are established using sound and rigorous actuarial analysis and prefund expected policyholder obligations under statutory accounting methods and assumptions.

We emphasize that justification for VR should be included in capital calculations. Where VR truly exceeds CTE 70 reserves for non-capital reasons, 100% credit may be conceptually appropriate, but not for reserves posted solely to influence capital.

Alternative Scalar Framework
A potential improvement in clarity would be to re-express the capital calculation as:

$$\textit{Scalar}_1 \times (\textit{TAR} - \textit{CTE Vx}) - \textit{Scalar}_2 \times \textit{VR}$$

[3] Joint Meeting Agenda: Life RBC (E) Working Group And The Variable Annuities Capital And Reserve (E/A) Subgroup, pages 2-6.

Where:

- TAR is defined as a CTE level (95 or 98, as examples) which is greater than CTE Vx
- Vx is the reserve amount at a given CTE level
- $Scalar_1$ reflects the multiple above the underlying CTE standard (e.g., RBC target multiple)
- $Scalar_2$ reflects the degree of credit granted for VR (where the scalar could range from 0% or 100%)

The above change would allow regulators to understand the impact of voluntary reserves and enhance transparency for regulator reviews.

Threshold for Using Voluntary Reserves

Our groups considered potential thresholds for VR credit. We note that the VR scalar is dependent on regulators' objectives.

Note that the comments below leverage the example laid out below and assume that the scalar applied to CTE level is different from the scalar applied to voluntary reserves:

- If regulators would like to maintain the TAR level when voluntary reserves are included vs. excluded, they would need to determine at which level they would like to maintain parity.
- If regulators would like to maintain the current scalar of 25%, that is applied to both CTE and voluntary reserves, the parity of TAR (which is reserves plus capital) only occurs at 400% CAL.
    - For example, the TAR is always higher at lower target RBC multiples if VR are included; however, the 400% TAR would be the same at $2,100.
- If regulators would like to maintain parity at the CTE 90 level with and without voluntary reserves, the VR scalar would be 1/(Target TAR %).
    - For example, if parity is to be maintained at 200% CAL in the example below, 50% scalar would be applied to VR to get the same TAR of $1,450.

	Current			Change Metric and Scalar				
	25% * CTE98			100% * CTE90				
CTE70	800	800	800	800	800	800	800	800
CTExx	2100	2100	2100	**1125**	1125	1125	1125	1125
Scalar 1	25%	25%	25%	**100%**	100%	100%	100%	100%
VR	100	100	**0**	100	100	100	100	**0**
VR Scalar	100%	**33%**	100%	100%	**50%**	**33%**	**25%**	100%
Reserves	900.0	900.0	800.0	900.0	900.0	900.0	900.0	800.0
Capital	300.0	316.7	325.0	225.0	275.0	291.7	325.0	325.0
TAR*	1,200	1,217	1,125	1,125	1,175	1,192	1,225	1,125
TAR at 200%	1,500	1,533	1,450	1,350	1,450	1,483	1,550	1,450
TAR at 300%	1,800	1,850	1,775	1,575	1,725	1,775	1,875	1,775
TAR at 400%	2,100	2,167	2,100	1,800	2,000	2,067	2,200	2,100
TAC	975	975	1,075	975	975	975	975	1,075
RBC Ratio	325%	308%	331%	433%	355%	334%	300%	331%

*TAR at xx% = reserves + capital at the target RBC multiple.

An alternative approach that does not try to maintain parity as shown in the examples above is to introduce a threshold, such as 300% ACL, where a defined percentage of VR is allowed. This approach would have alignment with other RBC admittance thresholds (e.g., disallowed IMR or DTA limits).

BROADER CONSIDERATIONS ON CAPITAL CONSISTENCY AND PURPOSE OF RBC

Several other considerations were raised by Subcommittee members that may guide calibration:

- Consistency across RBC components is important; future frameworks may benefit from moving toward a more uniform CTE-based approach across C-3 measures and away from percentile-based metrics.
- GOES-based volatility will remain a challenge under any CTE level; NAIC model office results will be important to inform directional decisions.
- Hedging responsiveness should be considered: deeper-tail metrics provide greater incentive for CDHS programs, whereas shallower-tail metrics may reduce economic justification for hedging.
- When a CTE metric is selected, it would be prudent to ensure that this is set at the same or at a similar level of conservatism as other capital metrics within RBC.

*****

If you have any questions or would like to discuss these comments further, please contact Amanda Barry-Moilanen (barrymoilanen@actuary.org) the Academy's life policy project manager.

Sincerely,

Rick Hayes
Chairperson, C-3 Subcommittee
American Academy of Actuaries

Maambo Mujala
Chairperson, Variable Annuity Reserves and Capital Subcommittee
American Academy of Actuaries

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January 9, 2025

Philip Barlow
Chair, NAIC Life Risk-Based Capital (E) Working Group (LRBC)

Peter Weber
Chair, NAIC Variable Annuities Capital and Reserve (E/A) Subgroup (VACR)

Re: LRBC-VACR Fall 2025 Generator of Economic Scenarios (GOES) Exposures

Dear Chair Barlow and Weber:

The American Council of Life Insurers (ACLI) appreciates the opportunity to respond to the latest set of GOES capital-related exposures which emerged from a joint effort of the LRBC Working Group and the VACR Subgroup. We would also like to thank regulators and NAIC staff for incorporating several of our prior recommendations from our comment letter dated September 26, 2025 as well as our suggestions for how to organize the current exposure.

At this time, it is ACLI's position that the most effective path forward is prioritizing the implementation of GOES, accompanied only by targeted technical and wording changes that this effort. Because the Generator introduces significant changes to capital calculations, it is important that its effects be understood before additional modifications to the C-3 framework are adopted. Many of the concepts raised in this exposure — such as revisiting calibration philosophy or adjusting reserve interactions— are substantial initiatives that warrant evaluation through a structured testing process. Implementing multiple untested framework changes concurrently with GOES would make it difficult for regulators and industry to isolate individual effects.

For the reasons stated above, we recommend the following (as reflected in the provided redlines of the C-3 Instructions):

1. **CTE Calibration**: For C-3 Phase II calculations, we recommend continued use of current framework of CTE(98) with a 25% scalar. Accompanying this approach, ACLI supports the collection of disclosure items on page LR039 – *Sensitivity Tests* of the RBC formula, including CTE(90) without a scalar and CTE(95) with a 25% scalar. While we believe that CTE(95) with a 25% scalar will lead to the appropriate level of capital for the longer term, the collection of these disclosures will provide regulators with meaningful data to assess that conclusion and

inform future calibration decisions, without prematurely adopting changes that cannot yet be evaluated.

2. NAER Discounting: We support the use of the Net Asset Earned Rate (NAER) or direct iteration approach for C-3 Phase I discounting, as it maintains consistency with the economic environment reflected in the GOES scenarios. This approach aligns with principle-based reserve methodology, avoids distortions in low-rate or negative-rate paths, and helps ensure that the C-3 Phase I calculation functions as intended under the new generator.
3. Exclusion of Stochastic Equity in C-3 Phase I calculation: ACLI is appreciative of the regulator decision to excluded stochastic equity from the C-3 Phase I calculation. It is appropriate to defer any consideration of this item until the American Academy of Actuaries has completed their holistic review described below.
4. Use of non-prescribed generators for C-3 Phase I calculation: ACLI also recommends that the C-3 Phase I instructions allow the use of non-prescribed generators, consistent with Valuation Manual practice permitting the use of alternative generators when calibration requirements are satisfied. This approach helps ensure alignment between reserving and capital methodologies.
5. Voluntary Reserves: We do not support applying a haircut to voluntary reserves in either C-3 framework, as such reserves generally do not have a meaningful impact on RBC ratios unless an insurer is already well capitalized. In that context, reducing recognition of voluntary reserves would have limited impact at lower capital levels, while unnecessarily diminishing recognition for well-capitalized companies. If, however, regulators determine that some reduction in recognition of truly voluntary reserves is warranted:
    - State reserves required to be held in excess of the NAIC minimum standard defined by VM-21 and AG 43 should not be treated as voluntary, as they are imposed through state law and are not within the insurer's unilateral control, distinguishing them from truly voluntary reserves held for other purposes. Additionally, the Actuarial Opinion itself requires an analysis of state specific reserves in the aggregate, with some states specifically not allowing offsets in the aggregation.
    - A 1/3 recognition factor as is currently proposed is excessively punitive as it is calibrated below the trend test level (i.e., 150% CAL or 300% ACL). Alternatives such as full reflection up to a particular threshold (such as 25% of CTE(98)) or a less severe haircut (such as a 2/3 recognition factor) should be considered.

While we support maintaining framework of CTE(98) with a 25% scalar for C-3 Phase II and the full reflection of voluntary reserves for both frameworks for the near term, ACLI acknowledges regulator concerns that the current framework may produce distorted RBC ratios at critical capital levels. As an alternative to the targeted changes in the current exposure and our additional recommendations, a simpler approach to address regulator concerns might be a bifurcated approach calibrated around a 150% Company Action Level RBC (CAL) threshold, under which the existing calibration and voluntary reserve treatment would continue to apply above 150% of CAL, while a more constrained approach would apply below that threshold.

This type of bifurcated treatment would be consistent with methodologies used elsewhere in the statutory framework (e.g., Negative IMR). Structural concerns, such as the cliff that would occur when a company is close to 150% of CAL, would need to be considered. ACLI members have had preliminary discussions on such a concept and would welcome the opportunity to evaluate it further through field

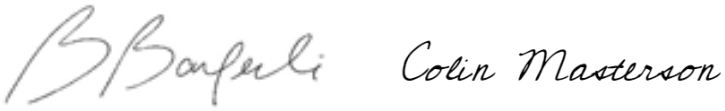
testing. This would also allow us additional time to assess whether ACLI could ultimately support such an approach.

Finally, as discussion of the current exposure continues, ACLI believes it is important to briefly reiterate several points raised in our prior comment letter (provided as a supplement) that remain relevant to the ongoing conversation and to consideration of potential future changes:

1. **C-3 Phase 1 Framework Review:** The American Academy of Actuaries is conducting a holistic review of the C-3 framework, including calibration levels, reserve interaction mechanics, and the integration of equity risk across C-1 and C-3 requirements. Any further changes to the C-3 framework should be coordinated with this work—both in substance and timing—to help ensure a consistent and cohesive approach that appropriately reflects the combined effects of GOES and related RBC components.
2. **Calibration History**: The current CTE(98) with a 25% scalar approach for C-3 Phase II was the result of extensive work during the VA reform process. Removing the scalar represents a significant structural shift from that established framework. Such a change should not be made in isolation; it requires careful consideration of the historical context, along with thorough discussion and rigorous testing before adoption.
3. **CTE(90) Limitations**: CTE(90) will likely have more scenarios bound by the cash surrender value floor, which could trigger non-economic volatility in capital.

Thank you once again for your consideration of our feedback. We look forward to continued engagement as GOES is implemented and as regulators, the Academy, and industry collaborate on the longer-term evolution of the C-3 framework.

Sincerely,



cc: Jane Ren, NAIC

LR027 INTEREST RATE RISK AND MARKET RISK

Commented [A1]: Added for clarity

Line (35)

Enter the interest rate risk component from the Cash Flow Modeling for C-3 RBC Requirements Variable Annuities and Similar Products (see Line (37)). The interest rate risk component should be entered on a pre-tax basis using the enacted maximum corporate income tax rate.

Line (36)

Total interest rate risk. Equals Line (34) plus Line (35).

Line (37)

Cash Flow Modeling for C-3 RBC Requirements for Variable Annuities and Similar Products:

Overview

The amount reported on Line (35) and Line (37) is calculated using the 7-step process defined below. This calculation applies to all policies and contracts that have been valued following the requirements of AG-43 or VM-21. For contracts whose reserve was determined using the Alternative Methodology (VM-21 Section 7) see step 3 while all other contracts follow steps 1 and 2, then all contracts follow steps 4 - 7.

Step 1 CTE98: The first step is to determine CTE98 by applying the one of the two methodologies described in paragraph A below.

Commented [A2]: Reverted to CTE98 (ACLI proposal) throughout.

Step 2 C-3 RBC: using the formulas in paragraph B, determine the C-3 RBC amount based on the amount calculated in step (1). Floor this amount at $0.

Step 3: Determine the C-3 RBC using the Alternative Methodology for any business subject to that requirement as described in paragraph C.

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Step 4: As described in paragraph D below, the C-3 RBC amount is the sum of the amounts determined in steps 2 and 3 above, but not less than zero. The Total Asset Requirement is the Reserve based on the requirements of VM-21 prior to the application of any phase-in, plus the C-3 RBC amount.

Step 5: For a company that has elected a Phase-in for reserves following VM-21 Section 2.B., the C-3 RBC amount is to be phased-in over the same time period following the requirements in paragraph E below.

Step 6: Apply the smoothing rules (if applicable) to the C-3 RBC amount in step (4) or (5) as applicable.

Step 7: Divide the amount from Step 4, 5, or 6 (as appropriate) by (1-enacted maximum federal corporate income tax rate). Split this amount into an interest rate risk portion and a market risk portion, as described in paragraph F.

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The interest rate portion of the risk should be included in Line (35) and the market risk portion in Line (37).

The C-3 RBC is calculated as follows:

A. CTE (98) is calculated as follows: Except for policies and contracts subject to the Alternative Methodology (See C. below), apply the CTE methodology described in NAIC Valuation Manual VM-21 and calculate the CTE (98) as the numerical average of the 2% largest values of the Scenario Reserves, as defined by Section 4 of VM-21. In performing this calculation, the process and methods used to calculate the Scenario Reserves use the requirements of VM-21 and should be the same as used for the reserve calculations. The effect of Federal Income Tax should be handled following one of the following two methods:

1. If using the Macro Tax Adjustment (MTA): The modeled cash flows will ignore the effect of Federal Income Tax. As a result, for each individual scenario, the numerical value of the scenario reserve used in this calculation should be identical to that for the same scenario in the Aggregate Reserve calculation under VM-21. Federal Income Tax is reflected later in the formula in paragraph B.1.

2. If using Specific Tax Recognition (STR): At the option of the company, CTE After-Tax (98) (CTEAT (98)) may be calculated using an approach in which the effect of Federal Income Tax is reflected in the projection of Accumulated Deficiencies, as defined in Section 4.A. of VM-21, when calculating the Scenario Reserve for each scenario. To reflect the effect of Federal Income Tax, the company should find a reasonable and consistent basis for approximating the evolution of tax reserves in the projection, taking into account restrictions around the size of the tax reserves (e.g., that tax reserve must equal or exceed the cash surrender value for a given contract). The Accumulated Deficiency at the end of each projection year should also be discounted at a rate that reflects the projected after-tax discount rates in that year. In addition, the company should add the Tax Adjustment as described below to the calculated CTEAT (98) value.

3. A company that has elected to calculate CTEAT (98) using STR may not switch back to using MTA in the projection of Accumulated Deficiencies without prominently disclosing that change in the certification and supporting memorandum. The company should also disclose the methodology adopted, and the rationale for its adoption, in the documentation required by paragraph J below.

4. Application of the Tax Adjustment: Under the U.S. IRC, the tax reserve is defined. It can never exceed the statutory reserve nor be less than the cash surrender value. If a company is using STR and if the company's actual tax reserves exceed the projected tax reserves at the beginning of the projection, a tax adjustment is required.

   The CTEAT (98) must be increased on an approximate basis to correct for the understatement of modeled tax expense. The additional taxable income at the time of claim will be realized over the projection and will be approximated using the duration to worst, i.e., the duration producing the lowest present value for each scenario. The method of developing the approximate tax adjustment is described below.

   The increase to CTEAT (98) may be approximated as the corporate tax rate times f times the difference between the company's actual tax reserves and projected tax reserves at the start of the projections. For this calculation, f is calculated as follows: For the scenarios reflected in calculating CTE (98), the ~~Scenario Greatest Present Value~~ scenario reserve is determined 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 (98) scenarios and f is one minus this average ratio. If the Alternative Method is used, f is approximated as 0.5.

B. Determination of RBC amount using stochastic modeling:

1. If using the MTA: Calculate the RBC Requirement by the following formula in which the statutory reserve is the actual reserve reported in the Annual Statement. In the second term – i.e., the difference between statutory reserves and tax reserves multiplied by the Federal Income Tax Rate – may not exceed the portion of the company's non- admitted deferred tax assets attributable to the same portfolio of contracts to which VM-21 is applied in calculating statutory reserves:

   25% x ((CTE (98) – SR – Excess Required Reserves – [i] x (Voluntary Reserves)) x (1 – Federal Income Tax Rate) – (Statutory Reserve – Tax Reserve) x Federal Income Tax Rate

2. If the company elects to use the STR: The C-3 RBC is determined by the following formula: 25% x (CTEAT (98) – SR – Excess Required Reserves – [i] x Voluntary Reserves)

For the purposes of this calculation, the SR is the CTE70 (best efforts) + E × max[0, CTE70 (adjusted) – CTE70 (best efforts)], before consideration of the Additional Standard Projection Amount, Asset Adequacy Reserves, Excess Required Reserves, or Voluntary Reserves. Excess Required Reserves mean the excess of the reserves required by the domiciliary commissioner over the NAIC minimum standard defined in AG 43/VM-21 (including the Additional Standard Projection Amount). Voluntary reserve means any reserve that is not required by AG-43, VM-21, VM-30 (e.g., asset adequacy reserves), or Excess Required Reserves. If the determination of asset adequacy reserves depends on inclusion of the reserve in

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cashflow testing, they are not considered voluntary reserves for this purpose.

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C. Determination of C-3 RBC using Alternative Methodology: This calculation applies to all policies and contracts that have been valued following the requirements of AG-43 or VM-21, for which the reserve was determined using the Alternative Methodology (VM-21 Section 7). The C-3 RBC amount is determined by applying the methodology as defined in Appendix 2 to these instructions.

D. The C-3 RBC amount is the sum of the amounts determined in paragraphs B and C above, but not less than zero. The TAR is defined as the Reserve determined according to VM-21 plus the C-3 RBC amount. All values are prior to any consideration of Phase-in allowances for either reserve or C-3 RBC. The RBC values are post-tax.

E. Phase in: A company that has elected to phase-in the effect of the new economic scenario requirements following VM-21 Section 2.C shall phase in the effect on C-3 RBC using the following steps:

- 1. Begin with the C-3 RBC amount from step 7 for Dec. 31, 2025 LR027 Line (37) instructions for all business within the scope of the Variable Annuities modeling requirements as of 12/31/25. Add to this the amount of C-3 RBC computed in the same manner as the 2025 value for any reinsurance ceded that is expected to be recaptured in 2026 and in the scope of the Variable Annuities modeling requirements. This amount is 2025 RBC.
- 2. Determine the C-3 RBC amount as of 12/31/25 using paragraphs A, B, C, and D for the same inforce business as in 1. This amount is 2025 RBC New.
- Determine the phase-in amount (PIA) as the excess of 2025 RBC New over 2025 RBC.
- For 12/31/2026, compute the C-3 RBC following paragraphs A –D above, then subtract PIA times (2/3).
- For 12/31/2027, compute the C-3 RBC following paragraphs A – D above, then subtract PIA times (1/3).

F. The amount determined in paragraphs D or E. above for the contracts shall be divided by (1-enacted maximum federal corporate income tax rate) to arrive at a pre-tax amount. This pre-tax amount shall be split into a component for interest rate risk and a component for market risk. Neither component may be less than zero. The provision for the interest rate risk, if any, is to be reported in Line (35). The market risk component is reported in Line (37).

The amount reported in Line (37) is to be combined with the C-1cs component for covariance purposes.

G. The way grouping (of funds and of contracts), sampling, number of scenarios, and simplification methods are handled is the responsibility of the company. However, all these methods are subject to Actuarial Standards of Practice, supporting documentation and justification, and should be identical to those used in calculating the company's statutory reserves following VM-21.

H. Certification of the work done to set the C-3 RBC amount for Variable Annuities and Similar products are the same as are required for reserves as part of VM-31. The certification should specify that the actuary is not opining on the adequacy of the company's surplus or its future financial condition.

The certification(s) should be submitted by hard copy with any state requiring an RBC hard copy.

I. An actuarial memorandum should be constructed documenting the methodology and assumptions upon which the required capital for the variable annuities and similar products is determined. Since the starting point for the C-3 RBC calculation is the cash flow modeling used for the reserves, the documentation requirements for reserves (VM-31) should be followed for the C-3 RBC. The reserve report may be incorporated by reference, with this C-3 RBC memorandum focused on identifying differences and items unique to the C-3 RBC process, or at the company's option, the documentation of C-3 RBC may be merged into the VA Report with the differences for C-3 RBC discussed in a separate section of the Memorandum as outlined in VM-31.

These differences that would need to be identified either in the RBC Actuarial Memorandum or the VA Report will typically include:

- The basis for considering federal income tax,
- Whether or not smoothing was applied, and the effect of that smoothing,
- Whether or not a phase in was used, and the impact on the reported values,
- If the company elects to calculate CTEAT (98) using STR whereby the effect of Federal Income Tax is reflected in the projection of Accumulated Deficiencies, the company should still disclose in the memorandum the Total Asset Requirement and C-3 RBC that would be obtained if the company had elected to use the MTA

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A company should decide whether or not to smooth the C-3 RBC calculated in paragraph D or E above to determine the amount in Line (37). For any business reinsured under a coinsurance agreement that complies with all applicable reinsurance reserve credit "transfer of risk" requirements, the ceding company shall reduce the reserve in proportion to the business ceded while the assuming company shall use a reserve consistent with the business assumed.¶
¶
A company may choose to smooth the C-3 RBC calculated in paragraph D or E above. A company is required to get approval from its domestic regulator prior to changing its decision about smoothing from the prior year. In addition, a company that has elected to smooth the risk-based capital is required to get approval from its domestic ... [2]

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method.

* Documentation of the alternative methodology calculations, if applicable, and
* Documentation of how the C-3 RBC values were allocated to the interest and market risk components.

This actuarial memorandum will be confidential and available to regulators upon request.

The lines on the alternative calculations page will not be required for 2019 or later.

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For 2026 reporting onward, accompanying sensitivity testing outlined in LR039 will be performed.

LR039 SENSITIVITY TESTS

CTE 95 Sensitivity: The company shall repeat Steps 1-7 from Cash Flow Modeling for C-3 RBC Requirements for Variable Annuities and Similar Products instructions in LR027 as appropriate, calculating the RBC C-3 requirement using a CTE 95 measure in lieu of the CTE 98 measure outlined in the instructions. The calculated value in Step 7 under the CTE 95 measure will be subtracted from the calculated value in Step 7 under the original CTE 98 calculation, which is the sum of Line (35) and Line (37) from LR027. This value shall be reported on LR039, Line (9.1), column (2).

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CTE 90 Sensitivity: The company shall repeat Steps 1-7 from Cash Flow Modeling for C-3 RBC Requirements for Variable Annuities and Similar Products instructions in LR027 as appropriate, calculating the RBC C-3 requirement using a CTE 90 measure in lieu of the CTE 98 measure outlined in the instructions, and the 25% factor in the formula in Determination of RBC amount using stochastic modeling shall be set to 100%. The calculated value in Step 7 under the CTE 90 measure will be subtracted from the calculated value in Step 7 under the original CTE 98 calculation, which is the sum of Line (35) and Line (37) from LR027. This value shall be reported on LR039, Line (9.2), column (2).

The total of all annual statement reserves representing exposure to C–3 risk on Line (36) should equal the following:

Exhibit 5, Column 2, Line 0199999
– Page 2, Column 3, Line 6
+ Exhibit 5, Column 2, Line 0299999
+ Exhibit 5, Column 2, Line 0399999
+ Exhibit 7, Column 1, Line 14
+ Separate Accounts Page 3, Column 3, Line 1 plus Line 2 after deducting (a) funds in unitized separate accounts with no underlying guaranteed minimum return and no unreinsured guaranteed living benefits; (b) non-indexed separate accounts that are not cash flow tested with guarantees less than 4%; (c) non-cash-flow-tested experience rated pension reserves/liabilities; and (d) guaranteed indexed separate accounts using a Class II investment strategy.
– Non policyholder reserves reported on Exhibit 7
+ Exhibit 5, Column 2, Line 0799997
+ Schedule S, Part 1, Section 1, Column 12
– Schedule S, Part 3, Section 1, Column 14

APPENDIX 2 – ALTERNATIVE METHOD FOR GMDB RISKS

{Drafting Note: the following is copied from the American Academy of Actuaries June 2005 Report to the NAIC Capital Adequacy Task Force
This Appendix describes the Alternative Method for GMDB exposure in significant detail; how it is to be applied and how the factors were developed. Factor tables have been developed using the Conditional Tail Expectation ("CTE") risk measure at two confidence levels: 65% and 90%. The latter is determined on an "after tax" basis and is required for the RBC C3 Phase II standard for Total Asset Requirement ("TAR"). The former is a pre-tax calculation and should assist the Variable Annuity Reserve Working Group ("VARWG") in formulating a consistent "alternative method" for statutory reserves.

General

1. It is expected that the Alternative Method ("AltM") will be applied on a policy-by-policy basis (i.e., seriatim). If the company adopts a cell-based approach, only materially similar contracts should be grouped together. Specifically, all policies comprising a "cell" must display substantially similar characteristics for those attributes expected to affect risk-based capital (e.g., definition of guaranteed benefits, attained age, policy duration, years-to-maturity, market-to-guaranteed value, asset mix, etc.).

2. The Alternative Method determines the TAR as the sum of the Cash Surrender Value and the following three (3) provisions, collectively referred to as the *Additional Asset Requirement* ("AAR"):
   - Provision for amortization of the outstanding (unamortized) surrender charges – "Charge Amortization" or "CA";
   - Provision for fixed dollar expenses/costs net of fixed dollar revenue – "Fixed Expenses" or "FE"; and
   - Provision for claims (in excess of account value) under the guaranteed benefits net of available spread-based revenue ("margin offset") – "Guaranteed Cost" or "GC".

   All of these components reflect the impact of income taxes and are explained in more detail later in this Appendix.
   The Risk-Based Capital amount (C-3 RBC) is determined in aggregate for the block of policies as the TAR less the reserve determined based on Section 7 of VM-21.
   Note the following regarding income taxes:
   The company determines the CA and FE amounts by projecting the inforce data and incorporating a 21% tax rate and a post-tax discount rate of 4.54% (= 5.75% x [1-21%]).

   In determining the GC amounts, a "look-up" function is used which provides a GMDB Cost Factor "f" and Base Margin Offset Factor "g". These factors ("f" and "g") represent CTE90 factors on a post-tax basis where a 35% tax rates and 3.74% (= 5.75% x (1-35%)) discount rate has been used. The company needs to multiply these factors by (.79/.65) to adjust the factors for a 21% tax rate basis. It is noted that this adjustment overstates the impact of the lower tax rate as the impact of the higher discount rate has not been reflected.

3. The total AAR (in excess of cash surrender value) is the sum of the AAR calculations for each policy or cell. The result for any given policy (cell) may be negative, zero or positive.

4. For variable annuities without guarantees, the Alternative Method for capital uses the methodology which applied previously to all variable annuities. The charge is 11% of the difference between fund balance and cash surrender value if the current surrender charge is based on fund balance. If the current surrender charge is based on fund contributions, the charge is 2.4% of the difference for those contracts for which the fund balance exceeds the sum of premiums less withdrawals and 11% for those for which that is not the case. In all cases, the result is to be multiplied by 0.79 to adjust for Federal Income Tax. For in-scope contracts, such as many payout annuities with no cash surrender value and no performance guarantees, there is no capital charge.

5. For variable annuities with death benefit guarantees, the AAR for a given policy is equal to: $R \times (CA + FE) + GC$ where:
   CA (Charge Amortization) = Provision for amortization of the outstanding (unamortized) surrender charges
   FE (Fixed Expense) = Provision for fixed dollar expenses/costs net of fixed dollar revenue
   GC (Guaranteed Cost) = Provision for claims (in excess of account value) under the guaranteed benefits net of available spread-based revenue ("margin offset")

The components *CA*, *FE* and *GC* are calculated separately. *CA* and *FE* are defined by deterministic "single-scenario" calculations which account for asset growth, interest, inflation and tax at prescribed rates. Mortality is ignored. However, the actuary determines the appropriate "prudent best estimate" lapses/withdrawal rates for the calculations. The components *CA*, *FE* and *GC* may be positive, zero or negative. $R=h(\circ)$ is a "scaling factor" that depends on certain risk attributes $\tilde{\theta}$ for the policy and the product portfolio.

6. The "Alternative Method" factors and formulas for GMDB risks (component *GC*) have been developed from stochastic testing using the 10,000 "Pre-packaged" scenarios (March 2005). The pre-packaged scenarios have been fully documented under separate cover – see http://www.actuary.org/pdf/life/c3supp_march05.pdf at the American Academy of Actuaries' website.

7. The model assumptions for the AltM Factors (component GC) are documented in the section of this Appendix entitled *Component GC*.

8. The table of *GC* factors that has been developed assumes male mortality at 100% of the MGDB 94 ALB table, and uses a 5-year age setback for female annuitants. Companies using the Alternative Method may use these factors, or may use the procedure described in Methodology Note C3-05 in the report "Recommended Approach for Setting Risk- Based Capital Requirements for Variable Annuities and Similar Products Presented by the American Academy of Actuaries' Life Capital Adequacy Subcommittee to the National Association of Insurance Commissioners' Capital Adequacy (E) Task Force (June 2005)" to adjust for the actuary's Prudent Best Estimate of mortality. If the company does not have a Prudent Best Estimate mortality assumption, the company may use the procedure described in Methodology Note C3-05 to adjust to the 2012 IAM as modified in VM-21 Section 11.C. Once a company uses the modified method for a block of business, the option to use the unadjusted table is no longer available for that part of its business.

9. There are five (5) major steps in using the *GC* factors to determine the "*GC*" component of the AAR for a given policy/cell:

    a) Classifying the asset exposure;
    b) Determining the risk attributes;
    c) Retrieving the appropriate nodes from the factor grid;
    d) Interpolating the nodal factors, where applicable (optional);
    e) Applying the factors to the policy values.

Categorizing the asset value for the given policy or cell involves mapping the entire exposure to one of the eight (8) prescribed "fund classes". Alternative Method factors are provided for each asset class.
The second step requires the company to determine (or derive) the appropriate attributes for the given policy or cell. These attributes are needed to calculate the required values and access the factor tables:

- Product form ("Guarantee Definition"), *P*.
- Adjustment to guaranteed value upon partial withdrawal ("GMDB Adjustment"), *A*.
- Fund class, *F*.
- Attained age of the annuitant, *X*.
- Policy duration since issue, *D*.
- Ratio of account value to guaranteed value, λ.
- Total account charges, *MER*.

Other required policy values include:

- Account value, *AV*.
- Current guaranteed minimum death benefit, *GMDB*.

- Net deposit value (sum of deposits less sum of withdrawals), *NetDeposits*[2].
- Net spread available to fund guaranteed benefits ("margin offset"), α.

The next steps – retrieving the appropriate nodes from the factor grid and interpolation – are explained in the section entitled *Component GC* of this Appendix. Tools are provided to assist the company in these efforts (see Appendix 9), but their use is not mandatory. This documentation is sufficiently detailed to permit the company to write its own lookup and extraction routines. A calculation example to demonstrate the application of the various component factors to sample policy values is shown in the section *Component GC* of this Appendix.

10. The total account charges should include all amounts assessed against policyholder accounts, expressed as a level spread per year (in basis points). This quantity is called the Management Expense Ratio ("MER") and is defined as the average amount (in dollars) charged against policyholder funds in a given year divided by average account value. Normally, the MER would vary by fund class and be the sum of investment management fees, mortality & expense charges, guarantee fees/risk premiums, etc. The spread available to fund the GMDB costs ("margin offset", denoted by α) should be net of spread-based costs and expenses (e.g., net of maintenance expenses, investment management fees, trail commissions, etc.), but may be increased for Revenue Sharing as can be reflected in modeling (i.e., had the Alternative Method not been elected) by adhering to the requirements set forth in section 6 of the *Modeling Methodology*. The section of this Appendix on *Component GC* describes how to determine *MER* and α. 'Time-to-maturity' is uniquely defined in the factor modeling by $T = 95 - X$. (This assumes an assumed maturity age of 95 and a current attained age of X.) Net deposits are used in determining benefit caps under the GMDB Roll-up and Enhanced Death Benefit ("EDB") designs.

11. The GMDB definition for a given policy/cell may not exactly correspond to those provided. In some cases, it may be reasonable to use the factors/formulas for a different product form (e.g., for a "roll-up" GMDB policy near or beyond the maximum reset age or amount, the company should use the "return-of-premium" GMDB factors/formulas, possibly adjusting the guaranteed value to reflect further resets, if any). In other cases, the company might determine the RBC based on two different guarantee definitions and interpolate the results to obtain an appropriate value for the given policy/cell. However, if the policy form (definition of the guaranteed benefit) is sufficiently different from those provided and there is no practical or obvious way to obtain a good result from the prescribed factors/formulas, the company must select one of the following options:
    a) Model the "C3 Phase II RBC" using stochastic projections according to the approved methodology;
    b) Select factors/formulas from the prescribed set such that the values obtained conservatively estimate the required capital; or
    c) Calculate company-specific factors or adjustments to the published factors based on stochastic testing of its actual business. This option is described more fully in the section of this Appendix on *Component GC*.

12. The actuary must decide if existing reinsurance arrangements can be accommodated by a straight-forward adjustment to the factors and formulas (e.g., quota-share reinsurance without caps, floors or sliding scales would normally be reflected by a simple pro-rata adjustment to the "gross" *GC* results). For more complicated forms of reinsurance, the company will need to justify any adjustments or approximations by stochastic modeling. However, this modeling need not be performed on the whole portfolio but can be undertaken on an appropriate set of representative policies. See the section of this Appendix on *Component GC*.

[2] Net deposits are required only for certain policy forms (e.g., when the guaranteed benefit is capped as a multiple of net policy contributions).

Component *CA*

Component *CA* provides for the amortization of the unamortized surrender charges using the actual surrender charge schedule applicable to the policy. Over time, the surrender charge is reduced and a portion of the charges in the policy are needed to fund the resulting increase in surrender value. This component can be interpreted as the "amount needed to amortize the unamortized surrender charge allowance for the *persisting* policies plus an implied borrowing cost". By definition, the amortization for non-persisting lives in each time period is exactly offset by the collected surrender charge revenue (ignoring timing differences and any waiver upon death). The company must project the unamortized balance to the end of the surrender charge period and discount the year-by-year amortization under the following assumptions. All calculations should reflect the impact of income taxes.

- Net asset return (i.e., after fees) as shown in Table 1 below. These rates roughly equate to an annualized 5th percentile return over a 10-year horizon3. The 10-year horizon was selected as a reasonable compromise between the length of a typical surrender charge period and the longer testing period usually needed to capture all the costs on "more expensive" portfolios (i.e., lower available spread, lower AV/GV ratio, older ages, etc.). Note, however, that it may not be necessary to use these returns if surrender charges are a function of deposits/premiums.
- Income tax and discount rates (after-tax) as defined in Table 9 of this Appendix.
- The "Dynamic Lapse Multiplier" calculated at the valuation date (a function of Account Value (AV) –– Guaranteed Value (GV) ratio) is assumed to apply in each future year. This factor adjusts the lapse rate to reflect the antiselection present when the guarantee is in-the-money. Lapse rates may be lower when the guarantees have more value.
- Surrender charges and free partial withdrawal provisions should be reflected as per the contract specifications.
- "Prudent best estimate" lapse and withdrawal rates. Rates may vary according to the attributes of the business being valued, including, but not limited to, attained age, policy duration, etc.
- For simplicity, mortality may be ignored in the calculations.

Unlike the GC component, which requires the actuary to map the entire contract exposure to a single "equivalent" asset class, the *CA* calculation separately projects each fund (as mapped to the 8 prescribed categories) using the net asset returns in Table 2-1.

Table 2-1: Net Asset Returns for "CA" Component

Asset Class/Fund	Net Annualized Return
Fixed Account	Guaranteed Rate
Money Market and Fixed Income	0%
Balanced	–1%
Diversified Equity	–2%
Diversified International Equity	–3%
Intermediate Risk Equity	–5%
Aggressive or Exotic Equity	–8%

[3] A 5th percentile return is consistent with the CTE90 risk measure adopted in the C3 Phase II RBC methodology.

Component *FE*

Component *FE* establishes a provision for fixed dollar costs (i.e., allocated costs, including overhead *and* those expenses defined on a "per policy" basis) less any fixed dollar revenue (e.g., annual administrative charges or policy fees). The company must project fixed expenses net of any "fixed revenue" to the earlier of contract maturity or 30 years and discount the year-by-year amounts under the following assumptions. All calculations should reflect the impact of income taxes.

- Income tax and discount rates (after-tax) as defined in Table 9 of this Appendix.
- The "Dynamic Lapse Multiplier" calculated at the valuation date (a function of MV-–GV ratio) is assumed to apply in each future year. This factor adjusts the lapse rate to reflect the antiselection present when the guarantee is in-the-money. Lapse rates may be lower when the guarantees have more value.
- Per policy expenses are assumed to grow with inflation starting in the second projection year. The ultimate inflation rate of 3% per annum is reached in the 8th year after the valuation date. The company must grade linearly from the current inflation rate ("CIR") to the ultimate rate. The CIR is the higher of 3% and the inflation rate assumed for expenses in the company's most recent asset adequacy analysis for similar business.
- "Prudent best estimate" for policy termination (i.e., total surrender). Rates may vary according to the attributes of the business being valued, including, but not limited to, attained age, policy duration, etc. Partial withdrawals should be ignored as they do not affect survivorship.
- For simplicity, mortality may be ignored in the calculations.

Component *GC*

The general format for *GC* may be written as: $GC = GV \times f(\tilde{\theta}) - AV \times \hat{g}(\tilde{\theta}) \times h(\hat{\theta})$ where *GV* = current guaranteed minimum death benefit, *AV* = current account value and $= \frac{\alpha}{\hat{\alpha}} \times g(\tilde{\theta})$. The functions $f(\circ)$, $g(\circ)$, and $h(\circ)$ depend on the risk attributes of the policy $\tilde{\theta}$ and product portfolio $\hat{\theta}$. $h(\circ) = R$ was introduced in the "General" section as a "scaling factor". α is the company-determined net spread ("margin offset") available to fund the guaranteed benefits and $\hat{\alpha} = 100$ basis points is the margin offset assumed in the development of the "Base" tabular factors. The functions $f(\circ)$ $g(\circ)$ and $h(\circ)$ are more fully described later in this section.

Rearranging terms for *GC*, we have $GC = f(\tilde{\theta}) \times [GV - AV \times z(\tilde{\theta})]$. Admittedly, $z(\tilde{\theta})$ is a complicated function that depends on the risk attribute sets $\tilde{\theta}$ and $\hat{\theta}$, but conceptually we can view $AV \times z(\tilde{\theta})$ as a shock to the current account value (in anticipation of the adverse investment return scenarios that typically comprise the CTE(90) risk measure for the AAR) so that the term in the square brackets is a "modified net amount at risk". Accordingly, $f(\tilde{\theta})$ can be loosely interpreted as a factor that adjusts for interest (i.e., discounting) and mortality (i.e., the probability of the annuitant dying).

In practice, $f(\circ)$, $g(\circ)$, and $h(\circ)$ are not functions in the typical sense, but values interpolated from the factor grid. The factor grid is a large pre-computed table developed from stochastic modeling for a wide array of combinations of the risk attribute set. The risk attribute set is defined by those policy and/or product portfolio characteristics that affect the risk profile (exposure) of the business: attained age, policy duration, AV/GV ratio, fund class, etc.

Fund Categorization

The following criteria should be used to select the appropriate factors, parameters and formulas for the exposure represented by a specified guaranteed benefit. When available, the volatility of the long-term annualized total return for the fund(s) – or an appropriate benchmark – should conform to the limits presented. This calculation should be made over a reasonably long period, such as 25 to 30 years.

Where data for the fund or benchmark are too sparse or unreliable, the fund exposure should be moved to the next higher volatility class than otherwise indicated. In reviewing the asset classifications, care should be taken to reflect any additional volatility of returns added by the presence of currency risk, liquidity (bid-ask) effects, short selling and speculative positions.

All exposures/funds must be categorized into one of the following eight (8) asset classes:

1. Fixed Account
2. Money Market
3. Fixed Income
4. Balanced
5. Diversified Equity
6. Diversified International Equity
7. Intermediate Risk Equity
8. Aggressive or Exotic Equity

Fixed Account. The fund is credited interest at guaranteed rates for a specified term or according to a 'portfolio rate' or 'benchmark' index. The funds offer a minimum positive guaranteed rate that is periodically adjusted according to company policy and market conditions.

Money Market/Short-Term. The fund is invested in money market instruments with an average remaining term-to-maturity of less than 365 days.

Fixed Income. The fund is invested primarily in investment grade fixed income securities. Up to 25% of the fund within this class may be invested in diversified equities or high- yield bonds. The expected volatility of the fund returns will be lower than the Balanced fund class.

Balanced. This class is a combination of fixed income securities with a larger equity component. The fixed income component should exceed 25% of the portfolio and may include high yield bonds as long as the total long-term volatility of the fund does not exceed the limits noted below. Additionally, any aggressive or 'specialized' equity component should not exceed one-third (33.3%) of the total equities held. Should the fund violate either of these constraints, it should be categorized as an equity fund. These funds usually have a long- term volatility in the range of 8% – 13%.

Diversified Equity. The fund is invested in a broad-based mix of U.S. and foreign equities. The foreign equity component (maximum 25% of total holdings) must be comprised of liquid securities in well-developed markets. Funds in this category would exhibit long-term volatility comparable to that of the S&P500. These funds should usually have a long-term volatility in the range of 13% – 18%.

Diversified International Equity. The fund is similar to the Diversified Equity class, except that the majority of fund holdings are in foreign securities. These funds should usually have a long-term volatility in the range of 14% – 19%.

Intermediate Risk Equity. The fund has a mix of characteristics from both the Diversified and Aggressive Equity Classes. These funds have a long-term volatility in the range of 19% – 25%.

Aggressive or Exotic Equity. This class comprises more volatile funds where risk can arise from: (a) underdeveloped markets, (b) uncertain markets, (c) high volatility of returns, (d) narrow focus (e.g., specific market sector), etc. The fund (or market benchmark) either does not have sufficient history to allow for the calculation of a long-term expected volatility, or the volatility is very high. This class would be used whenever the long-term expected annualized volatility is indeterminable or exceeds 25%.

THE SELECTION OF AN APPROPRIATE INVESTMENT TYPE SHOULD BE DONE AT THE LEVEL FOR WHICH THE GUARANTEE APPLIES. FOR GUARANTEES APPLYING ON A DEPOSIT-BY-DEPOSIT BASIS, THE FUND SELECTION IS STRAIGHTFORWARD. HOWEVER, WHERE THE GUARANTEE APPLIES ACROSS DEPOSITS OR FOR AN ENTIRE CONTRACT, THE APPROACH CAN BE MORE COMPLICATED. IN SUCH INSTANCES, THE APPROACH IS TO IDENTIFY FOR EACH POLICY WHERE THE "GROUPED FUND HOLDINGS" FIT WITHIN THE CATEGORIES LISTED AND TO CLASSIFY THE ASSOCIATED ASSETS ON THIS BASIS.

A seriatim process is used to identify the "grouped fund holdings", to assess the risk profile of the current fund holdings (possibly calculating the expected long-term volatility of the funds held with reference to the indicated market proxies), and to classify the entire "asset exposure" into one of the specified choices. Here, "asset exposure" refers to the underlying assets (separate and/or general account investment options) on which the guarantee will be determined. For example, if the guarantee applies separately for each deposit year within the contract, then the classification process would be applied separately for the exposure of each deposit year.

In summary, mapping the benefit exposure (i.e., the asset exposure that applies to the calculation of the guaranteed minimum death benefits) to one of the prescribed asset classes is a multi-step process:

1. Map each separate and/or general account investment option to one of the prescribed asset classes. For some funds, this mapping will be obvious, but for others it will involve a review of the fund's investment policy, performance benchmarks, composition and expected long-term volatility.
2. Combine the mapped exposure to determine the expected long-term "volatility of current fund holdings". This will require a calculation based on the expected long-term volatilities for each fund and the correlations between the prescribed asset classes as given in Table 2-2.
3. Evaluate the asset composition and expected volatility (as calculated in step 2) of current holdings to determine the single asset class that best represents the exposure, with due consideration to the constraints and guidelines presented earlier in this section.

In step 1., the company should use the fund's actual experience (i.e., historical performance, inclusive of reinvestment) only as a guide in determining the expected long-term volatility. Due to limited data and changes in investment objectives, style and/or management (e.g., fund mergers, revised investment policy, different fund managers, etc.), the company may need to give more weight to the expected long-term volatility of the fund's benchmarks. In general, the company should exercise caution and not be overly optimistic in assuming that future returns will consistently be less volatile than the underlying markets.

In step 2., the company should calculate the "volatility of current fund holdings" (σ for the exposure being categorized) by the following formula using the volatilities and correlations in Table 2.

$$\sigma = \sqrt{\sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \rho_{ij} \sigma_i \sigma_j}$$

where $w_i = \frac{AV_i}{\sum_k AV_k}$ is the relative value of fund *i* expressed as a proportion of total contract value, ρ_{ij} is the correlation between asset classes *i* and *j* and σ_i is the volatility of asset class *i* (see Table 2). An example is provided at the end of this section.

Table 2-2: Volatilities and Correlations for Prescribed Asset Classes

ANNUAL VOLATILITY		FIXED ACCOUNT	MONEY MARKET	FIXED INCOME	BALANCED	DIVERSE EQUITY	INTL EQUITY	INTERM EQUITY	AGGR EQUITY
1.0%	FIXED ACCOUNT	**1**	0.50	0.15	0	0	0	0	0
1.5%	MONEY MARKET	0.50	**1**	0.20	0	0	0	0	0
5.0%	FIXED INCOME	0.15	0.20	**1**	0.30	0.10	0.10	0.10	0.05
10.0%	BALANCED	0	0	0.30	**1**	0.95	0.60	0.75	0.60
15.5%	DIVERSE EQUITY	0	0	0.10	0.95	**1**	0.60	0.80	0.70
17.5%	INTL EQUITY	0	0	0.10	0.60	0.60	**1**	0.50	0.60
21.5%	INTERM EQUITY	0	0	0.10	0.75	0.80	0.50	**1**	0.70
26.0%	AGGR EQUITY	0	0	0.05	0.60	0.70	0.60	0.70	**1**

As an example, suppose three funds (Fixed Income, diversified U.S. Equity and Aggressive Equity) are offered to clients on a product with a contract level guarantee (i.e., across all funds held within the policy). The current fund holdings (in dollars) for five sample contracts are shown in Table 2-3.

TABLE 2-3: FUND CATEGORIZATION EXAMPLE

	1	2	3	4	5
MV Fund X (Fixed Income):	5,000	4,000	8,000	-	5,000
MV Fund Y (Diversified Equity):	9,000	7,000	2,000	5,000	-
MV Fund Z (Aggressive Equity):	1,000	4,000	-	5,000	5,000
Total Market Value:	15,000	15,000	10,000	10,000	10,000
Total Equity Market Value:	10,000	11,000	2,000	10,000	5,000
Fixed Income % (*A*):	33%	27%	80%	0%	50%
Fixed Income Test (*A*>75%):	No	No	Yes	No	No
Aggressive % of Equity (B):	10%	36%	n/a	50%	100%
Balanced Test (*A*>25% & *B*<33.3%):	Yes	No	n/a	No	No
Volatility of Current Fund Holdings:	10.9%	13.2%	5.3%	19.2%	13.4%
Fund Classification:	**Balanced**	**Diversified***	**Fixed Income**	**Intermediate**	**Diversified**

* Although the volatility suggests "Balanced Fund", the Balanced Fund criteria were not met. Therefore, this 'exposure' is moved "up" to Diversified Equity. For those funds classified as Diversified Equity, additional analysis would be required to assess whether they should be instead designated as "Diversified International Equity".

As an example, the "Volatility of Current Fund Holdings" for policy #1 is calculated as $\sqrt{A+B}$ where:

$$A = \left(\frac{5}{15}\times 0.05\right)^2 + \left(\frac{9}{15}\times 0.155\right)^2 + \left(\frac{1}{15}\times 0.26\right)^2$$

$$B = 2\cdot\left(\frac{5}{15}\cdot\frac{9}{15}\right)(0.1\times 0.05\times 0.155) + 2\cdot\left(\frac{5}{15}\cdot\frac{1}{15}\right)(0.05\times 0.05\times 0.26) + 2\cdot\left(\frac{9}{15}\cdot\frac{1}{15}\right)(0.7\times 0.155\times 0.26)$$

So, the volatility for contract #1 = $\sqrt{0.0092+0.0026}$ = 0.109 or 10.9%.

Derivation of Total Equivalent Account Charges (MER) and Margin Offset (α)

The total equivalent account charge ("MER") is meant to capture *all* amounts that are deducted from policyholder funds, not only those that are commonly expressed as spread-based fees. The MER, expressed as an equivalent annual basis point charge against account value, should include (but not be limited to) the following: investment management fees, mortality & expense charges, administrative loads, policy fees and risk premiums. In light of the foregoing, it may be necessary to estimate the "equivalent MER" if there are fees withdrawn from policyholder accounts that are not expressed as basis point charges against account value.

The margin offset, α, represents the total amount available to fund the guaranteed benefit claims and amortization of the unamortized surrender charge allowance after considering most other policy expenses (including overhead). The margin offset, expressed as an equivalent annual basis point charge against account value, may include the effect of Revenue Sharing in the same manner as would be done for modeling as described in section 6 of the Modeling Methodology, except as may be thereby permitted, should be deemed "permanently available" in all future scenarios. However, the margin offset should not include per policy charges (e.g., annual policy fees) since these are included in *FE*. It is often helpful to interpret the margin offset as $\alpha = MER - X + RS$, where *X* is the sum of:

- Investment management expenses and advisory fees;
- Commissions, bonuses (dividends) and overrides;
- Maintenance expenses, other than those included in *FE*; and
- Unamortized acquisition costs not reflected in *CA*.

And *RS* is the Revenue Sharing to the extent permitted as described above.

Product Attributes and Factor Tables

The tabular approach for the *GC* component creates a multi-dimensional grid (array) by testing a very large number of combinations for the policy attributes. The results are expressed as factors. Given the seven (7) attributes for a policy (i.e., *P*, *A*, *F*, *X*, *D*, *AV*, *MER*), two factors are returned for $f(\circ)$ and $g(\circ)$. The factors are determined by looking up (based on a "key") into the large, pre-computed multi-dimensional tables and using multi-dimensional linear interpolation.

The policy attributes for constructing the test cases and the lookup keys are given in Table 2-4.

As can be seen, there are 6 ξ 2 ξ 8 ξ 8 ξ 5 ξ 7 ξ 3 = 80,640 "nodes" in the factor grid. Interpolation is only permitted across the last four (4) dimensions: Attained Age (*X*), Policy Duration (*D*), AV—GV Ratio (*AV*) and MER. The "MER Delta" is calculated based on the difference between the actual MER and that assumed in the factor testing (see Table 10), subject to a cap (floor) of 100 bps (−100 bps).

Functions are available to assist the company in applying the Alternative Method for GMDB risks. These functions perform the factor table lookups and associated multi-dimensional linear interpolations. Their use is not mandatory. Based on the information in this document, the company should be able to write its own lookup and retrieval routines. Interpolation in the factor tables is described further later in this section.

Table 2-4: Nodes of the Factor Grid

Policy Attribute	Key: Possible Values & Description	
Product Definition, *P*.	0 : 0	Return-of-premium.
	1 : 1	Roll-up (3% per annum).
	2 : 2	Roll-up (5% per annum).
	3 : 3	Maximum Anniversary Value (MAV).
	4 : 4	High of MAV and 5% Roll-up.
	5 : 5	Enhanced Death Benefit (excl. GMDB)
GV Adjustment Upon Partial Withdrawal, *A*.	0 : 0	Pro-rata by market value.
	1 : 1	Dollar-for-dollar.
Fund Class, *F*.	0 : 0	Fixed Account.
	1 : 1	Money Market.
	2 : 2	Fixed Income (Bond).
	3 : 3	Balanced Asset Allocation.
	4 : 4	Diversified Equity.
	5 : 5	International Equity.
	6 : 6	Intermediate Risk Equity.
	7 : 7	Aggressive / Exotic Equity.
Attained Age (Last Birthday), *X*.	0 : 35	4 : 65
	1 : 45	5 : 70
	2 : 55	6 : 75
	3 : 60	7 : 80
Policy Duration (years-since-issue), *D*.	0 : 0.5	
	1 : 3.5	
	2 : 6.5	
	3 : 9.5	
	4 : 12.5	
Account Value-to-Guaranteed Value Ratio, λ.	0 : 0.25	4 : 1.25
	1 : 0.50	5 : 1.50
	2 : 0.75	6 : 2.00
	3 : 1.00	
Annualized Account Charge Differential from Table 2-10 Assumptions ("MER Delta")	0 : −100 bps	
	1 : +0	
	2 : +100	

A test case (i.e., a node on the multi-dimensional matrix of factors) can be uniquely identified by its key, which is the concatenation of the individual 'policy attribute' keys, prefixed by a leading '1'. For example, the key '12034121' indicates the factor for a 5% roll-up GMDB, where the GV is adjusted pro-rata upon partial withdrawal, balanced asset allocation, attained age 65, policy duration 3.5, 75% AV/GV ratio and "equivalent" annualized fund based charges equal to the 'base' assumption (i.e., 250 bps p.a.).

The factors are contained in the file "C3-II GMDB Factors 100%Mort CTE(90) (2005-03-29).csv", a comma-separated value text file. Each "row" represents the factors/parameters for a test policy as identified by the lookup keys shown in Table 2-4. Rows are terminated by new line and line feed characters.

Each row consists of 5 entries, described further below.

1	2	3	4	5
Test Case Identifier (Key)	Base GMDB Cost Factor	Base Margin Offset Factor	Scaling Adjustment (Intercept)	Scaling Adjustment (Slope)

GMDB Cost Factor. This is the term $f(\tilde{\theta})$ in the formula for *GC*. The parameter set $\tilde{\theta}$ is defined by $(P, A, F, X, D, \varphi, MER)$. Here, φ is the AV/GV ratio for the benefit exposure (e.g., policy) under consideration. The values in the factor grid represent CTE(90) of the sample distribution[4] for the present value of guaranteed benefit cash flows (in excess of account value) in all future years (i.e., to the earlier of contract maturity and 30 years), normalized by guaranteed value.

Base Margin Offset Factor. This is the term $g(\tilde{\theta})$ in the formula for *GC*. The parameter set $\tilde{\theta}$ is defined by $(P, A, F, X, D, \varphi, MER)$. Here, φ is the AV/GV ratio for the benefit exposure (e.g., policy) under consideration. The values in the factor grid represent CTE(90) of the sample distribution for the present value of margin offset cash flows in all future years (i.e., to the earlier of contract maturity and 30 years), normalized by account value. Note that the Base Margin Offset Factors assume $\hat{\alpha} = 100$ basis points of "margin offset" (net spread available to fund the guaranteed benefits).

All else being equal, the margin offset α has a profound effect on the resulting AAR. In comparing the Alternative Method against models for a variety of GMDB portfolios, it became clear that some adjustment factor would be required to "scale" the results to account for the diversification effects[5] of attained age, policy duration and AV/GV ratio. The testing examined $W_1 = \frac{\alpha}{MER} = 0.20$ and $W_2 = \frac{\alpha}{MER} = 0.60$, where α = available margin offset and *MER* = total "equivalent" account based charges, in order to understand the interaction between the margin ratio ("*W*") and AAR.

Based on this analysis, the *Scaling Factor* is defined as:

$$h(\hat{\theta}) = R = \beta_0 + \beta_1 \times W$$

β_0 and β_1 are respectively the intercept and slope for the linear relationship, defined by the parameter set $\hat{\theta} = (P, F, \hat{\varphi})$. Here, $\hat{\varphi}$ is 90% of the aggregate AV/GV for the *product form* (i.e., not for the individual policy or cell) under consideration. In calculating the *Scaling Factor* directly from this linear function, the margin ratio "*W*" must be constrained[6] to the range $[0.2, 0.6]$.

It is important to remember that $\hat{\varphi} = 0.90 \times \frac{\sum AV}{\sum GV}$ for the product form being evaluated (e.g., all 5% Roll-up policies). The 90% factor is meant to reflect the fact that the cost (payoff structure) for a basket of otherwise identical put options (e.g., GMDB) with varying degrees of in-the-moneyness (i.e., AV/GV ratios) is more left-skewed than the cost for a

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4 Technically, the sample distribution for "present value of net cost" = PV[GMDB claims] – PV[Margin Offset] was used to determine the scenario results that comprise the CTE90 risk measure. Hence, the "GMDB Cost Factors" and "Base Margin Offset Factors" are calculated from the same scenarios.

5 By design, the Alternative Methodology does not directly capture the diversification benefits due to a varied asset profile and product mix. This is not a flaw of the methodology, but a consequence of the structure. Specific assumptions would be required to capture such diversification effects. Unfortunately, such assumptions might not be applicable to a given company and could grossly over-estimate the ensuing reduction in required capital.

6 The scaling factors were developed by testing "margin ratios" $W_1 = 0.2$ and $W_2 = 0.6$. Using values outside this range could give anomalous results.

single put option at the "weighted average" asset-to-strike ratio.

To appreciate the foregoing comment, consider a basket of two 10-year European put options as shown in Table 2-5. These options are otherwise identical except for their "market-to-strike price" ratios. The option values are calculated assuming a 5% continuous risk-free rate and 16% annualized volatility. The combined option value of the portfolio is $9.00, equivalent to a single put option with S = $180.92 and X = $200. The market-to-strike (i.e., AV/GV) ratio is 0.905, which is less than the average $AV/GV = 1 = \frac{\$75+\$125}{\$100+\$100}$.

Table 2-5: Equivalent Single European Put Option

	Equivalent Single Put Option	Put Option A ("in-the-money")	Put Option B ("out-of-the-money")
Market value (*AV*)	$180.92	$75	$125
Strike price (*GV*)	$200.00	$100	$100
Option Value	$9.00	$7.52	$1.48

Scaling Adjustment (Intercept). The scaling factor $h(\hat{\theta}) = R$ is a linear function of W, the ratio of margin offset to MER. This is the intercept β_0 that defines the line.

Scaling Adjustment (Slope). The scaling factor $h(\hat{\theta}) = R$ is a linear function of W, the ratio of margin offset to MER. This is the slope β_1 that defines the line.

Table 2-6 shows the "Base Cost" and "Base Margin Offset" values from the factor grid for some sample policies. As mentioned earlier, the Base Margin Offset factors assume 100 basis points of "available spread". The "Margin Factors" are therefore scaled by the ratio $\frac{\alpha}{100}$, where α = the actual margin offset (in basis points per annum) for the policy being valued. Hence, the margin factor for the 7th sample policy is exactly half the factor for node 12044121 (the 4th sample policy in Table 6). That is, 0.02160 = 0.5 × 0.04319.

Table 2-6: Sample Nodes on the Factor Grid

KEY	GMDB TYPE	GV ADJUST	FUND CLASS	AGE	POLICY DUR	AV/GV	MER (bps)	OFFSET	COST FACTOR	MARGIN FACTOR
10132031	ROP	$-for-$	Balanced Allocation	55	0.5	1.00	250	100	0.01073	0.04172
10133031	ROP	$-for-$	Balanced Allocation	60	0.5	1.00	250	100	0.01619	0.03940
10134031	ROP	$-for-$	Balanced Allocation	65	0.5	1.00	250	100	0.02286	0.03634
12044121	5% Rollup	Pro-rata	Diverse Equity	65	3.5	0.75	250	100	0.18484	0.04319
12044131	5% Rollup	Pro-rata	Diverse Equity	65	3.5	1.00	250	100	0.12931	0.03944
12044141	5% Rollup	Pro-rata	Diverse Equity	65	3.5	1.25	250	100	0.08757	0.03707
12044121	5% Rollup	Pro-rata	Diverse Equity	65	3.5	0.75	250	50	0.18484	0.02160

Interpolation in the Factor Tables

Interpolation is only permitted across the last four (4) dimensions of the risk parameter set $\hat{\theta}$: Attained Age (X), Policy Duration (D), AV––GV Ratio ( ) and MER. The "MER Delta" is calculated based on the difference between the actual MER and that assumed in the factor testing (see Table 2-10), subject to a cap (floor) of 100 bps (–100 bps). In general, the calculation for a single policy will require *three* applications of multi-dimensional linear interpolation between the $16 = 2^4$ factors/values in the grid:

(1) To obtain the *Base Factors* $f(\hat{\theta})$ and $g(\hat{\theta})$.

(2) To obtain the *Scaling Factor* $h(\hat{\theta}) = R$.

Based on the input parameters, the supplied functions (see Appendix 9) will automatically perform the required lookups, interpolations and calculations for $h(\hat{\theta}) = R$, including the constraints imposed on the margin ratio W. Use of the tools noted in Appendix 9 is not mandatory.

Multi-dimensional interpolation is an iterative extension of the familiar two-dimensional linear interpolation for a discrete function $V(x)$:

$$\tilde{V}(x_k + \delta) = (1 - \xi) \times V(x_k) + \xi \times V(x_{k+1})$$

and

$$\xi = \frac{\delta}{x_{k+1} - x_x}$$

In the above formulation, $\tilde{V}(x)$ is assumed continuous and x_k and x_{k+1} are defined values ("nodes") for $V(x)$. By definition, $x_k \leq (x_k + \delta) \leq x_{k+1}$ so that $0 \leq \xi \leq 1$. In effect, multi-dimensional interpolation repeatedly applies simple linear interpolation one dimension at a time until a single value is obtained.

Multi-dimensional interpolation across all four dimensions is not required. However, simple linear interpolation for *AV*--*GV* Ratio (λ) is mandatory. In this case, the company must choose nodes for the other three (3) dimensions according to the following rules:

Risk Attribute (Dimension)	**Node Determination**
Attained Age	Use next higher attained age.
Policy Duration	Use nearest.
MER Delta	Use nearest (capped at +100 & floored at –100 bps.

For example, if the actual policy/cell is attained age 62, policy duration 4.25 and MER Delta = +55 bps, the company should use the nodes defined by attained age 65, policy duration 3.5 and MER Delta = +100.

Table 2-7 provides an example of the fully interpolated results for a 5% Roll-up "Pro Rata" policy mapped to the Diversified Equity class (first row). While Table 2-7 does not demonstrate how to perform the multi-dimensional interpolation, it does show the required 16 nodes from the *Base Factors*. The margin offset is assumed to be 100 basis points.

Table 2-7: Base Factors for a 5% Rollup GMDB Policy, Diversified Equity

Key	Age	Policy Dur	Policy Av/Gv	Mer (Bps)	Base Cost Factor	Base Margin Factor
INTERPOLATED	62	4.25	0.80	265	0.15010	0.04491
12043121	60	3.5	0.75	250	0.14634	0.04815
12043122	60	3.5	0.75	350	0.15914	0.04511
12043131	60	3.5	1.00	250	0.10263	0.04365
12043132	60	3.5	1.00	350	0.11859	0.04139
12043221	60	6.5	0.75	250	0.12946	0.04807
12043222	60	6.5	0.75	350	0.14206	0.04511
12043231	60	6.5	1.00	250	0.08825	0.04349
12043232	60	6.5	1.00	350	0.10331	0.04129
12044121	65	3.5	0.75	250	0.18484	0.04319
12044122	65	3.5	0.75	350	0.19940	0.04074
12044131	65	3.5	1.00	250	0.12931	0.03944
12044132	65	3.5	1.00	350	0.14747	0.03757
12044221	65	6.5	0.75	250	0.16829	0.04313
12044222	65	6.5	0.75	350	0.18263	0.04072
12044231	65	6.5	1.00	250	0.11509	0.03934
12044232	65	6.5	1.00	350	0.13245	0.03751

The interpolations required to compute the *Scaling Factor* are slightly different from those needed for the *Base Factors*. Specifically, the user should *not* interpolate the intercept and slope terms for each surrounding node, but rather interpolate the *Scaling Factors* applicable to each of the nodes.

Table 2-8 provides an example of the *Scaling Factor* for the sample policy given earlier in Table 2-7 (i.e., a 5% Roll-up "Pro Rata" policy mapped to the Diversified Equity class) as well as the nodes used in the interpolation. The aggregate AV/GV for the product portfolio (i.e., all 5% Roll-up policies combined) is 0.75; hence, 90% of this value is 0.675 as shown under "Adjusted Product AV/GV". As before, the margin offset is 100 basis points per annum.

Table 2-8: Interpolated Scaling Factors for a 5% Rollup GMDB Policy, Diversified Equity

Key	Age	Policy Dur	Adjusted Product Av/Gv	Mer (Bps)	Intercept	Slope	Scaling Factor
INTERPOLATED	62	4.25	0.675	265	n/a	n/a	0.871996
12043111	60	3.5	0.50	250	0.855724	0.092887	0.892879
12043112	60	3.5	0.50	350	0.855724	0.092887	0.882263
12043121	60	3.5	0.75	250	0.834207	0.078812	0.865732
12043122	60	3.5	0.75	350	0.834207	0.078812	0.856725
12043211	60	6.5	0.50	250	0.855724	0.092887	0.892879
12043212	60	6.5	0.50	350	0.855724	0.092887	0.882263
12043221	60	6.5	0.75	250	0.834207	0.078812	0.865732
12043222	60	6.5	0.75	350	0.834207	0.078812	0.856725
12044111	65	3.5	0.50	250	0.855724	0.092887	0.892879
12044112	65	3.5	0.50	350	0.855724	0.092887	0.882263
12044121	65	3.5	0.75	250	0.834207	0.078812	0.865732
12044122	65	3.5	0.75	350	0.834207	0.078812	0.856725
12044211	65	6.5	0.50	250	0.855724	0.092887	0.892879
12044212	65	6.5	0.50	350	0.855724	0.092887	0.882263
12044221	65	6.5	0.75	250	0.834207	0.078812	0.865732
12044222	65	6.5	0.75	350	0.834207	0.078812	0.856725

Adjustments to GC for Product Variations & Risk Mitigation/Transfer

In some cases, it may be necessary for the company to make adjustments to the published factors due to:

1. A variation in product form wherein the definition of the guaranteed benefit is materially different from those for which factors are available (see Table 2-9); and/or
2. A risk mitigation / management strategy that cannot be accommodated through a straight-forward and direct adjustment to the published values.

Any adjustments to the published factors must be fully documented and supported through stochastic modeling. Such modeling may require stochastic simulations but would not ordinarily be based on full inforce projections. Instead, a representative "model office" should be sufficient. In the absence of material changes to the product design, risk management program and Alternative Method (including the published factors), the company would not be expected to redo this modeling each year.

Note that minor variations in product design do not necessarily require additional effort. In some cases, it may be reasonable to use the factors/formulas for a different product form (e.g., for a "roll-up" GMDB policy near or beyond the maximum reset age or amount, the company should use the "return-of-premium" GMDB factors/formulas, possibly adjusting the guaranteed value to reflect further resets, if any). In other cases, the company might determine the RBC based on two different guarantee definitions and interpolate the results to obtain an appropriate value for the given policy/cell. Likewise, it may be possible to adjust the Alternative Method results for certain risk transfer arrangements without significant additional work (e.g., quota-share reinsurance without caps, floors or sliding scales would normally be reflected by a simple pro-rata adjustment to the "gross" *GC* results).

However, if the policy design is sufficiently different from those provided and/or the risk mitigation strategy is non-linear in its impact on the AAR, and there is no practical or obvious way to obtain a good result from the prescribed factors/formulas, the company must justify any adjustments or approximations by stochastic modeling. Notably this modeling need not be performed on the whole portfolio but can be undertaken on an appropriate set of representative policies.

The remainder of this section suggests a process for adjusting the published "Cost" and "Margin Offset" factors due to a variation in product design (e.g., a "step-up" option at every 7th anniversary whereby the guaranteed value is reset to the account value, if higher). Note that the "Scaling Factors" (as determined by the slope and intercept terms in the factor table) would not be adjusted.

The steps for adjusting the published *Cost* and *Margin Offset* factors for product design variations are:

1. Select a policy design in the published tables that is similar to the product being valued. Execute cashflow projections using the documented assumptions (see Tables 2-9 and 2-10) and the scenarios from the prescribed generators for a set of representative cells (combinations of attained age, policy duration, asset class, AV/GV ratio and MER). These cells should correspond to nodes in the factor grid. Rank (order) the sample distribution of results for the present value of net cost[7]. Determine those scenarios which comprise CTE(90).

2. Using the results from step 1., average the present value of cost for the CTE(90) scenarios and divide by the current guaranteed value. For a the J^{th} cell, denote this value by F_J. Similarly, average the present value of margin offset revenue for the same subset of scenarios and divide by account value. For the J^{th} cell, denote this value by G_J.

[7] Present value of net cost = PV[guaranteed benefit claims in excess of account value] – PV[margin offset]. The discounting includes cashflows in all future years (i.e., to the earlier of contract maturity and the end of the horizon).

3. Extract the corresponding factors from the published grid. For each cell, calibrate to the published tables by defining a "model adjustment factor" (denoted by asterisk) separately for the "cost" and "margin offset" components:

$$F_J^* = \frac{f(\tilde{\theta})}{F_J} \text{ and } G_J^* = \frac{\hat{g}(\tilde{\theta})}{G_J}$$

4. Execute "product specific" cashflow projections using the documented assumptions and scenarios from the prescribed generators for the same set of representative cells. Here, the company should model the actual product design. Rank (order) the sample distribution of results for the present value of net cost. Determine those scenarios which comprise CTE(90).

5. Using the results from step 4., average the present value of cost for the CTE(90) scenarios and divide by the current guaranteed value. For a the J^{th} cell, denote this value by $\bar{F}_J$. Similarly, average the present value of margin offset revenue for the same subset of scenarios and divide by account value. For a the J^{th} cell, denote this value by $\bar{G}_J$.

6. To calculate the AAR for the specific product in question, the company should implement the Alternative Method as documented, but use $\bar{F}_J \times F_J^*$ in place of $f(\tilde{\theta})$ and $\bar{G}_J \times G_J^*$ instead of $\hat{g}(\tilde{\theta})$. The company must use the "Scaling Factors" for the product evaluated in step 1. (i.e., the product used to calibrate the company's cashflow model).

Assumptions for the Alternative Method Published GMDB Factors

This subsection reviews the model assumptions used to develop the Alternative Method factors. Each node in the factor grid is effectively the modeled result for a given "cell".

Table 2-9: Model Assumptions & Product Characteristics

Account Charges (MER)	Vary by fund class. See Table 2-10 later in this section.
Base Margin Offset	100 basis points per annum
GMDB Description	1. ROP = return of premium ROP. 2. ROLL = 5% roll-up, capped at 2.5 ξ premium, frozen at age 80. 3. MAV = annual ratchet (maximum anniversary value), frozen at age 80. 4. HIGH = Higher of 5% roll-up and annual ratchet frozen at age 80. 5. EDB = ROP + 40% Enhanced Death Benefit (capped at 40% of deposit).
Adjustment to GMDB Upon Partial Withdrawal	"Pro-Rata by Market Value" and "Dollar-for-Dollar" are tested separately.
Surrender Charges	Ignored (i.e., zero). Reflected in the "CA" component of the AAR.
Single Premium/Deposit	$100,000. No future deposits; no intra-policy fund rebalancing.
Base Policy Lapse Rate	• Pro-rata by MV: 10% p.a. at all policy durations (before dynamics) • Dollar-for-dollar: 2% p.a. at all policy durations (no dynamics)
Partial Withdrawals	• Pro-rata by MV: None (i.e., zero) • Dollar-for-dollar: Flat 8% p.a. at all policy durations (as a % of AV).

	No dynamics or anti-selective behavior.
Mortality	100% of MGDB 94 ALB.
Gender/Age Distribution	100% male. Methodology accommodates different attained ages and policy durations. A 5-year age setback will be used for female annuitants.
Max. Annuitization Age	All policies terminate at age 95.
Fixed Expenses, Annual Fees	Ignored (i.e., zero). Reflected in the "FE" component of the AAR.
Income Tax Rate	21%
Discount Rate	4.54% (after-tax) effective = 5.75% pre-tax.
Dynamic Lapse Multiplier (Applies only to policies where GMDB is adjusted "pro-rata by MV" upon withdrawal)	*U*=1, *L*=0.5, *M*=1.25, *D*=1.1 ■ Applied to the 'Base Policy Lapse Rate' (not withdrawals).

Notes on GMDB Factor Development

- The roll-up is continuous (not simple interest, not stepped at each anniversary) and is applied to the previous roll-up guaranteed value (i.e., not the contract guaranteed value under HIGH).
- The Enhanced Death Benefit ("EDB") is floored at zero. It pays out 40% of the gain in the policy upon death at time *t*: $B_t = MIN[0.40 \times Deposit, 0.40 \times MAX(0, AV_t - Deposit)]$. The test policy also has a 100% return-of-premium GMDB, but the EDB Alternative Factors will be net of the GMDB component. That is, the EDB factors are 'stand-alone' and applied *in addition to* the GMDB factors.
- The "Base Policy Lapse Rate" is the rate of policy termination (total surrenders). Policy terminations (surrenders) are assumed to occur throughout the policy year (not only on anniversaries).
- Partial withdrawals (if applicable) are assumed to occur at the end of each time period (quarterly).
- Account charges ("MER") represent the total amount (annualized, in basis points) assessed against policyholder funds (e.g., sum of investment management fees, mortality and expense charges, risk premiums, policy/administrative fees, etc.). They are assumed to occur throughout the policy year (not only on anniversaries).

Table 2-10: Account-Based Fund Charges (bps per annum)

Asset Class / Fund	Account Value Charges (MER)
Fixed Account	0
Money Market	110
Fixed Income (Bond)	200
Balanced	250
Diversified Equity	250
Diversified International Equity	250
Intermediate Risk Equity	265
Aggressive or Exotic Equity	275

Calculation Example

Continuing the previous example (see Tables 2-7 and 2-8) for a 5% Roll-up GMDB policy mapped to Diversified Equity, suppose we have the policy/product parameters as specified in Table 2-11.

Table 2-11: Sample Policy Results for 5% Roll-up GMDB, Diversified Equity

Parameter	Value	Description
Deposit Value	$100.00	Total deposits adjusted for partial withdrawals.
Account Value	$98.43	Total account value at valuation date, in dollars.
GMDB	$123.04	Current guaranteed minimum death benefit, in dollars.
Attained Age	62	Attained age at the valuation date (in years).
Policy Duration	4.25	Policy duration at the valuation date (in years).
GV Adjustment	Pro-Rata	GMDB adjusted pro-rata by MV upon partial withdrawal.
Fund Class	Diversified Equity	Contract exposure mapped to Diversified Equity as per the Fund Categorization instructions in the section of this Appendix on Component GC.
MER	265	Total charge against policyholder funds (bps).
ProductCode	2	Product Definition code as per lookup key in Table 4.
GVAdjust	0	GV Adjustment Upon Partial Withdrawal as per key in Table 2-4.

FundCode	4	Fund Class code as per lookup key in Table 2-4.
PolicyMVGV	0.800	Contract account value divided by GMDB.
AdjProductMVGV	0.675	90% of the aggregate AV/GV for the Product portfolio.
RC	150	Margin offset (basis points per annum).

Using the usual notation, $GC = GV \times f(\tilde{\theta}) - AV \times \hat{g}(\tilde{\theta}) \times h(\hat{\theta})$.

$f(\tilde{\theta})$ = 0.150099 = GetCostFactor(2, 0, 4, 62, 4.25, 0.8, 265)

$\hat{g}(\tilde{\theta})$ = 0.067361 = GetMarginFactor(2, 0, 4, 62, 4.25, 0.8, 265, 150)

$h(\hat{\theta})$ = 0.887663 = GetScalingFactor(2, 0, 4, 62, 4.25, 0.675, 265, 150)

Hence, *GC* = \$12.58 = (123.04 × 0.150099) – (98.43 × 0.067361 × 0.887663). As a normalized value, this quantity is 12.78% of account value, 10.23% of guaranteed value and 51.1% of the current net amount at risk (Net amount at risk = GV – AV).

Note that $\hat{g}(\tilde{\theta}) = \frac{\alpha}{\hat{\alpha}} \times g(\tilde{\theta}) = \frac{150}{100} \times 0.044907$ where $g(\tilde{\theta})$ is "per 100 basis points" of available margin offset.

$g(\tilde{\theta})$ = 0.044907 = GetMarginFactor(2, 0, 4, 62, 4.25, 0.8, 265, 100)

Appendix 1a – Cash Flow Modeling for C-3 RBC Methodology

General Approach

1. The underlying asset and liability model(s) are those used for year-end Asset Adequacy Analysis cash flow testing, or a consistent model.

2. Run the 200 scenario subset selected from the 10,000 scenarios for interest rates produced from the NAIC economic scenario generator, using significance values based on the 20-year US treasury rates.

3. The statutory capital and surplus position, S(t), should be captured for every scenario for each calendar year-end of the testing horizon. The capital and surplus position is equal to statutory assets less statutory liabilities for the portfolio including asset adequacy reserves and voluntary reserves to the extent allowed under measurement consideration #2 below.

4. For each scenario, the C-3 measure is the most negative of the series of present values S(t)*pv(t), where pv(t) is the accumulated discount factor for t years using [105 percent of the after-tax one-year US Treasury rates/ the NAER on additional invested assets or direct iteration method] for that scenario. [The NAER on additional invested assets should follow the approach in VM-21 Section 4.B.3. The direct iteration method should follow the approach in VM-21 Section 4.B.4.] In other words:

$$pv(t) \quad \prod_{1}^{t} 1/(1+i_t)$$

5. Rank the scenario-specific C-3 measures in descending order, with scenario number 1's measure being the positive capital amount needed to equal the very worst present value measure.

6. Taking the weighted average of a subset of the scenario specific C-3 scores derives the final C-3 after-tax factor. The C-3 scores are multiplied by the following series of weights:

---------- Weighting Table ----------

Scenario Rank:	17	16	15	14	13	12	11	10	9	8	7	6	5
Weight:	0.02	0.04	0.06	0.08	0.10	0.12	0.16	0.12	0.10	0.08	0.06	0.04	0.02

The sum of these products is the C-3 charge for the product.

7. If multiple asset/liability portfolios are tested and aggregated, an aggregate C-3 charge can be derived by first summing the S(t)'s from all the portfolios (by scenario) and then following Steps 2 through 6 above. An alternative method is to calculate the C-3 score by scenario for each product, sum them by scenario, then order them by rank and apply the above weights.

8. Phase in: A company may elect to phase-in the effect of the new economic scenario requirements on C-3 RBC, using the following steps:
   - 1. Begin with the C-3 RBC amount from step 7 for the Dec. 31, 2025 instructions for all business within the scope of the modeling requirements as of 12/31/25. Add to this the amount of C-3 RBC computed in the same manner as the 2025 value for any reinsurance ceded that is expected to be recaptured in 2026 and in the scope of the modeling requirements. This amount is 2025 RBC.
   - 2. Determine the C-3 RBC amount as of 12/31/25 using steps 2 - 7 for the same inforce business as in 1. This amount is 2025 RBC New.

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- Determine the phase-in amount (PIA) as the excess of 2025 RBC New over 2025 RBC.
- For 12/31/2026, compute the C-3 RBC following steps 2 – 7 above, then subtract PIA times (2/3).
- For 12/31/2027, compute the C-3 RBC following steps 2 – 7 above, then subtract PIA times (1/3).

Single Scenario C-3 Measurement Considerations

1. GENERAL METHOD - This approach incorporates interim values, consistent with the approach used for bond, mortgage and mortality RBC factor quantification. The approach establishes the risk measure in terms of an absolute level of risk (e.g., solvency) rather than volatility around an expected level of risk. It also recognizes reserve conservatism, to the degree that such conservatism has not been used elsewhere.

2. INITIAL ASSETS = RESERVES - Consistent with appointed actuary practice, the cash flow models are run with initial assets equal to reserves; that is, no surplus assets are used. Asset adequacy reserves that are held and can be shown to be directly attributable to this business and are based on a cashflow testing model consistent with the C-3 calculation under moderately adverse conditions may be included in these reserves. Excess Required Reserves, meaning the excess of the reserves required by the domiciliary commissioner over the NAIC minimum standard, may be included in these reserves. Voluntary reserves that address risks that are both 1) not reflected in the initial calculated reserve and 2) are reflected in the cashflow testing model at a moderately adverse level may be included in these reserves. Any other voluntary reserves attributable to this business may be included in reserve means any reserve that is not required by VM-A, VM-C, VM-20, VM-22, or VM-30 (e.g., asset adequacy reserves). If the determination of asset adequacy reserves depends on inclusion of the reserve in cashflow testing, they are not considered voluntary reserves for this purpose.

3. AVR - Existing AVR-related assets should not be included in the initial assets used in the C-3 modeling. These assets are available for future credit loss deviations over and above expected credit losses. These deviations are covered by C-1 risk capital. Similarly, future AVR contributions should not be modeled. However, the expected credit losses should be in the cash flow modeling. (Deviations from expected are covered by both the AVR and the C-1 risk capital.)

4. IMR - IMR assets should be used for C-3 modeling. (Also see #9 – Disinvestment Strategy.)

5. INTERIM MEASURE - Retained statutory surplus (i.e., statutory assets less statutory liabilities) is used as the year-to-year interim measure.

6. TESTING HORIZONS - Surplus adequacy should be tested over a period that extends to a point at which contributions to surplus on a closed block are immaterial in relationship to the analysis. If some products are being cash flow tested for Asset Adequacy Analysis over a longer period than the 100 years generated by the economic scenario generator, the scenario rates should be held constant at the year 100 level for all future years. A consistent testing horizon is important for all lines if the C-3 results from different lines of business are aggregated.

7. TAX TREATMENT - The tax treatment should be consistent with that used in Asset Adequacy Analysis. Appropriate disclosure of tax assumptions may be required.

8. REINVESTMENT STRATEGY - The reinvestment strategy should be that used in Asset Adequacy Analysis modeling.

9. DISINVESTMENT STRATEGY - In general, negative cash flows should be handled just as they are in the Asset Adequacy Analysis. The one caveat is, since the RBC scenarios are more severe, models that depend on borrowing need to be reviewed to be confident that loans in the necessary volume are likely to be available under these circumstances at a rate consistent with the model's assumptions. If not, adjustments need to be made.

   If negative cash flows are handled by selling assets, then appropriate modeling of contributions and withdrawals to the IMR need to be reflected in the modeling.

10. STATUTORY PROFITS RETAINED - The measure is based on a profits retained model, anticipating that statutory net income earned one period is retained to support capital requirements in future periods. In other words, no stockholder dividends are withdrawn, but policyholder dividends, excess interest, declared rates, etc., are modeled realistically and assumed, paid or credited.

11. LIABILITY and ASSET ASSUMPTIONS - The liability and asset assumptions should be those used in Asset Adequacy Analysis modeling. Disclosure of these assumptions may be required.

12. SENSITIVITY TESTING - Key assumptions shall be stress tested (e.g., lapses increased by 50 percent) to evaluate sensitivity of the resulting C-3 requirement to the various

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assumptions made by the actuary. Disclosure of these results may be required.

13. USE OF NON-PRESCRIBED SCENARIO GENERATORS - At the option of the company, interest rates may be generated in part or in full using non-prescribed scenario generators in lieu of the prescribed economic generators, provided that the scenarios thus generated do not result in a C-3 charge for the product as calculated in Step 6 that is materially lower than the C-3 charge for the product as calculated in Step 6 resulting from the use of the scenarios from the prescribed economic generators as defined in Step 2 above.

Appendix 1b - Frequently Asked Questions for Cash Flow Modeling for C-3 RBC

1. Where can the scenario generator be found?

   The scenario generator is the Conning GEMS Economic Scenario Generator. Outputs may be found at the following website: https://naic.conning.com/scenariofiles

2. The results may include sensitive information in some instances. How can it be kept confidential?

   As provided for in Section 8 of the Risk-Based Capital (RBC) For Insurers Model Act, all information in support of and provided in the RBC reports (to the extent the information therein is not required to be set forth in a publicly available annual statement schedule), with respect to any domestic or foreign insurer, which is filed with the commissioner constitute information that might be damaging to the insurer if made available to its competitors, and therefore shall be kept confidential by the commissioner. This information shall not be made public or be subject to subpoena, other than by the commissioner and then only for the purpose of enforcement actions taken by the commissioner under the Risk-Based Capital (RBC) For Insurers Model Act or any other provision of the insurance laws of the state.

3. The definition of the annuities category talks about "debt incurred for funding an investment account…" Could you give a specific description of what is intended?

   One example is a situation where an insurer is borrowing under an advance agreement with a federal home loan bank, under which agreement collateral, on a current fair value basis, is required to be maintained with the bank. This arrangement has many of the characteristics of a GIC, but is classified as debt.

4. The instructions specify that assumptions consistent with those used for Asset Adequacy Analysis testing be used for C-3 RBC, but my company cash flow tests a combination of universal life and annuities for that analysis and using the same assumptions will produce incorrect results. What was intended in this situation?

   Where this situation exists, assumptions should be used for the risk-based capital work that are consistent with those used for the Asset Adequacy Cash Flow Testing. In other words, the assumptions used should be appropriate to the annuity component being evaluated for RBC and consistent with the overall assumption set used for Asset Adequacy Analysis.

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Deleted: a Microsoft Excel spreadsheet. By entering the Treasury yield curve at the date for which the testing is done, it will generate the sets of 50 or 12 scenarios. It requires Windows 95 or higher. This spreadsheet and instructions are available on the NAIC Web site at (http://www.naic.org/cmte_e_lrbc.htm). It is also available on diskette from the American Academy of Actuaries

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January 5, 2026

Philip Barlow
Chair, Life RBC (E) ("LRBC") Working Group
National Association of Insurance Commissioners

Peter Weber
Chair, Variable Annuities Capital and Reserve (E/A) ("VACR") Subgroup
National Association of Insurance Commissioners

Re: LRBC and VACR Fall 2025 Generator of Economic Scenarios (GOES) Exposure

Dear Chairs Barlow and Weber:

On behalf of the Committee of Annuity Insurers (the "CAI"),[1] we are submitting this letter in response to the latest set of Generator of Economic Scenarios ("GOES") capital-related exposures put forth through a joint effort of the LRBC Working Group and the VACR Subgroup following the LRBC Working Group's meeting on October 31, 2025 (the "Exposure"). The CAI had commented on the prior exposure and welcomes the opportunity to submit comments on this latest Exposure.

The CAI appreciates the efforts made by the Working Group and the Subgroup to address some of the concerns raised by the industry in connection with the earlier proposal. In particular, we appreciate the revision to include at least some level of voluntary reserves in the C-3 capital calculation. However, the CAI remains concerned that the substantial changes to capital calculations already introduced by GOES and planned refinements for year 2 of implementation warrant caution in the consideration of additional changes before the effects of the GOES implementation itself are fully understood.

Accordingly, the CAI reiterates its strong recommendations that the LRBC Working Group refrain from immediately altering the CTE(98) confidence level and the 25% scalar currently used in the C3 Phase II capital metric, which have been proven to work well over a host of economic environments. Instead, the CAI supports the collection of GOES-based disclosure items, including CTE(90) without a scalar and CTE(95) with a 25% scalar to allow regulators to evaluate the implications of any change to the CTE confidence level and multiplier under GOES in a controlled, non-disruptive manner. If, following this evaluation, regulators

[1] The Committee of Annuity Insurers is a coalition of life insurance companies formed in 1981 to address legislative and regulatory issues relevant to the annuity industry and to participate in the development of federal and state policies with respect to regulatory, securities and tax issues affecting annuities. A list of the CAI's member companies is attached. The CAI's current 33 member companies represent approximately 80% of the annuity business in the United States.

determine that a change in the CTE confidence level and/or multiplier may be appropriate, such a change could then be pursued in a data-driven and consultative manner.

Conclusion

The Committee of Annuity Insurers appreciates this opportunity to comment on the Exposure. Together with other interested parties, like the American Academy of Actuaries and the American Council of Life Insurers, the CAI stands ready to provide the NAIC with any information that may further its consideration of the concerns expressed herein.

Sincerely,

THE COMMITTEE OF ANNUITY INSURERS

Stephen E. Roth
Eversheds Sutherland (US) LLP

CC: Ben Slutsker, Vice Chair, Life RBC (E) Working Group
Matt Cheung, Vice Chair, Variable Annuities Capital and Reserve (E/A) Subgroup
Jane Ren, Advisor, NAIC
Kazeem Okuson, Sr. Life RBC Analyst, NAIC
Daren Moreira, Eversheds Sutherland (US) LLP

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Allianz Life Insurance Company
American Equity Investment Life Insurance Company
Ameriprise Financial
Athene USA
AuguStar Life Insurance Company
Brighthouse Financial, Inc.
Corebridge Financial
Equitable
Fidelity Investments Life Insurance Company
Fortitude Re
Genworth Financial
Global Atlantic Financial Group
Guardian Insurance & Annuity Co., Inc.
Jackson National Life Insurance Company
John Hancock Life Insurance Company
Lincoln Financial Group
Massachusetts Mutual Life Insurance Company
Metropolitan Life Insurance Company
Nationwide Life Insurance Companies
New York Life Insurance Company
Northwestern Mutual Life Insurance Company
Pacific Life Insurance Company
Protective Life Insurance Company
Prudential Insurance Company of America
Sammons Financial Group
Security Benefit Life Insurance Company
Symetra Financial Corporation
Talcott Resolution
Thrivent
TIAA
Transamerica
TruStage
USAA Life Insurance Company

The Committee of Annuity Insurers was formed in 1981 to participate in the development of federal and state policies with respect to annuities. The member companies of the Committee represent approximately 80% of the annuity business in the United States.

The comment is to replace the current approach with the proposed NAER approach for discounting in C-3 Phase I calculations. It was provided by Jackson Waechter, FSA, MAAA, Managing Actuary of Farm Bureau Financial Services.

Appendix 1a – Cash Flow Modeling for C-3 RBC Methodology

General Approach

1. The underlying asset and liability model(s) are those used for year-end Asset Adequacy Analysis cash flow testing, or a consistent model.

2. Run the 200 scenario subset selected from the 10,000 scenarios for interest rates produced from the NAIC economic scenario generator, using significance values based on the 20-year US treasury rates.

3. The statutory capital and surplus position, S(t), should be captured for every scenario for each calendar year-end of the testing horizon. The capital and surplus position is equal to statutory assets less statutory liabilities for the portfolio.

4. For each scenario, the C-3 measure is the most negative of the series of present values S(t)*pv(t), where pv(t) is the accumulated discount factor for t years using 105 percent of the after-tax one-year US Treasury rates for that scenario. In other words:

$$pv(t) \quad \prod_{1}^{t} 1/(1+i_t)$$

5. Rank the scenario-specific C-3 measures in descending order, with scenario number 1's measure being the positive capital amount needed to equal the very worst present value measure.

6. Taking the weighted average of a subset of the scenario specific C-3 scores derives the final C-3 after-tax factor. The C-3 scores are multiplied by the following series of weights:

---------- Weighting Table ----------

Scenario Rank:	17	16	15	14	13	12	11	10	9	8	7	6	5
Weight:	0.02	0.04	0.06	0.08	0.10	0.12	0.16	0.12	0.10	0.08	0.06	0.04	0.02

The sum of these products is the C-3 charge for the product.

7. If multiple asset/liability portfolios are tested and aggregated, an aggregate C-3 charge can be derived by first summing the S(t)'s from all the portfolios (by scenario) and then following Steps 2 through 6 above. An alternative method is to calculate the C-3 score by scenario for each product, sum them by scenario, then order them by rank and apply the above weights.

8. Phase in: A company may elect to phase-in the effect of the new economic scenario requirements on C-3 RBC, using the following steps:
   - 1. Begin with the C-3 RBC amount from Step 7 for the Dec. 31, 2025 instructions for all business within the scope of the modeling requirements as of 12/31/25. Add to this the amount of C-3 RBC computed in the same manner as the 2025 value for any reinsurance ceded that is expected to be recaptured in 2026 and in the scope of the modeling requirements. This amount is 2025 RBC.
   - 2. Determine the C-3 RBC amount as of 12/31/25 using Steps 2 - 7 for the same inforce business as in 1. This amount is 2025 RBC New.
   - Determine the phase-in amount (PIA) as the excess of 2025 RBC New over 2025 RBC.
   - For 12/31/2026, compute the C-3 RBC following Steps 2 – 7 above, then subtract PIA times (2/3).
   - For 12/31/2027, compute the C-3 RBC following Steps 2 – 7 above, then subtract PIA times (1/3).

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Single Scenario C-3 Measurement Considerations

1. GENERAL METHOD - This approach incorporates interim values, consistent with the approach used for bond, mortgage and mortality RBC factor quantification. The approach establishes the risk measure in terms of an absolute level of risk (e.g., solvency) rather than volatility around an expected level of risk. It also recognizes reserve conservatism, to the degree that such conservatism has not been used elsewhere.

2. INITIAL ASSETS = RESERVES - Consistent with appointed actuary practice, the cash flow models are run with initial assets equal to reserves; that is, no surplus assets are used.

3. AVR - Existing AVR-related assets should not be included in the initial assets used in the C-3 modeling. These assets are available for future credit loss deviations over and above expected credit losses. These deviations are covered by C-1 risk capital. Similarly, future AVR contributions should not be modeled. However, the expected credit losses should be in the cash flow modeling. (Deviations from expected are covered by both the AVR and the C-1 risk capital.)

4. IMR - IMR assets should be used for C-3 modeling. (Also see #9 – Disinvestment Strategy.)

5. INTERIM MEASURE - Retained statutory surplus (i.e., statutory assets less statutory liabilities) is used as the year-to-year interim measure.

6. TESTING HORIZONS - Surplus adequacy should be tested over a period that extends to a point at which contributions to surplus on a closed block are immaterial in relationship to the analysis. If some products are being cash flow tested for Asset Adequacy Analysis over a longer period than the 100 years generated by the economic scenario generator, the scenario rates should be held constant at the year 100 level for all future years. A consistent testing horizon is important for all lines if the C-3 results from different lines of business are aggregated.

7. TAX TREATMENT - The tax treatment should be consistent with that used in Asset Adequacy Analysis. Appropriate disclosure of tax assumptions may be required.

8. REINVESTMENT STRATEGY - The reinvestment strategy should be that used in Asset Adequacy Analysis modeling.

9. DISINVESTMENT STRATEGY - In general, negative cash flows should be handled just as they are in the Asset Adequacy Analysis. The one caveat is, since the RBC scenarios are more severe, models that depend on borrowing need to be reviewed to be confident that loans in the necessary volume are likely to be available under these circumstances at a rate consistent with the model's assumptions. If not, adjustments need to be made.

   If negative cash flows are handled by selling assets, then appropriate modeling of contributions and withdrawals to the IMR need to be reflected in the modeling.

10. STATUTORY PROFITS RETAINED - The measure is based on a profits retained model, anticipating that statutory net income earned one period is retained to support capital requirements in future periods. In other words, no stockholder dividends are withdrawn, but policyholder dividends, excess interest, declared rates, etc., are modeled realistically and assumed, paid or credited.

11. LIABILITY and ASSET ASSUMPTIONS - The liability and asset assumptions should be those used in Asset Adequacy Analysis modeling. Disclosure of these assumptions may be required.

12. SENSITIVITY TESTING - Key assumptions shall be stress tested (e.g., lapses increased by 50 percent) to evaluate sensitivity of the resulting C-3 requirement to the various assumptions made by the actuary. Disclosure of these results may be required.

13. USE OF NON-PRESCRIBED SCENARIO GENERATORS - At the option of the company, interest rates may be generated in part or in full using non-prescribed scenario generators in lieu of the prescribed economic generators, provided that the scenarios thus generated do not result in a C-3 charge for the product as calculated in Step 6 that is materially lower than the C-3 charge for the product as calculated in Step 6 resulting from the use of the scenarios from the prescribed NAIC economic scenario generator as defined in Step 2 above.

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Appendix 1b - Frequently Asked Questions for Cash Flow Modeling for C-3 RBC

1. Where can the scenario generator be found?

   The scenario generator is the Conning GEMS Economic Scenario Generator. Outputs may be found at the following website: https://naic.conning.com/scenariofiles

2. The results may include sensitive information in some instances. How can it be kept confidential?

   As provided for in Section 8 of the Risk-Based Capital (RBC) For Insurers Model Act, all information in support of and provided in the RBC reports (to the extent the information therein is not required to be set forth in a publicly available annual statement schedule), with respect to any domestic or foreign insurer, which is filed with the commissioner constitute information that might be damaging to the insurer if made available to its competitors, and therefore shall be kept confidential by the commissioner. This information shall not be made public or be subject to subpoena, other than by the commissioner and then only for the purpose of enforcement actions taken by the commissioner under the Risk-Based Capital (RBC) For Insurers Model Act or any other provision of the insurance laws of the state.

3. The definition of the annuities category talks about "debt incurred for funding an investment account…" Could you give a specific description of what is intended?

   One example is a situation where an insurer is borrowing under an advance agreement with a federal home loan bank, under which agreement collateral, on a current fair value basis, is required to be maintained with the bank. This arrangement has many of the characteristics of a GIC, but is classified as debt.

4. The instructions specify that assumptions consistent with those used for Asset Adequacy Analysis testing be used for C-3 RBC, but my company cash flow tests a combination of universal life and annuities for that analysis and using the same assumptions will produce incorrect results. What was intended in this situation?

   Where this situation exists, assumptions should be used for the risk-based capital work that are consistent with those used for the Asset Adequacy Cash Flow Testing. In other words, the assumptions used should be appropriate to the annuity component being evaluated for RBC and consistent with the overall assumption set used for Asset Adequacy Analysis.

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Deleted: a Microsoft Excel spreadsheet. By entering the Treasury yield curve at the date for which the testing is done, it will generate the sets of 50 or 12 scenarios. It requires Windows 95 or higher. This spreadsheet and instructions are available on the NAIC Web site at (http://www.naic.org/cmte_e_lrbc.htm). It is also available on diskette from the American Academy of Actuaries

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Line (35)
Enter the interest rate risk component from the Cash Flow Modeling for C-3 RBC Requirements Variable Annuities and Similar Products (see Line (37)). The interest rate risk component should be entered on a pre-tax basis using the enacted maximum corporate income tax rate.

Line (36)
Total interest rate risk. Equals Line (34) plus Line (35).

Line (37)

Cash Flow Modeling for C-3 RBC Requirements for Variable Annuities and Similar Products:

Overview

The amount reported on Line (35) and Line (37) is calculated using the 7-step process defined below. This calculation applies to all policies and contracts that have been valued following the requirements of AG-43 or VM-21. For contracts whose reserve was determined using the Alternative Methodology (VM-21 Section 7) see step 3 while all other contracts follow steps 1 and 2, then all contracts follow steps 4 - 7.

Step 1 CTE98: The first step is to determine CTE98 by applying the one of the two methodologies described in paragraph A below.

Step 2 C-3 RBC: using the formulas in paragraph B, determine the C-3 RBC amount based on the amount calculated in step (1). Floor this amount at $0.

Step 3: Determine the C-3 RBC using the Alternative Methodology for any business subject to that requirement as described in paragraph C.

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Step 4: As described in paragraph D below, the C-3 RBC amount is the sum of the amounts determined in steps 2 and 3 above, but not less than zero. The Total Asset Requirement is the Reserve based on the requirements of VM-21 prior to the application of any phase-in, plus the C-3 RBC amount.

Step 5: For a company that has elected a Phase-in for reserves following VM-21 Section 2.B., the C-3 RBC amount is to be phased-in over the same time period following the requirements in paragraph E below.

Step 6: Apply the smoothing rules (if applicable) to the C-3 RBC amount in step (4) or (5) as applicable.

Step 7: Divide the amount from Step 4, 5, or 6 (as appropriate) by (1-enacted maximum federal corporate income tax rate). Split this amount into an interest rate risk portion and a market risk portion, as described in paragraph F.
The interest rate portion of the risk should be included in Line (35) and the market risk portion in Line (37).

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The C-3 RBC is calculated as follows:

A. CTE (98) is calculated as follows: Except for policies and contracts subject to the Alternative Methodology (See C. below), apply the CTE methodology described in NAIC Valuation Manual VM-21 and calculate the CTE (98) as the numerical average of the 2% largest values of the Scenario Reserves, as defined by Section 4 of VM-21. In performing this calculation, the process and methods used to calculate the Scenario Reserves use the requirements of VM-21 and should be the same as used for the reserve calculations. The effect of Federal Income Tax should be handled following one of the following two methods:

1. If using the Macro Tax Adjustment (MTA): The modeled cash flows will ignore the effect of Federal Income Tax. As a result, for each individual scenario, the numerical value of the scenario reserve used in this calculation should be identical to that for the same scenario in the Aggregate Reserve calculation under VM-21. Federal Income Tax is reflected later in the formula in paragraph B.1.

2. If using Specific Tax Recognition (STR): At the option of the company, CTE After-Tax (98) (CTEAT (98)) may be calculated using an approach in which the effect of Federal Income Tax is reflected in the projection of Accumulated Deficiencies, as defined in Section 4.A. of VM-21, when calculating the Scenario Reserve for each scenario. To reflect the effect of Federal Income Tax, the company should find a reasonable and consistent basis for approximating the evolution of tax reserves in the projection, taking into account restrictions around the size of the tax reserves (e.g., that tax reserve must equal or exceed the cash surrender value for a given contract). The Accumulated Deficiency at the end of each projection year should also be discounted at a rate that reflects the projected after-tax discount rates in that year. In addition, the company should add the Tax Adjustment as described below to the calculated CTEAT (98) value.

3. A company that has elected to calculate CTEAT (98) using STR may not switch back to using MTA in the projection of Accumulated Deficiencies without prominently disclosing that change in the certification and supporting memorandum. The company should also disclose the methodology adopted, and the rationale for its adoption, in the documentation required by paragraph J below.

4. Application of the Tax Adjustment: Under the U.S. IRC**,** the tax reserve is defined. It can never exceed the statutory reserve nor be less than the cash surrender value. If a company is using STR and if the company's actual tax reserves exceed the projected tax reserves at the beginning of the projection, a tax adjustment is required.

   The CTEAT (98) must be increased on an approximate basis to correct for the understatement of modeled tax expense. The additional taxable income at the time of claim will be realized over the projection and will be approximated using the duration to worst, i.e., the duration producing the lowest present value for each scenario. The method of developing the approximate tax adjustment is described below.

   The increase to CTEAT (98) may be approximated as the corporate tax rate times f times the difference between the company's actual tax reserves and projected tax reserves at the start of the projections. For this calculation, f is calculated as follows**:** For the scenarios reflected in calculating CTE (98), the scenario reserve is determined 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 (98) scenarios and f is one minus this average ratio. If the Alternative Method is used, f is approximated as 0.5.

B. Determination of RBC amount using stochastic modeling:

1. If using the MTA: Calculate the RBC Requirement by the following formula in which the statutory reserve is the actual reserve reported in the Annual Statement. In the second term – i.e., the difference between statutory reserves and tax reserves multiplied by the Federal Income Tax Rate – may not exceed the portion of the company's non- admitted deferred tax assets attributable to the same portfolio of contracts to which VM-21 is applied in calculating statutory reserves:

   25% x ((CTE (98) + Additional Standard Projection Amount – Statutory Reserve) x (1 – Federal Income Tax Rate) – (Statutory Reserve – Tax Reserve) x Federal Income Tax Rate

If the company elects to use the STR: The C-3 RBC is determined by the following formula: 25% x (CTEAT (98) + Additional Standard Projection Amount – Statutory Reserve) The Additional Standard Projection Amount is calculated using the methodology outlined in Section 6 of VM-21.

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C. Determination of C-3 RBC using Alternative Methodology: This calculation applies to all policies and contracts that have been valued following the requirements of AG-43 or VM-21, for which the reserve was determined using the Alternative Methodology (VM-21 Section 7). The C-3 RBC amount is determined by applying the methodology as defined in Appendix 2 to these instructions.

D. The C-3 RBC amount is the sum of the amounts determined in paragraphs B and C above, but not less than zero. The TAR is defined as the Reserve determined according to VM-21 plus the C-3 RBC amount. All values are prior to any consideration of Phase-in allowances for either reserve or C-3 RBC. The RBC values are post-tax.

E. Phase in: A company that has elected to phase-in the effect of the new economic scenario requirements following VM-21 Section 2.C shall phase in the effect on C-3 RBC using the following steps:

- 1. Begin with the C-3 RBC amount from step 7 for Dec. 31, 2025 LR027 Line (37) instructions for all business within the scope of the Variable Annuities modeling requirements as of 12/31/25. Add to this the amount of C-3 RBC computed in the same manner as the 2025 value for any reinsurance ceded that is expected to be recaptured in 2026 and in the scope of the Variable Annuities modeling requirements. This amount is 2025 RBC.
- 2. Determine the C-3 RBC amount as of 12/31/25 using paragraphs A, B, C, and D for the same inforce business as in 1. This amount is 2025 RBC New.
- Determine the phase-in amount (PIA) as the excess of 2025 RBC New over 2025 RBC.
- For 12/31/2026, compute the C-3 RBC following paragraphs A –D above, then subtract PIA times (2/3).
- For 12/31/2027, compute the C-3 RBC following paragraphs A – D above, then subtract PIA times (1/3).

F. The amount determined in paragraphs D or E. above for the contracts shall be divided by (1-enacted maximum federal corporate income tax rate) to arrive at a pre-tax amount. This pre-tax amount shall be split into a component for interest rate risk and a component for market risk. Neither component may be less than zero. The provision for the interest rate risk, if any, is to be reported in Line (35). The market risk component is reported in Line (37).

The amount reported in Line (37) is to be combined with the C-1cs component for covariance purposes.

G. The way grouping (of funds and of contracts), sampling, number of scenarios, and simplification methods are handled is the responsibility of the company. However, all these methods are subject to Actuarial Standards of Practice, supporting documentation and justification, and should be identical to those used in calculating the company's statutory reserves following VM-21.

H. Certification of the work done to set the C-3 RBC amount for Variable Annuities and Similar products are the same as are required for reserves as part of VM-31. The certification should specify that the actuary is not opining on the adequacy of the company's surplus or its future financial condition.

The certification(s) should be submitted by hard copy with any state requiring an RBC hard copy.

I. An actuarial memorandum should be constructed documenting the methodology and assumptions upon which the required capital for the variable annuities and similar products is determined. Since the starting point for the C-3 RBC calculation is the cash flow modeling used for the reserves, the documentation requirements for reserves (VM-31) should be followed for the C-3 RBC. The reserve report may be incorporated by reference, with this C-3 RBC memorandum focused on identifying differences and items unique to the C-3 RBC process, or at the company's option, the documentation of C-3 RBC may be merged into the VA Report with the differences for C-3 RBC discussed in a separate section of the Memorandum as outlined in VM-31.

These differences that would need to be identified either in the RBC Actuarial Memorandum or the VA Report will typically include:

- The basis for considering federal income tax,
- Whether or not smoothing was applied, and the effect of that smoothing,
- Whether or not a phase in was used, and the impact on the reported values,
- If the company elects to calculate CTEAT (98) using STR whereby the effect of Federal Income Tax is reflected in the projection of Accumulated Deficiencies, the company should still disclose in the memorandum the Total Asset Requirement and C-3 RBC that would be obtained if the company had elected to use the MTA

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A company should decide whether or not to smooth the C-3 RBC calculated in paragraph D or E above to determine the amount in Line (37). For any business reinsured under a coinsurance agreement that complies with all applicable reinsurance reserve credit "transfer of risk" requirements, the ceding company shall reduce the reserve in proportion to the business ceded while the assuming company shall use a reserve consistent with the business assumed.¶
¶
A company may choose to smooth the C-3 RBC calculated in paragraph D or E above. A company is required to get approval from its domestic regulator prior to changing its decision about smoothing from the prior year. In addition, a company that has elected to smooth the risk-based capital is required to get approval from its domestic ... [2]

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method.

* Documentation of the alternative methodology calculations, if applicable, and
* Documentation of how the C-3 RBC values were allocated to the interest and market risk components.

This actuarial memorandum will be confidential and available to regulators upon request.

The lines on the alternative calculations page will not be required for 2019 or later.

The total of all annual statement reserves representing exposure to C–3 risk on Line (36) should equal the following:

Exhibit 5, Column 2, Line 0199999
– Page 2, Column 3, Line 6
+ Exhibit 5, Column 2, Line 0299999
+ Exhibit 5, Column 2, Line 0399999
+ Exhibit 7, Column 1, Line 14
+ Separate Accounts Page 3, Column 3, Line 1 plus Line 2 after deducting (a) funds in unitized separate accounts with no underlying guaranteed minimum return and no unreinsured guaranteed living benefits; (b) non-indexed separate accounts that are not cash flow tested with guarantees less than 4%; (c) non-cash-flow-tested experience rated pension reserves/liabilities; and (d) guaranteed indexed separate accounts using a Class II investment strategy.
– Non policyholder reserves reported on Exhibit 7
+ Exhibit 5, Column 2, Line 0799997
+ Schedule S, Part 1, Section 1, Column 12
– Schedule S, Part 3, Section 1, Column 14

APPENDIX 2 – ALTERNATIVE METHOD FOR GMDB RISKS

{Drafting Note: the following is copied from the American Academy of Actuaries June 2005 Report to the NAIC Capital Adequacy Task Force
This Appendix describes the Alternative Method for GMDB exposure in significant detail; how it is to be applied and how the factors were developed. Factor tables have been developed using the Conditional Tail Expectation ("CTE") risk measure at two confidence levels: 65% and 90%. The latter is determined on an "after tax" basis and is required for the RBC C3 Phase II standard for Total Asset Requirement ("TAR"). The former is a pre-tax calculation and should assist the Variable Annuity Reserve Working Group ("VARWG") in formulating a consistent "alternative method" for statutory reserves.

General

1. It is expected that the Alternative Method ("AltM") will be applied on a policy-by-policy basis (i.e., seriatim). If the company adopts a cell-based approach, only materially similar contracts should be grouped together. Specifically, all policies comprising a "cell" must display substantially similar characteristics for those attributes expected to affect risk-based capital (e.g., definition of guaranteed benefits, attained age, policy duration, years-to-maturity, market-to-guaranteed value, asset mix, etc.).

2. The Alternative Method determines the TAR as the sum of the Cash Surrender Value and the following three (3) provisions, collectively referred to as the *Additional Asset Requirement* ("AAR"):
   - Provision for amortization of the outstanding (unamortized) surrender charges – "Charge Amortization" or "CA";
   - Provision for fixed dollar expenses/costs net of fixed dollar revenue – "Fixed Expenses" or "FE"; and
   - Provision for claims (in excess of account value) under the guaranteed benefits net of available spread-based revenue ("margin offset") – "Guaranteed Cost" or "GC".

   All of these components reflect the impact of income taxes and are explained in more detail later in this Appendix.
   The Risk-Based Capital amount (C-3 RBC) is determined in aggregate for the block of policies as the TAR less the reserve determined based on Section 7 of VM-21.
   Note the following regarding income taxes:
   The company determines the CA and FE amounts by projecting the inforce data and incorporating a 21% tax rate and a post-tax discount rate of 4.54% (= 5.75% x [1-21%]).

   In determining the GC amounts, a "look-up" function is used which provides a GMDB Cost Factor "f" and Base Margin Offset Factor "g". These factors ("f" and "g") represent CTE90 factors on a post-tax basis where a 35% tax rates and 3.74% (= 5.75% x (1-35%)) discount rate has been used. The company needs to multiply these factors by (.79/.65) to adjust the factors for a 21% tax rate basis. It is noted that this adjustment overstates the impact of the lower tax rate as the impact of the higher discount rate has not been reflected.

3. The total AAR (in excess of cash surrender value) is the sum of the AAR calculations for each policy or cell. The result for any given policy (cell) may be negative, zero or positive.

4. For variable annuities without guarantees, the Alternative Method for capital uses the methodology which applied previously to all variable annuities. The charge is 11% of the difference between fund balance and cash surrender value if the current surrender charge is based on fund balance. If the current surrender charge is based on fund contributions, the charge is 2.4% of the difference for those contracts for which the fund balance exceeds the sum of premiums less withdrawals and 11% for those for which that is not the case. In all cases, the result is to be multiplied by 0.79 to adjust for Federal Income Tax. For in-scope contracts, such as many payout annuities with no cash surrender value and no performance guarantees, there is no capital charge.

5. For variable annuities with death benefit guarantees, the AAR for a given policy is equal to: $R \times (CA + FE) + GC$ where:
   CA (Charge Amortization) = Provision for amortization of the outstanding (unamortized) surrender charges
   FE (Fixed Expense) = Provision for fixed dollar expenses/costs net of fixed dollar revenue
   GC (Guaranteed Cost) = Provision for claims (in excess of account value) under the guaranteed benefits net of available spread-based revenue ("margin offset")

The components *CA*, *FE* and *GC* are calculated separately. *CA* and *FE* are defined by deterministic "single-scenario" calculations which account for asset growth, interest, inflation and tax at prescribed rates. Mortality is ignored. However, the actuary determines the appropriate "prudent best estimate" lapses/withdrawal rates for the calculations. The components *CA*, *FE* and *GC* may be positive, zero or negative. $R=h(\circ)$ is a "scaling factor" that depends on certain risk attributes $\tilde{\theta}$ for the policy and the product portfolio.

6. The "Alternative Method" factors and formulas for GMDB risks (component *GC*) have been developed from stochastic testing using the 10,000 "Pre-packaged" scenarios (March 2005). The pre-packaged scenarios have been fully documented under separate cover – see http://www.actuary.org/pdf/life/c3supp_march05.pdf at the American Academy of Actuaries' website.

7. The model assumptions for the AltM Factors (component GC) are documented in the section of this Appendix entitled *Component GC*.

8. The table of *GC* factors that has been developed assumes male mortality at 100% of the MGDB 94 ALB table, and uses a 5-year age setback for female annuitants. Companies using the Alternative Method may use these factors, or may use the procedure described in Methodology Note C3-05 in the report "Recommended Approach for Setting Risk- Based Capital Requirements for Variable Annuities and Similar Products Presented by the American Academy of Actuaries' Life Capital Adequacy Subcommittee to the National Association of Insurance Commissioners' Capital Adequacy (E) Task Force (June 2005)" to adjust for the actuary's Prudent Best Estimate of mortality. If the company does not have a Prudent Best Estimate mortality assumption, the company may use the procedure described in Methodology Note C3-05 to adjust to the 2012 IAM as modified in VM-21 Section 11.C. Once a company uses the modified method for a block of business, the option to use the unadjusted table is no longer available for that part of its business.

9. There are five (5) major steps in using the *GC* factors to determine the "*GC*" component of the AAR for a given policy/cell:

    a) Classifying the asset exposure;
    b) Determining the risk attributes;
    c) Retrieving the appropriate nodes from the factor grid;
    d) Interpolating the nodal factors, where applicable (optional);
    e) Applying the factors to the policy values.

Categorizing the asset value for the given policy or cell involves mapping the entire exposure to one of the eight (8) prescribed "fund classes". Alternative Method factors are provided for each asset class.
The second step requires the company to determine (or derive) the appropriate attributes for the given policy or cell. These attributes are needed to calculate the required values and access the factor tables:

- Product form ("Guarantee Definition"), *P*.
- Adjustment to guaranteed value upon partial withdrawal ("GMDB Adjustment"), *A*.
- Fund class, *F*.
- Attained age of the annuitant, *X*.
- Policy duration since issue, *D*.
- Ratio of account value to guaranteed value, λ.
- Total account charges, *MER*.

Other required policy values include:

- Account value, *AV*.
- Current guaranteed minimum death benefit, *GMDB*.

- Net deposit value (sum of deposits less sum of withdrawals), *NetDeposits*[2].
- Net spread available to fund guaranteed benefits ("margin offset"), α.

The next steps – retrieving the appropriate nodes from the factor grid and interpolation – are explained in the section entitled *Component GC* of this Appendix. Tools are provided to assist the company in these efforts (see Appendix 9), but their use is not mandatory. This documentation is sufficiently detailed to permit the company to write its own lookup and extraction routines. A calculation example to demonstrate the application of the various component factors to sample policy values is shown in the section *Component GC* of this Appendix.

10. The total account charges should include all amounts assessed against policyholder accounts, expressed as a level spread per year (in basis points). This quantity is called the Management Expense Ratio ("MER") and is defined as the average amount (in dollars) charged against policyholder funds in a given year divided by average account value. Normally, the MER would vary by fund class and be the sum of investment management fees, mortality & expense charges, guarantee fees/risk premiums, etc. The spread available to fund the GMDB costs ("margin offset", denoted by α) should be net of spread-based costs and expenses (e.g., net of maintenance expenses, investment management fees, trail commissions, etc.), but may be increased for Revenue Sharing as can be reflected in modeling (i.e., had the Alternative Method not been elected) by adhering to the requirements set forth in section 6 of the *Modeling Methodology*. The section of this Appendix on *Component GC* describes how to determine *MER* and α. 'Time-to-maturity' is uniquely defined in the factor modeling by $T = 95 - X$. (This assumes an assumed maturity age of 95 and a current attained age of X.) Net deposits are used in determining benefit caps under the GMDB Roll-up and Enhanced Death Benefit ("EDB") designs.

11. The GMDB definition for a given policy/cell may not exactly correspond to those provided. In some cases, it may be reasonable to use the factors/formulas for a different product form (e.g., for a "roll-up" GMDB policy near or beyond the maximum reset age or amount, the company should use the "return-of-premium" GMDB factors/formulas, possibly adjusting the guaranteed value to reflect further resets, if any). In other cases, the company might determine the RBC based on two different guarantee definitions and interpolate the results to obtain an appropriate value for the given policy/cell. However, if the policy form (definition of the guaranteed benefit) is sufficiently different from those provided and there is no practical or obvious way to obtain a good result from the prescribed factors/formulas, the company must select one of the following options:
    a) Model the "C3 Phase II RBC" using stochastic projections according to the approved methodology;
    b) Select factors/formulas from the prescribed set such that the values obtained conservatively estimate the required capital; or
    c) Calculate company-specific factors or adjustments to the published factors based on stochastic testing of its actual business. This option is described more fully in the section of this Appendix on *Component GC*.

12. The actuary must decide if existing reinsurance arrangements can be accommodated by a straight-forward adjustment to the factors and formulas (e.g., quota-share reinsurance without caps, floors or sliding scales would normally be reflected by a simple pro-rata adjustment to the "gross" *GC* results). For more complicated forms of reinsurance, the company will need to justify any adjustments or approximations by stochastic modeling. However, this modeling need not be performed on the whole portfolio but can be undertaken on an appropriate set of representative policies. See the section of this Appendix on *Component GC*.

[2] Net deposits are required only for certain policy forms (e.g., when the guaranteed benefit is capped as a multiple of net policy contributions).

Component *CA*

Component *CA* provides for the amortization of the unamortized surrender charges using the actual surrender charge schedule applicable to the policy. Over time, the surrender charge is reduced and a portion of the charges in the policy are needed to fund the resulting increase in surrender value. This component can be interpreted as the "amount needed to amortize the unamortized surrender charge allowance for the *persisting* policies plus an implied borrowing cost". By definition, the amortization for non-persisting lives in each time period is exactly offset by the collected surrender charge revenue (ignoring timing differences and any waiver upon death). The company must project the unamortized balance to the end of the surrender charge period and discount the year-by-year amortization under the following assumptions. All calculations should reflect the impact of income taxes.

- Net asset return (i.e., after fees) as shown in Table 1 below. These rates roughly equate to an annualized 5th percentile return over a 10-year horizon3. The 10-year horizon was selected as a reasonable compromise between the length of a typical surrender charge period and the longer testing period usually needed to capture all the costs on "more expensive" portfolios (i.e., lower available spread, lower AV/GV ratio, older ages, etc.). Note, however, that it may not be necessary to use these returns if surrender charges are a function of deposits/premiums.
- Income tax and discount rates (after-tax) as defined in Table 9 of this Appendix.
- The "Dynamic Lapse Multiplier" calculated at the valuation date (a function of Account Value (AV) –– Guaranteed Value (GV) ratio) is assumed to apply in each future year. This factor adjusts the lapse rate to reflect the antiselection present when the guarantee is in-the-money. Lapse rates may be lower when the guarantees have more value.
- Surrender charges and free partial withdrawal provisions should be reflected as per the contract specifications.
- "Prudent best estimate" lapse and withdrawal rates. Rates may vary according to the attributes of the business being valued, including, but not limited to, attained age, policy duration, etc.
- For simplicity, mortality may be ignored in the calculations.

Unlike the GC component, which requires the actuary to map the entire contract exposure to a single "equivalent" asset class, the *CA* calculation separately projects each fund (as mapped to the 8 prescribed categories) using the net asset returns in Table 2-1.

Table 2-1: Net Asset Returns for "CA" Component

Asset Class/Fund	Net Annualized Return
Fixed Account	Guaranteed Rate
Money Market and Fixed Income	0%
Balanced	–1%
Diversified Equity	–2%
Diversified International Equity	–3%
Intermediate Risk Equity	–5%
Aggressive or Exotic Equity	–8%

[3] A 5th percentile return is consistent with the CTE90 risk measure adopted in the C3 Phase II RBC methodology.

Component *FE*

Component *FE* establishes a provision for fixed dollar costs (i.e., allocated costs, including overhead *and* those expenses defined on a "per policy" basis) less any fixed dollar revenue (e.g., annual administrative charges or policy fees). The company must project fixed expenses net of any "fixed revenue" to the earlier of contract maturity or 30 years and discount the year-by-year amounts under the following assumptions. All calculations should reflect the impact of income taxes.

- Income tax and discount rates (after-tax) as defined in Table 9 of this Appendix.
- The "Dynamic Lapse Multiplier" calculated at the valuation date (a function of MV-–GV ratio) is assumed to apply in each future year. This factor adjusts the lapse rate to reflect the antiselection present when the guarantee is in-the-money. Lapse rates may be lower when the guarantees have more value.
- Per policy expenses are assumed to grow with inflation starting in the second projection year. The ultimate inflation rate of 3% per annum is reached in the 8th year after the valuation date. The company must grade linearly from the current inflation rate ("CIR") to the ultimate rate. The CIR is the higher of 3% and the inflation rate assumed for expenses in the company's most recent asset adequacy analysis for similar business.
- "Prudent best estimate" for policy termination (i.e., total surrender). Rates may vary according to the attributes of the business being valued, including, but not limited to, attained age, policy duration, etc. Partial withdrawals should be ignored as they do not affect survivorship.
- For simplicity, mortality may be ignored in the calculations.

Component *GC*

The general format for *GC* may be written as: $GC = GV \times f(\tilde{\theta}) - AV \times \hat{g}(\tilde{\theta}) \times h(\hat{\theta})$ where *GV* = current guaranteed minimum death benefit, *AV* = current account value and $= \frac{\alpha}{\hat{\alpha}} \times g(\tilde{\theta})$. The functions $f(\circ)$, $g(\circ)$, and $h(\circ)$ depend on the risk attributes of the policy $\tilde{\theta}$ and product portfolio $\hat{\theta}$. $h(\circ) = R$ was introduced in the "General" section as a "scaling factor". α is the company-determined net spread ("margin offset") available to fund the guaranteed benefits and $\hat{\alpha} = 100$ basis points is the margin offset assumed in the development of the "Base" tabular factors. The functions $f(\circ)$ $g(\circ)$ and $h(\circ)$ are more fully described later in this section.

Rearranging terms for *GC*, we have $GC = f(\tilde{\theta}) \times [GV - AV \times z(\tilde{\theta})]$. Admittedly, $z(\tilde{\theta})$ is a complicated function that depends on the risk attribute sets $\tilde{\theta}$ and $\hat{\theta}$, but conceptually we can view $AV \times z(\tilde{\theta})$ as a shock to the current account value (in anticipation of the adverse investment return scenarios that typically comprise the CTE(90) risk measure for the AAR) so that the term in the square brackets is a "modified net amount at risk". Accordingly, $f(\tilde{\theta})$ can be loosely interpreted as a factor that adjusts for interest (i.e., discounting) and mortality (i.e., the probability of the annuitant dying).

In practice, $f(\circ)$, $g(\circ)$, and $h(\circ)$ are not functions in the typical sense, but values interpolated from the factor grid. The factor grid is a large pre-computed table developed from stochastic modeling for a wide array of combinations of the risk attribute set. The risk attribute set is defined by those policy and/or product portfolio characteristics that affect the risk profile (exposure) of the business: attained age, policy duration, AV/GV ratio, fund class, etc.

Fund Categorization

The following criteria should be used to select the appropriate factors, parameters and formulas for the exposure represented by a specified guaranteed benefit. When available, the volatility of the long-term annualized total return for the fund(s) – or an appropriate benchmark – should conform to the limits presented. This calculation should be made over a reasonably long period, such as 25 to 30 years.

Where data for the fund or benchmark are too sparse or unreliable, the fund exposure should be moved to the next higher volatility class than otherwise indicated. In reviewing the asset classifications, care should be taken to reflect any additional volatility of returns added by the presence of currency risk, liquidity (bid-ask) effects, short selling and speculative positions.

All exposures/funds must be categorized into one of the following eight (8) asset classes:

1. Fixed Account
2. Money Market
3. Fixed Income
4. Balanced
5. Diversified Equity
6. Diversified International Equity
7. Intermediate Risk Equity
8. Aggressive or Exotic Equity

Fixed Account. The fund is credited interest at guaranteed rates for a specified term or according to a 'portfolio rate' or 'benchmark' index. The funds offer a minimum positive guaranteed rate that is periodically adjusted according to company policy and market conditions.

Money Market/Short-Term. The fund is invested in money market instruments with an average remaining term-to-maturity of less than 365 days.

Fixed Income. The fund is invested primarily in investment grade fixed income securities. Up to 25% of the fund within this class may be invested in diversified equities or high- yield bonds. The expected volatility of the fund returns will be lower than the Balanced fund class.

Balanced. This class is a combination of fixed income securities with a larger equity component. The fixed income component should exceed 25% of the portfolio and may include high yield bonds as long as the total long-term volatility of the fund does not exceed the limits noted below. Additionally, any aggressive or 'specialized' equity component should not exceed one-third (33.3%) of the total equities held. Should the fund violate either of these constraints, it should be categorized as an equity fund. These funds usually have a long- term volatility in the range of 8% – 13%.

Diversified Equity. The fund is invested in a broad-based mix of U.S. and foreign equities. The foreign equity component (maximum 25% of total holdings) must be comprised of liquid securities in well-developed markets. Funds in this category would exhibit long-term volatility comparable to that of the S&P500. These funds should usually have a long-term volatility in the range of 13% – 18%.

Diversified International Equity. The fund is similar to the Diversified Equity class, except that the majority of fund holdings are in foreign securities. These funds should usually have a long-term volatility in the range of 14% – 19%.

Intermediate Risk Equity. The fund has a mix of characteristics from both the Diversified and Aggressive Equity Classes. These funds have a long-term volatility in the range of 19% – 25%.

Aggressive or Exotic Equity. This class comprises more volatile funds where risk can arise from: (a) underdeveloped markets, (b) uncertain markets, (c) high volatility of returns, (d) narrow focus (e.g., specific market sector), etc. The fund (or market benchmark) either does not have sufficient history to allow for the calculation of a long-term expected volatility, or the volatility is very high. This class would be used whenever the long-term expected annualized volatility is indeterminable or exceeds 25%.

THE SELECTION OF AN APPROPRIATE INVESTMENT TYPE SHOULD BE DONE AT THE LEVEL FOR WHICH THE GUARANTEE APPLIES. FOR GUARANTEES APPLYING ON A DEPOSIT-BY-DEPOSIT BASIS, THE FUND SELECTION IS STRAIGHTFORWARD. HOWEVER, WHERE THE GUARANTEE APPLIES ACROSS DEPOSITS OR FOR AN ENTIRE CONTRACT, THE APPROACH CAN BE MORE COMPLICATED. IN SUCH INSTANCES, THE APPROACH IS TO IDENTIFY FOR EACH POLICY WHERE THE "GROUPED FUND HOLDINGS" FIT WITHIN THE CATEGORIES LISTED AND TO CLASSIFY THE ASSOCIATED ASSETS ON THIS BASIS.

A seriatim process is used to identify the "grouped fund holdings", to assess the risk profile of the current fund holdings (possibly calculating the expected long-term volatility of the funds held with reference to the indicated market proxies), and to classify the entire "asset exposure" into one of the specified choices. Here, "asset exposure" refers to the underlying assets (separate and/or general account investment options) on which the guarantee will be determined. For example, if the guarantee applies separately for each deposit year within the contract, then the classification process would be applied separately for the exposure of each deposit year.

In summary, mapping the benefit exposure (i.e., the asset exposure that applies to the calculation of the guaranteed minimum death benefits) to one of the prescribed asset classes is a multi-step process:

1. Map each separate and/or general account investment option to one of the prescribed asset classes. For some funds, this mapping will be obvious, but for others it will involve a review of the fund's investment policy, performance benchmarks, composition and expected long-term volatility.
2. Combine the mapped exposure to determine the expected long-term "volatility of current fund holdings". This will require a calculation based on the expected long-term volatilities for each fund and the correlations between the prescribed asset classes as given in Table 2-2.
3. Evaluate the asset composition and expected volatility (as calculated in step 2) of current holdings to determine the single asset class that best represents the exposure, with due consideration to the constraints and guidelines presented earlier in this section.

In step 1., the company should use the fund's actual experience (i.e., historical performance, inclusive of reinvestment) only as a guide in determining the expected long-term volatility. Due to limited data and changes in investment objectives, style and/or management (e.g., fund mergers, revised investment policy, different fund managers, etc.), the company may need to give more weight to the expected long-term volatility of the fund's benchmarks. In general, the company should exercise caution and not be overly optimistic in assuming that future returns will consistently be less volatile than the underlying markets.

In step 2., the company should calculate the "volatility of current fund holdings" (σ for the exposure being categorized) by the following formula using the volatilities and correlations in Table 2.

$$\sigma = \sqrt{\sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \rho_{ij} \sigma_i \sigma_j}$$

where $w_i = \frac{AV_i}{\sum_k AV_k}$ is the relative value of fund *i* expressed as a proportion of total contract value, ρ_{ij} is the correlation between asset classes *i* and *j* and σ_i is the volatility of asset class *i* (see Table 2). An example is provided at the end of this section.

Table 2-2: Volatilities and Correlations for Prescribed Asset Classes

ANNUAL VOLATILITY		FIXED ACCOUNT	MONEY MARKET	FIXED INCOME	BALANCED	DIVERSE EQUITY	INTL EQUITY	INTERM EQUITY	AGGR EQUITY
1.0%	FIXED ACCOUNT	**1**	0.50	0.15	0	0	0	0	0
1.5%	MONEY MARKET	0.50	**1**	0.20	0	0	0	0	0
5.0%	FIXED INCOME	0.15	0.20	**1**	0.30	0.10	0.10	0.10	0.05
10.0%	BALANCED	0	0	0.30	**1**	0.95	0.60	0.75	0.60
15.5%	DIVERSE EQUITY	0	0	0.10	0.95	**1**	0.60	0.80	0.70
17.5%	INTL EQUITY	0	0	0.10	0.60	0.60	**1**	0.50	0.60
21.5%	INTERM EQUITY	0	0	0.10	0.75	0.80	0.50	**1**	0.70
26.0%	AGGR EQUITY	0	0	0.05	0.60	0.70	0.60	0.70	**1**

As an example, suppose three funds (Fixed Income, diversified U.S. Equity and Aggressive Equity) are offered to clients on a product with a contract level guarantee (i.e., across all funds held within the policy). The current fund holdings (in dollars) for five sample contracts are shown in Table 2-3.

TABLE 2-3: FUND CATEGORIZATION EXAMPLE

	1	2	3	4	5
MV Fund X (Fixed Income):	5,000	4,000	8,000	-	5,000
MV Fund Y (Diversified Equity):	9,000	7,000	2,000	5,000	-
MV Fund Z (Aggressive Equity):	1,000	4,000	-	5,000	5,000
Total Market Value:	15,000	15,000	10,000	10,000	10,000
Total Equity Market Value:	10,000	11,000	2,000	10,000	5,000
Fixed Income % (*A*):	33%	27%	80%	0%	50%
Fixed Income Test (*A*>75%):	No	No	Yes	No	No
Aggressive % of Equity (B):	10%	36%	n/a	50%	100%
Balanced Test (*A*>25% & *B*<33.3%):	Yes	No	n/a	No	No
Volatility of Current Fund Holdings:	10.9%	13.2%	5.3%	19.2%	13.4%
Fund Classification:	**Balanced**	**Diversified***	**Fixed Income**	**Intermediate**	**Diversified**

* Although the volatility suggests "Balanced Fund", the Balanced Fund criteria were not met. Therefore, this 'exposure' is moved "up" to Diversified Equity. For those funds classified as Diversified Equity, additional analysis would be required to assess whether they should be instead designated as "Diversified International Equity".

As an example, the "Volatility of Current Fund Holdings" for policy #1 is calculated as $\sqrt{A+B}$ where:

$$A = \left(\frac{5}{15}\times 0.05\right)^2 + \left(\frac{9}{15}\times 0.155\right)^2 + \left(\frac{1}{15}\times 0.26\right)^2$$

$$B = 2\cdot\left(\frac{5}{15}\cdot\frac{9}{15}\right)(0.1\times 0.05\times 0.155) + 2\cdot\left(\frac{5}{15}\cdot\frac{1}{15}\right)(0.05\times 0.05\times 0.26) + 2\cdot\left(\frac{9}{15}\cdot\frac{1}{15}\right)(0.7\times 0.155\times 0.26)$$

So, the volatility for contract #1 = $\sqrt{0.0092+0.0026}$ = 0.109 or 10.9%.

Derivation of Total Equivalent Account Charges (MER) and Margin Offset (α)

The total equivalent account charge ("MER") is meant to capture *all* amounts that are deducted from policyholder funds, not only those that are commonly expressed as spread-based fees. The MER, expressed as an equivalent annual basis point charge against account value, should include (but not be limited to) the following: investment management fees, mortality & expense charges, administrative loads, policy fees and risk premiums. In light of the foregoing, it may be necessary to estimate the "equivalent MER" if there are fees withdrawn from policyholder accounts that are not expressed as basis point charges against account value.

The margin offset, α, represents the total amount available to fund the guaranteed benefit claims and amortization of the unamortized surrender charge allowance after considering most other policy expenses (including overhead). The margin offset, expressed as an equivalent annual basis point charge against account value, may include the effect of Revenue Sharing in the same manner as would be done for modeling as described in section 6 of the Modeling Methodology, except as may be thereby permitted, should be deemed "permanently available" in all future scenarios. However, the margin offset should not include per policy charges (e.g., annual policy fees) since these are included in *FE*. It is often helpful to interpret the margin offset as $\alpha = MER - X + RS$, where *X* is the sum of:

- Investment management expenses and advisory fees;
- Commissions, bonuses (dividends) and overrides;
- Maintenance expenses, other than those included in *FE*; and
- Unamortized acquisition costs not reflected in *CA*.

And *RS* is the Revenue Sharing to the extent permitted as described above.

Product Attributes and Factor Tables

The tabular approach for the *GC* component creates a multi-dimensional grid (array) by testing a very large number of combinations for the policy attributes. The results are expressed as factors. Given the seven (7) attributes for a policy (i.e., *P*, *A*, *F*, *X*, *D*, AV—GV Ratio, *MER*), two factors are returned for $f(\circ)$ and $g(\circ)$. The factors are determined by looking up (based on a "key") into the large, pre-computed multi-dimensional tables and using multi-dimensional linear interpolation.

The policy attributes for constructing the test cases and the lookup keys are given in Table 2-4.

As can be seen, there are 6 ξ 2 ξ 8 ξ 8 ξ 5 ξ 7 ξ 3 = 80,640 "nodes" in the factor grid. Interpolation is only permitted across the last four (4) dimensions: Attained Age (*X*), Policy Duration (*D*), AV—GV Ratio (*F*) and MER. The "MER Delta" is calculated based on the difference between the actual MER and that assumed in the factor testing (see Table 10), subject to a cap (floor) of 100 bps (−100 bps).

Functions are available to assist the company in applying the Alternative Method for GMDB risks. These functions perform the factor table lookups and associated multi-dimensional linear interpolations. Their use is not mandatory. Based on the information in this document, the company should be able to write its own lookup and retrieval routines. Interpolation in the factor tables is described further later in this section.

Table 2-4: Nodes of the Factor Grid

Policy Attribute	Key: Possible Values & Description	
Product Definition, *P*.	0 : 0	Return-of-premium.
	1 : 1	Roll-up (3% per annum).
	2 : 2	Roll-up (5% per annum).
	3 : 3	Maximum Anniversary Value (MAV).
	4 : 4	High of MAV and 5% Roll-up.
	5 : 5	Enhanced Death Benefit (excl. GMDB)
GV Adjustment Upon Partial Withdrawal, *A*.	0 : 0	Pro-rata by market value.
	1 : 1	Dollar-for-dollar.
Fund Class, *F*.	0 : 0	Fixed Account.
	1 : 1	Money Market.
	2 : 2	Fixed Income (Bond).
	3 : 3	Balanced Asset Allocation.
	4 : 4	Diversified Equity.
	5 : 5	International Equity.
	6 : 6	Intermediate Risk Equity.
	7 : 7	Aggressive / Exotic Equity.
Attained Age (Last Birthday), *X*.	0 : 35	4 : 65
	1 : 45	5 : 70
	2 : 55	6 : 75
	3 : 60	7 : 80
Policy Duration (years-since-issue), *D*.	0 : 0.5	
	1 : 3.5	
	2 : 6.5	
	3 : 9.5	
	4 : 12.5	
Account Value-to-Guaranteed Value Ratio, λ.	0 : 0.25	4 : 1.25
	1 : 0.50	5 : 1.50
	2 : 0.75	6 : 2.00
	3 : 1.00	
Annualized Account Charge Differential from Table 2-10 Assumptions ("MER Delta")	0 : −100 bps	
	1 : +0	
	2 : +100	

A test case (i.e., a node on the multi-dimensional matrix of factors) can be uniquely identified by its key, which is the concatenation of the individual 'policy attribute' keys, prefixed by a leading '1'. For example, the key '12034121' indicates the factor for a 5% roll-up GMDB, where the GV is adjusted pro-rata upon partial withdrawal, balanced asset allocation, attained age 65, policy duration 3.5, 75% AV/GV ratio and "equivalent" annualized fund based charges equal to the 'base' assumption (i.e., 250 bps p.a.).

The factors are contained in the file "C3-II GMDB Factors 100%Mort CTE(90) (2005-03-29).csv", a comma-separated value text file. Each "row" represents the factors/parameters for a test policy as identified by the lookup keys shown in Table 2-4. Rows are terminated by new line and line feed characters.

Each row consists of 5 entries, described further below.

1	2	3	4	5
Test Case Identifier (Key)	Base GMDB Cost Factor	Base Margin Offset Factor	Scaling Adjustment (Intercept)	Scaling Adjustment (Slope)

GMDB Cost Factor. This is the term $f(\tilde{\theta})$ in the formula for *GC*. The parameter set $\tilde{\theta}$ is defined by $(P, A, F, X, D, \varphi, MER)$. Here, φ is the AV/GV ratio for the benefit exposure (e.g., policy) under consideration. The values in the factor grid represent CTE(90) of the sample distribution[4] for the present value of guaranteed benefit cash flows (in excess of account value) in all future years (i.e., to the earlier of contract maturity and 30 years), normalized by guaranteed value.

Base Margin Offset Factor. This is the term $g(\tilde{\theta})$ in the formula for *GC*. The parameter set $\tilde{\theta}$ is defined by $(P, A, F, X, D, \varphi, MER)$. Here, φ is the AV/GV ratio for the benefit exposure (e.g., policy) under consideration. The values in the factor grid represent CTE(90) of the sample distribution for the present value of margin offset cash flows in all future years (i.e., to the earlier of contract maturity and 30 years), normalized by account value. Note that the Base Margin Offset Factors assume $\hat{\alpha} = 100$ basis points of "margin offset" (net spread available to fund the guaranteed benefits).

All else being equal, the margin offset α has a profound effect on the resulting AAR. In comparing the Alternative Method against models for a variety of GMDB portfolios, it became clear that some adjustment factor would be required to "scale" the results to account for the diversification effects[5] of attained age, policy duration and AV/GV ratio. The testing examined $W_1 = \frac{\alpha}{MER} = 0.20$ and $W_2 = \frac{\alpha}{MER} = 0.60$, where α = available margin offset and *MER* = total "equivalent" account based charges, in order to understand the interaction between the margin ratio ("*W*") and AAR.

Based on this analysis, the *Scaling Factor* is defined as:

$$h(\hat{\theta}) = R = \beta_0 + \beta_1 \times W$$

β_0 and β_1 are respectively the intercept and slope for the linear relationship, defined by the parameter set $\hat{\theta} = (P, F, \hat{\varphi})$. Here, $\hat{\varphi}$ is 90% of the aggregate AV/GV for the *product form* (i.e., not for the individual policy or cell) under consideration. In calculating the *Scaling Factor* directly from this linear function, the margin ratio "*W*" must be constrained[6] to the range $[0.2, 0.6]$.

It is important to remember that $\hat{\varphi} = 0.90 \times \frac{\sum AV}{\sum GV}$ for the product form being evaluated (e.g., all 5% Roll-up policies). The 90% factor is meant to reflect the fact that the cost (payoff structure) for a basket of otherwise identical put options (e.g., GMDB) with varying degrees of in-the-moneyness (i.e., AV/GV ratios) is more left-skewed than the cost for a

---

4 Technically, the sample distribution for "present value of net cost" = PV[GMDB claims] – PV[Margin Offset] was used to determine the scenario results that comprise the CTE90 risk measure. Hence, the "GMDB Cost Factors" and "Base Margin Offset Factors" are calculated from the same scenarios.

5 By design, the Alternative Methodology does not directly capture the diversification benefits due to a varied asset profile and product mix. This is not a flaw of the methodology, but a consequence of the structure. Specific assumptions would be required to capture such diversification effects. Unfortunately, such assumptions might not be applicable to a given company and could grossly over-estimate the ensuing reduction in required capital.

6 The scaling factors were developed by testing "margin ratios" $W_1 = 0.2$ and $W_2 = 0.6$. Using values outside this range could give anomalous results.

single put option at the "weighted average" asset-to-strike ratio.

To appreciate the foregoing comment, consider a basket of two 10-year European put options as shown in Table 2-5. These options are otherwise identical except for their "market-to-strike price" ratios. The option values are calculated assuming a 5% continuous risk-free rate and 16% annualized volatility. The combined option value of the portfolio is $9.00, equivalent to a single put option with S = $180.92 and X = $200. The market-to-strike (i.e., AV/GV) ratio is 0.905, which is less than the average $AV/GV = 1 = \frac{\$75+\$125}{\$100+\$100}$.

Table 2-5: Equivalent Single European Put Option

	Equivalent Single Put Option	Put Option A ("in-the-money")	Put Option B ("out-of-the-money")
Market value (*AV*)	$180.92	$75	$125
Strike price (*GV*)	$200.00	$100	$100
Option Value	$9.00	$7.52	$1.48

Scaling Adjustment (Intercept). The scaling factor $h(\hat{\theta}) = R$ is a linear function of W, the ratio of margin offset to MER. This is the intercept β_0 that defines the line.

Scaling Adjustment (Slope). The scaling factor $h(\hat{\theta}) = R$ is a linear function of W, the ratio of margin offset to MER. This is the slope β_1 that defines the line.

Table 2-6 shows the "Base Cost" and "Base Margin Offset" values from the factor grid for some sample policies. As mentioned earlier, the Base Margin Offset factors assume 100 basis points of "available spread". The "Margin Factors" are therefore scaled by the ratio $\frac{\alpha}{100}$, where α = the actual margin offset (in basis points per annum) for the policy being valued. Hence, the margin factor for the 7th sample policy is exactly half the factor for node 12044121 (the 4th sample policy in Table 6). That is, 0.02160 = 0.5 × 0.04319.

Table 2-6: Sample Nodes on the Factor Grid

KEY	GMDB TYPE	GV ADJUST	FUND CLASS	AGE	POLICY DUR	AV/GV	MER (bps)	OFFSET	COST FACTOR	MARGIN FACTOR
10132031	ROP	$-for-$	Balanced Allocation	55	0.5	1.00	250	100	0.01073	0.04172
10133031	ROP	$-for-$	Balanced Allocation	60	0.5	1.00	250	100	0.01619	0.03940
10134031	ROP	$-for-$	Balanced Allocation	65	0.5	1.00	250	100	0.02286	0.03634
12044121	5% Rollup	Pro-rata	Diverse Equity	65	3.5	0.75	250	100	0.18484	0.04319
12044131	5% Rollup	Pro-rata	Diverse Equity	65	3.5	1.00	250	100	0.12931	0.03944
12044141	5% Rollup	Pro-rata	Diverse Equity	65	3.5	1.25	250	100	0.08757	0.03707
12044121	5% Rollup	Pro-rata	Diverse Equity	65	3.5	0.75	250	50	0.18484	0.02160

Interpolation in the Factor Tables

Interpolation is only permitted across the last four (4) dimensions of the risk parameter set $\hat{\theta}$: Attained Age (X), Policy Duration (D), AV––GV Ratio ( ) and MER. The "MER Delta" is calculated based on the difference between the actual MER and that assumed in the factor testing (see Table 2-10), subject to a cap (floor) of 100 bps (–100 bps). In general, the calculation for a single policy will require *three* applications of multi-dimensional linear interpolation between the $16 = 2^4$ factors/values in the grid:

(1) To obtain the *Base Factors* $f(\hat{\theta})$ and $g(\hat{\theta})$.

(2) To obtain the *Scaling Factor* $h(\hat{\theta}) = R$.

Based on the input parameters, the supplied functions (see Appendix 9) will automatically perform the required lookups, interpolations and calculations for $h(\hat{\theta}) = R$, including the constraints imposed on the margin ratio W. Use of the tools noted in Appendix 9 is not mandatory.

Multi-dimensional interpolation is an iterative extension of the familiar two-dimensional linear interpolation for a discrete function $V(x)$:

$$\tilde{V}(x_k + \delta) = (1 - \xi) \times V(x_k) + \xi \times V(x_{k+1})$$

and

$$\xi = \frac{\delta}{x_{k+1} - x_x}$$

In the above formulation, $\tilde{V}(x)$ is assumed continuous and x_k and x_{k+1} are defined values ("nodes") for $V(x)$. By definition, $x_k \leq (x_k + \delta) \leq x_{k+1}$ so that $0 \leq \xi \leq 1$. In effect, multi-dimensional interpolation repeatedly applies simple linear interpolation one dimension at a time until a single value is obtained.

Multi-dimensional interpolation across all four dimensions is not required. However, simple linear interpolation for *AV*--*GV* Ratio (λ) is mandatory. In this case, the company must choose nodes for the other three (3) dimensions according to the following rules:

Risk Attribute (Dimension)	**Node Determination**
Attained Age	Use next higher attained age.
Policy Duration	Use nearest.
MER Delta	Use nearest (capped at +100 & floored at –100 bps.

For example, if the actual policy/cell is attained age 62, policy duration 4.25 and MER Delta = +55 bps, the company should use the nodes defined by attained age 65, policy duration 3.5 and MER Delta = +100.

Table 2-7 provides an example of the fully interpolated results for a 5% Roll-up "Pro Rata" policy mapped to the Diversified Equity class (first row). While Table 2-7 does not demonstrate how to perform the multi-dimensional interpolation, it does show the required 16 nodes from the *Base Factors*. The margin offset is assumed to be 100 basis points.

Table 2-7: Base Factors for a 5% Rollup GMDB Policy, Diversified Equity

Key	Age	Policy Dur	Policy Av/Gv	Mer (Bps)	Base Cost Factor	Base Margin Factor
INTERPOLATED	62	4.25	0.80	265	0.15010	0.04491
12043121	60	3.5	0.75	250	0.14634	0.04815
12043122	60	3.5	0.75	350	0.15914	0.04511
12043131	60	3.5	1.00	250	0.10263	0.04365
12043132	60	3.5	1.00	350	0.11859	0.04139
12043221	60	6.5	0.75	250	0.12946	0.04807
12043222	60	6.5	0.75	350	0.14206	0.04511
12043231	60	6.5	1.00	250	0.08825	0.04349
12043232	60	6.5	1.00	350	0.10331	0.04129
12044121	65	3.5	0.75	250	0.18484	0.04319
12044122	65	3.5	0.75	350	0.19940	0.04074
12044131	65	3.5	1.00	250	0.12931	0.03944
12044132	65	3.5	1.00	350	0.14747	0.03757
12044221	65	6.5	0.75	250	0.16829	0.04313
12044222	65	6.5	0.75	350	0.18263	0.04072
12044231	65	6.5	1.00	250	0.11509	0.03934
12044232	65	6.5	1.00	350	0.13245	0.03751

The interpolations required to compute the *Scaling Factor* are slightly different from those needed for the *Base Factors*. Specifically, the user should *not* interpolate the intercept and slope terms for each surrounding node, but rather interpolate the *Scaling Factors* applicable to each of the nodes.

Table 2-8 provides an example of the *Scaling Factor* for the sample policy given earlier in Table 2-7 (i.e., a 5% Roll-up "Pro Rata" policy mapped to the Diversified Equity class) as well as the nodes used in the interpolation. The aggregate AV/GV for the product portfolio (i.e., all 5% Roll-up policies combined) is 0.75; hence, 90% of this value is 0.675 as shown under "Adjusted Product AV/GV". As before, the margin offset is 100 basis points per annum.

Table 2-8: Interpolated Scaling Factors for a 5% Rollup GMDB Policy, Diversified Equity

Key	Age	Policy Dur	Adjusted Product Av/Gv	Mer (Bps)	Intercept	Slope	Scaling Factor
INTERPOLATED	62	4.25	0.675	265	n/a	n/a	0.871996
12043111	60	3.5	0.50	250	0.855724	0.092887	0.892879
12043112	60	3.5	0.50	350	0.855724	0.092887	0.882263
12043121	60	3.5	0.75	250	0.834207	0.078812	0.865732
12043122	60	3.5	0.75	350	0.834207	0.078812	0.856725
12043211	60	6.5	0.50	250	0.855724	0.092887	0.892879
12043212	60	6.5	0.50	350	0.855724	0.092887	0.882263
12043221	60	6.5	0.75	250	0.834207	0.078812	0.865732
12043222	60	6.5	0.75	350	0.834207	0.078812	0.856725
12044111	65	3.5	0.50	250	0.855724	0.092887	0.892879
12044112	65	3.5	0.50	350	0.855724	0.092887	0.882263
12044121	65	3.5	0.75	250	0.834207	0.078812	0.865732
12044122	65	3.5	0.75	350	0.834207	0.078812	0.856725
12044211	65	6.5	0.50	250	0.855724	0.092887	0.892879
12044212	65	6.5	0.50	350	0.855724	0.092887	0.882263
12044221	65	6.5	0.75	250	0.834207	0.078812	0.865732
12044222	65	6.5	0.75	350	0.834207	0.078812	0.856725

Adjustments to GC for Product Variations & Risk Mitigation/Transfer

In some cases, it may be necessary for the company to make adjustments to the published factors due to:

1. A variation in product form wherein the definition of the guaranteed benefit is materially different from those for which factors are available (see Table 2-9); and/or
2. A risk mitigation / management strategy that cannot be accommodated through a straight-forward and direct adjustment to the published values.

Any adjustments to the published factors must be fully documented and supported through stochastic modeling. Such modeling may require stochastic simulations but would not ordinarily be based on full inforce projections. Instead, a representative "model office" should be sufficient. In the absence of material changes to the product design, risk management program and Alternative Method (including the published factors), the company would not be expected to redo this modeling each year.

Note that minor variations in product design do not necessarily require additional effort. In some cases, it may be reasonable to use the factors/formulas for a different product form (e.g., for a "roll-up" GMDB policy near or beyond the maximum reset age or amount, the company should use the "return-of-premium" GMDB factors/formulas, possibly adjusting the guaranteed value to reflect further resets, if any). In other cases, the company might determine the RBC based on two different guarantee definitions and interpolate the results to obtain an appropriate value for the given policy/cell. Likewise, it may be possible to adjust the Alternative Method results for certain risk transfer arrangements without significant additional work (e.g., quota-share reinsurance without caps, floors or sliding scales would normally be reflected by a simple pro-rata adjustment to the "gross" *GC* results).

However, if the policy design is sufficiently different from those provided and/or the risk mitigation strategy is non-linear in its impact on the AAR, and there is no practical or obvious way to obtain a good result from the prescribed factors/formulas, the company must justify any adjustments or approximations by stochastic modeling. Notably this modeling need not be performed on the whole portfolio but can be undertaken on an appropriate set of representative policies.

The remainder of this section suggests a process for adjusting the published "Cost" and "Margin Offset" factors due to a variation in product design (e.g., a "step-up" option at every 7th anniversary whereby the guaranteed value is reset to the account value, if higher). Note that the "Scaling Factors" (as determined by the slope and intercept terms in the factor table) would not be adjusted.

The steps for adjusting the published *Cost* and *Margin Offset* factors for product design variations are:

1. Select a policy design in the published tables that is similar to the product being valued. Execute cashflow projections using the documented assumptions (see Tables 2-9 and 2-10) and the scenarios from the prescribed generators for a set of representative cells (combinations of attained age, policy duration, asset class, AV/GV ratio and MER). These cells should correspond to nodes in the factor grid. Rank (order) the sample distribution of results for the present value of net cost[7]. Determine those scenarios which comprise CTE(90).

2. Using the results from step 1., average the present value of cost for the CTE(90) scenarios and divide by the current guaranteed value. For a the J^{th} cell, denote this value by F_J. Similarly, average the present value of margin offset revenue for the same subset of scenarios and divide by account value. For the J^{th} cell, denote this value by G_J.

[7] Present value of net cost = PV[guaranteed benefit claims in excess of account value] – PV[margin offset]. The discounting includes cashflows in all future years (i.e., to the earlier of contract maturity and the end of the horizon).

3. Extract the corresponding factors from the published grid. For each cell, calibrate to the published tables by defining a "model adjustment factor" (denoted by asterisk) separately for the "cost" and "margin offset" components:

$$F_J^* = \frac{f(\tilde{\theta})}{F_J} \text{ and } G_J^* = \frac{\hat{g}(\tilde{\theta})}{G_J}$$

4. Execute "product specific" cashflow projections using the documented assumptions and scenarios from the prescribed generators for the same set of representative cells. Here, the company should model the actual product design. Rank (order) the sample distribution of results for the present value of net cost. Determine those scenarios which comprise CTE(90).

5. Using the results from step 4., average the present value of cost for the CTE(90) scenarios and divide by the current guaranteed value. For a the J^{th} cell, denote this value by $\bar{F}_J$. Similarly, average the present value of margin offset revenue for the same subset of scenarios and divide by account value. For a the J^{th} cell, denote this value by $\bar{G}_J$.

6. To calculate the AAR for the specific product in question, the company should implement the Alternative Method as documented, but use $\bar{F}_J \times F_J^*$ in place of $f(\tilde{\theta})$ and $\bar{G}_J \times G_J^*$ instead of $\hat{g}(\tilde{\theta})$. The company must use the "Scaling Factors" for the product evaluated in step 1. (i.e., the product used to calibrate the company's cashflow model).

Assumptions for the Alternative Method Published GMDB Factors

This subsection reviews the model assumptions used to develop the Alternative Method factors. Each node in the factor grid is effectively the modeled result for a given "cell".

Table 2-9: Model Assumptions & Product Characteristics

Account Charges (MER)	Vary by fund class. See Table 2-10 later in this section.
Base Margin Offset	100 basis points per annum
GMDB Description	1. ROP = return of premium ROP. 2. ROLL = 5% roll-up, capped at 2.5 ξ premium, frozen at age 80. 3. MAV = annual ratchet (maximum anniversary value), frozen at age 80. 4. HIGH = Higher of 5% roll-up and annual ratchet frozen at age 80. 5. EDB = ROP + 40% Enhanced Death Benefit (capped at 40% of deposit).
Adjustment to GMDB Upon Partial Withdrawal	"Pro-Rata by Market Value" and "Dollar-for-Dollar" are tested separately.
Surrender Charges	Ignored (i.e., zero). Reflected in the "CA" component of the AAR.
Single Premium/Deposit	$100,000. No future deposits; no intra-policy fund rebalancing.
Base Policy Lapse Rate	• Pro-rata by MV: 10% p.a. at all policy durations (before dynamics) • Dollar-for-dollar: 2% p.a. at all policy durations (no dynamics)
Partial Withdrawals	• Pro-rata by MV: None (i.e., zero) • Dollar-for-dollar: Flat 8% p.a. at all policy durations (as a % of AV).

	No dynamics or anti-selective behavior.
Mortality	100% of MGDB 94 ALB.
Gender/Age Distribution	100% male. Methodology accommodates different attained ages and policy durations. A 5-year age setback will be used for female annuitants.
Max. Annuitization Age	All policies terminate at age 95.
Fixed Expenses, Annual Fees	Ignored (i.e., zero). Reflected in the "FE" component of the AAR.
Income Tax Rate	21%
Discount Rate	4.54% (after-tax) effective = 5.75% pre-tax.
Dynamic Lapse Multiplier (Applies only to policies where GMDB is adjusted "pro-rata by MV" upon withdrawal)	*U*=1, *L*=0.5, *M*=1.25, *D*=1.1 ■ Applied to the 'Base Policy Lapse Rate' (not withdrawals).

Notes on GMDB Factor Development

- The roll-up is continuous (not simple interest, not stepped at each anniversary) and is applied to the previous roll-up guaranteed value (i.e., not the contract guaranteed value under HIGH).
- The Enhanced Death Benefit ("EDB") is floored at zero. It pays out 40% of the gain in the policy upon death at time *t*: $B_t = MIN[0.40 \times Deposit, 0.40 \times MAX(0, AV_t - Deposit)]$. The test policy also has a 100% return-of-premium GMDB, but the EDB Alternative Factors will be net of the GMDB component. That is, the EDB factors are 'stand-alone' and applied *in addition to* the GMDB factors.
- The "Base Policy Lapse Rate" is the rate of policy termination (total surrenders). Policy terminations (surrenders) are assumed to occur throughout the policy year (not only on anniversaries).
- Partial withdrawals (if applicable) are assumed to occur at the end of each time period (quarterly).
- Account charges ("MER") represent the total amount (annualized, in basis points) assessed against policyholder funds (e.g., sum of investment management fees, mortality and expense charges, risk premiums, policy/administrative fees, etc.). They are assumed to occur throughout the policy year (not only on anniversaries).

Table 2-10: Account-Based Fund Charges (bps per annum)

Asset Class / Fund	Account Value Charges (MER)
Fixed Account	0
Money Market	110
Fixed Income (Bond)	200
Balanced	250
Diversified Equity	250
Diversified International Equity	250
Intermediate Risk Equity	265
Aggressive or Exotic Equity	275

Calculation Example

Continuing the previous example (see Tables 2-7 and 2-8) for a 5% Roll-up GMDB policy mapped to Diversified Equity, suppose we have the policy/product parameters as specified in Table 2-11.

Table 2-11: Sample Policy Results for 5% Roll-up GMDB, Diversified Equity

Parameter	Value	Description
Deposit Value	$100.00	Total deposits adjusted for partial withdrawals.
Account Value	$98.43	Total account value at valuation date, in dollars.
GMDB	$123.04	Current guaranteed minimum death benefit, in dollars.
Attained Age	62	Attained age at the valuation date (in years).
Policy Duration	4.25	Policy duration at the valuation date (in years).
GV Adjustment	Pro-Rata	GMDB adjusted pro-rata by MV upon partial withdrawal.
Fund Class	Diversified Equity	Contract exposure mapped to Diversified Equity as per the Fund Categorization instructions in the section of this Appendix on Component GC.
MER	265	Total charge against policyholder funds (bps).
ProductCode	2	Product Definition code as per lookup key in Table 4.
GVAdjust	0	GV Adjustment Upon Partial Withdrawal as per key in Table 2-4.

FundCode	4	Fund Class code as per lookup key in Table 2-4.
PolicyMVGV	0.800	Contract account value divided by GMDB.
AdjProductMVGV	0.675	90% of the aggregate AV/GV for the Product portfolio.
RC	150	Margin offset (basis points per annum).

Using the usual notation, $GC = GV \times f(\tilde{\theta}) - AV \times \hat{g}(\tilde{\theta}) \times h(\tilde{\theta})$.

$f(\tilde{\theta})$ = 0.150099 = GetCostFactor(2, 0, 4, 62, 4.25, 0.8, 265)

$\hat{g}(\tilde{\theta})$ = 0.067361 = GetMarginFactor(2, 0, 4, 62, 4.25, 0.8, 265, 150)

$h(\tilde{\theta})$ = 0.887663 = GetScalingFactor(2, 0, 4, 62, 4.25, 0.675, 265, 150)

Hence, *GC* = \$12.58 = (123.04 × 0.150099) – (98.43 × 0.067361 × 0.887663). As a normalized value, this quantity is 12.78% of account value, 10.23% of guaranteed value and 51.1% of the current net amount at risk (Net amount at risk = GV – AV).

Note that $\hat{g}(\tilde{\theta}) = \frac{\alpha}{\hat{\alpha}} \times g(\tilde{\theta}) = \frac{150}{100} \times 0.044907$ where $g(\tilde{\theta})$ is "per 100 basis points" of available margin offset.

$g(\tilde{\theta})$ = 0.044907 = GetMarginFactor(2, 0, 4, 62, 4.25, 0.8, 265, 100)

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November 26, 2025

Philip Barlow
Chair, NAIC Life Risk-Based Capital (E) Working Group (LRBC)

Peter Weber
Chair, NAIC Variable Annuities Capital and Reserve (E/A) Subgroup (VACR)

Re: LRBC-VACR VM-21 Exposures

Dear Chairs Barlow and Weber:

The American Council of Life Insurers (ACLI) appreciates the opportunity to respond to the exposures which came out of a joint meeting of the LRBC Working Group and the VACR Subgroup on October 31st related to VM-21 scope clarifications. These included *Amendment Proposal Form (APF) 2025-14*, *RBC Proposal Form 2025-17-L*, and *Proposed Changes in the Life RBC Appendix 1 Instructions*.

Generally, ACLI is not opposed to the adoption of these items by the appropriate NAIC groups. The proposed changes are consistent with industry's understanding from past discussions that either VM-21 or VM-22 could be appropriate for the kinds of payouts being described, depending on how the business is managed, and we agree with regulators that clarification is useful for the purposes of calculating reserves and capital.

However, there is a question ACLI members would like to see addressed related to APF 2025-14. Specifically, the proposed language seems to contradict existing VM-22 (VM-V for 2026 Valuation Manual) Section 1.A.2 language that scopes out "benefits arising from variable annuities.". If this was not the intention of the drafters, clarification could be warranted to bring this language in alignment with the proposed language in Section II Reserve Requirements Subsection 2: Annuity Products.

Thank you once again for the consideration of our feedback and we look forward to additional discussion on this topic soon.

Sincerely,

B Bayerle Colin Masterson

cc: Kazeem Okosun, NAIC; Jane Ren, NAIC

American Council of Life Insurers | 300 New Jersey Avenue, NW, 10th Floor | Washington, DC 20001

Life Actuarial (A) Task Force/ Health Actuarial (B) Task Force
Amendment Proposal Form*

1. Identify yourself, your affiliation, and a very brief description (title) of the issue.

Identification:
Matt Cheung, Illinois Department of Insurance

Title of the Issue:
Clarify that variable annuities in payout phase, either after annuitization or account value depletion, can be reserved for as a variable annuity under VM-21 with domiciliary commissioner approval. If reserved for under VM-21, the Standard Projection Amount requirements apply to these contracts. This also clarifies the discount rates to use for VA's in payout phase that are reserved for as payout annuities.

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2. Identify the document, including the date if the document is "released for comment," and the location in the document where the amendment is proposed:

- 2026 Valuation Manual, Section II Reserve Requirements Subsection 2: Annuity Products
- 2026 Valuation Manual, VM-21 Requirements Section 6.C.9
- 2026 Valuation Manual, VM-V Section 1.B

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3. Show what changes are needed by providing a red-line version of the original verbiage with deletions and identify the verbiage to be deleted, inserted, or changed by providing a red-line (turn on "track changes" in Word®) version of the verbiage. (You may do this through an attachment.)

See attached.

4. State the reason for the proposed amendment? (You may do this through an attachment.)

There is a diversity of practice currently of how variable annuities in payout are reserved for, and this APF serves to clarify that they can either be treated as variable annuities (which is the same treatment they had prior to annuitization/account value depletion, with domiciliary commissioner approval), or as fixed annuities.

Dates: Received	Reviewed by Staff	Distributed	Considered
Notes:			

Subsection 2: Annuity Products

A. This subsection establishes reserve requirements for all contracts classified as annuity contracts as defined in SSAP No. 50 in the AP&P Manual.

B. Minimum reserve requirements for variable annuity (VA) contracts and similar business, specified in VM-21, Requirements for Principle-Based Reserves for Variable Annuities, shall be those provided by VM-21. The minimum reserve requirements of VM-21 are considered PBR requirements for purposes of the *Valuation Manual,* and therefore are applicable to VM-G.

C. Minimum reserve requirements for non-variable annuity contracts issued prior to 1/1/2026 are those requirements as found in VM-A, VM-C, and VM-V as applicable, with the exception of the minimum requirements for the valuation interest rate for single premium immediate annuity contracts, and other similar contracts, issued after Dec. 31, 2017, including those fixed payout annuities emanating from host contracts issued on or after Jan. 1, 2017, and on or before Dec. 31, 2017. The maximum valuation interest rate requirements for those contracts and fixed payout annuities are defined in VM-V, Statutory Maximum Valuation Interest Rates for Formulaic Reserves.

Minimum reserve requirements for non-variable annuity contracts issued on 1/1/2026 and later are those requirements as found in VM-22, with the exception of Preneed Annuities, Guaranteed Investment Contracts, Synthetic Guaranteed Investment Contracts, Funding Agreements, and other Stable Value Contracts which shall follow the requirements found in VM-A, VM-C, and VM-V. Minimum reserve requirements for fixed payout annuities resulting from the exercise of settlement options or annuitizations of host contracts, as well as fixed income payment streams attributable to guaranteed living benefits associated with deferred annuity contracts with guaranteed living benefits once the contract funds are exhausted, are those requirements as found in VM-22, with the exception that, with the permission of the domiciliary commissioner, the company may use the same maximum valuation interest rate used to value payment streams in accordance with the guidance applicable to the host contract. The minimum reserve requirements of VM-22 are considered PBR requirements for purposes of the *Valuation Manual,* and therefore are applicable to VM-G.

~~VA contracts in payout phase, regardless of how they are administered, can be reserved for under VM-21 with domiciliary commissioner approval.~~

VA contracts in payout phase administered as payout contracts can be reserved for under VM-21 with domiciliary commissioner approval.

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VM-21: Requirements for Principles-Based Reserves for Variable Annuities

Section 6: Requirements for the Additional Standard Projection Amount

C. Prescribed Assumptions

9. Mortality

The mortality rate for a contract holder with age x in year (2012 + n) shall be calculated using the following formula, where q_x denotes mortality from the 2012 IAM Basic Mortality Table multiplied by the appropriate factor (F_x) from Table 6.9 and $G2_x$ denotes mortality improvement from Projection Scale G2:

$$q_x^{2012+n} = q_x^{2012}(1 - G2_x)^n * F_x$$

Table 6.9

Attained Age (x)	F_x for VA with GLB and VA in payout phase		F_x for VA without GLB and with roll-up GDB		F_x for All Other	
	Male	Female	Male	Female	Male	Female
<=52	100%	95%	160%	150%	110%	105%
53	99%	95%	160%	152%	110%	106%
54	98%	95%	160%	154%	110%	107%
55	97%	95%	160%	156%	110%	108%
56	96%	95%	160%	158%	110%	109%
57	95%	95%	160%	160%	110%	110%
58	93.5%	93.5%	160%	160%	109%	109%
59	92%	92%	160%	160%	108%	108%
60	90.5%	90.5%	160%	160%	107%	107%
61	89%	89%	160%	160%	106%	106%
62	88%	88%	160%	160%	105%	105%
63	89%	88%	160%	159%	105%	104%
64	90%	88%	160%	158%	105%	103%
65	91%	88%	160%	157%	105%	102%
66	92%	88%	160%	156%	105%	101%
67	93%	88%	160%	155%	105%	100%
68	95%	90%	160%	154%	107%	101.5%
69	97%	92%	160%	153%	109%	103%
70	99%	94%	160%	152%	111%	104.5%
71	101%	96%	160%	151%	113%	106%
72	103%	98%	160%	150%	115%	108%
73	103.5%	99.5%	158%	149%	115%	109%
74	104%	101%	156%	148%	115%	110%
75	104.5%	102.5%	154%	147%	115%	111%
76	104.5%	103.5%	152%	146%	115%	112%
77	105%	105%	150%	145%	115%	113%
78	106.5%	106.5%	147%	143%	115%	113.5%
79	108%	108%	144%	141%	115%	114%
80	109.5%	109.5%	141%	139%	115%	114.5%
81	111%	111%	138%	137%	115%	114.5%
82	113%	113%	135%	135%	115%	115%
83	113%	113%	132%	132%	114.5%	114.5%
84	113%	113%	129%	129%	114%	114%
85	113%	113%	126%	126%	113.5%	113.5%
86	113%	113%	123%	123%	113.5%	113.5%
87	113%	113%	120%	120%	113%	113%
88	113%	113%	119%	119%	113%	113%
89	113%	113%	118%	118%	113%	113%
90	113%	113%	117%	117%	113%	113%
91	113%	113%	113%	116%	113%	113%

92	113%	113%	115%	115%	113%	113%
93	112.5%	112.5%	114%	114%	112.5%	112.5%
94	112%	112%	113%	113%	112%	112%
95	111.5%	111.5%	112%	112%	111.5%	111.5%
96	111%	111%	111%	111%	111%	111%
97	110%	110%	110%	110%	110%	110%
98	109%	109%	109%	109%	109%	109%
99	108%	108%	108%	108%	108%	108%
100	107%	107%	107%	107%	107%	107%
101	106%	106%	106%	106%	106%	106%
102	105%	105%	105%	105%	105%	105%
103	103.0%	103.0%	103.0%	103.0%	103.0%	103.0%
104	101.0%	101.0%	101.0%	101.0%	101.0%	101.0%
>=105	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

VM-V

A. Purpose and Scope

1. These requirements define for single premium immediate annuity contracts and other similar contracts, certificates and contract features the statutory maximum valuation interest rate that complies with Model #820. These are the maximum interest rate assumption requirements to be used in the CARVM and for certain contracts, the CRVM. These requirements do not preclude the use of a lower valuation interest rate assumption by the company if such assumption produces statutory reserves at least as great as those calculated using the maximum rate defined herein.

2. The following categories of contracts, certificates and contract features, whether group or individual, including both life contingent and term certain only contracts, directly written or assumed through reinsurance, with the exception of benefits arising from variable annuities elected to be valued under VM-21 and all contracts not passing the SET covered by Sections 1 through 13 of VM-22, are covered by VM-V:

   a. Immediate annuity contracts issued after Dec. 31, 2017;
   b. Deferred income annuity contracts issued after Dec. 31, 2017;
   c. Structured settlements in payout or deferred status issued after Dec. 31, 2017;
   d. Fixed payout annuities resulting from the exercise of settlement options or annuitizations of host contracts issued after Dec. 31, 2017;
   e. Fixed payout annuities resulting from the exercise of settlement options or annuitizations of host contracts issued during 2017, for fixed payouts commencing after Dec. 31, 2018, or, at the option of the company, for fixed payouts commencing after Dec. 31, 2017;
   f. Supplementary contracts, excluding contracts with no scheduled payments (such as retained asset accounts and settlements at interest), issued after Dec. 31, 2017;
   g. Fixed income payment streams, attributable to contingent deferred annuities (CDAs) issued after Dec. 31, 2017, once the underlying contract funds are exhausted;

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h. Fixed income payment streams attributable to guaranteed living benefits associated with deferred annuity contracts issued after Dec. 31, 2017, once the contract funds are exhausted; and

i. Certificates with premium determination dates after Dec. 31, 2017, emanating from non-variable group annuity contracts specified in Model #820, Section 5.C.2, purchased for the purpose of providing certificate holders benefits upon their retirement.

Guidance Note: For Section 1.B.4, Section 1.B.5, Section 1.B.6 and Section 1.B.8 above, there is no restriction on the type of contract that may give rise to the benefit.