



AMERICAN ACADEMY *of* ACTUARIES

Recommended Approach for Updating Regulatory Risk-Based Capital Requirements for Interest Rate Risk for Fixed Annuities and Single Premium Life Insurance (C-3 Phase I)

Presented by the American Academy of Actuaries' C-3 Work Group of the Life Capital Adequacy Subcommittee to the National Association of Insurance Commissioners' Life Risk-Based Capital Working Group

May 2014

The American Academy of Actuaries is an 18,000-member professional association whose mission is to serve the public and the U.S. actuarial profession. The Academy assists 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.

Link Richardson, CERA, FSA, MAAA, Chairperson

Nancy Bennett, CERA, FSA, MAAA
Mike Dubois, FSA, MAAA
Geoff Hancock, CERA, FCIA, FSA, MAAA
Jeff Johnson, FSA, MAAA

Jennifer Parkes, FSA, MAAA
Keith Sell, FSA, MAAA
Chris Trost, FSA, MAAA
Dale Uthoff, FSA, MAAA

In 2013, the NAIC's Life Risk-Based Capital (RBC) Work Group (LRBC WG) asked the American Academy of Actuaries (Academy) to review the C-3 Phase I component of the RBC formula in order to recommend an updated approach more aligned with C-3 Phase II and the proposed framework of C-3 Phase III.

The Academy's Life Capital Adequacy Subcommittee's (LCAS) C-3 Work Group (C3 WG) believes that the use of consistent methodologies among the different C-3 Phases is essential to more accurately reflect a life insurer's exposure to risks in the RBC formula and thus appropriate to advance the goal of differentiating weakly capitalized companies from those that are not weakly capitalized. Movement in the direction of being able to evaluate all of the risks of an entire company under consistent scenarios will provide a more accurate picture of interactions among risk components. Progress on this front could also make analyses more useful for a company's own risk management framework.

The current C-3 Phase I component has not changed since it was introduced. Consequently, the C-3 Phase I component includes interest rate scenarios that have not been updated for recent market conditions and are based on representative asset and liability portfolios from the late 1990's. A brief history of the C-3 component is as follows:

Effective December 31, 2000, the NAIC implemented Phase I. Phase I addressed interest rate risk for fixed annuities and single premium life. The LCAS submitted its final report on Phase I in October 1999 recommending the determination of capital requirements by scenario testing (http://www.actuary.org/files/C3_Phase_I_Report_October_1999.pdf). The 1999 Report included a fixed Mean Reversion Point (MRP) for the long treasury rate of 6.55%, which has remained unchanged since that time. The required capital is determined by applying different weights to the scenario results for the 92nd percentile through 98th percentile results, with the heaviest weighting at the 95th percentile.

In June 2005, the LCAS submitted its final report on Phase II, "Recommended Approach for Setting Regulatory Risk-Based Capital Requirements for Variable Annuities and Similar Products" (http://www.actuary.org/pdf/life/c3_june05.pdf). This report defined the methodology for calculating capital requirements for variable annuities, including the use of pre-packaged equity return scenarios and the option to use proprietary scenario generators that satisfy specified calibration criteria for equity returns. Calibration criteria were not specified for interest rates. The scenario weighting measure in the 2005 report is a Conditional Tail Expectation (CTE) 90, defined as the average of the scenario results beyond the 90th percentile.

The December 2008 report of the Academy's Economic Scenario Work Group (ESWG) (http://dev.actuary.org/files/publications/report_lbrc_dec08.pdf) described the development of an updated interest rate generator and recommendations for using this generator for regulatory reserve and capital calculations. The report also included a formula for the determination of the MRP that would be automatically updated based on actual US Treasury rates. The NAIC adopted a modification of this formula. A third key element of the 2008 report was recommended calibration criteria for interest rates, so that companies could use their own internal generator or a subset of the base 10,000 Academy scenarios.

In previous discussions between the C3 WG and the LRBC WG, the C3 WG recommended, and the LRBC WG approved, certain changes to the C-3 Phase I component. The LRBC WG approved using the latest version of the Academy generator for interest rates, including a formulaic MRP, and a CTE90 scenario weighting framework for determining capital requirements. Further, the LRBC WG agreed to implement these recommendations on a field test basis. For 2014 RBC filings, the current C-3 Phase I framework will remain the basis of reported RBC results. Large companies will be required to submit a sensitivity test for 2014 using the recommended updated C-3 Phase I basis. This sensitivity test will be optional for small companies for 2014 filings. In the 2015 filings small companies will be required to submit the sensitivity test results using the recommended updated C-3 Phase I basis.

In the interest of time, and to maintain comparability of results, the suggestion by the LRBC WG to include equity indexed annuities in the testing was deferred, by agreement of the LRBC WG and the C3 WG.

The topic of allowing the use of proprietary interest rate generators was also discussed by the LRBC WG and the C3 WG. A decision was made to require the use of a scenario set that would be an identical 200 scenarios for all companies, and to permit the optional submission of a second sensitivity test, for which companies may use internal generators or other alternatives such as generators from a third party vendor. In both cases, the calibration criteria defined in the 2008 report should be applied. The C3 WG continues to support the use of proprietary generators, for the reasons outlined in the last pages of the 2008 report.

Areas for future research could include applying the requirements to Equity Indexed Annuities. As part of this effort, “two dimensional stratification” of scenarios, to allow stratification on both interest rates and equity returns simultaneously, should be examined. The long length of time it takes for median or mean interest rates to approach the MRP could be examined to assess whether it produces counter-cyclical effects on capital requirements, when starting interest rates are at extreme levels. The possible need for more large interest rate changes in the early projection years, when starting rates are very low, may warrant investigation. Further examination of discount rates across C-3 Phases should also be undertaken.

The remainder of this report contains instructions for completing the sensitivity test or tests. The report also includes recommended instruction updates for two additional items. The first update specifies the Asset Valuation Reserve (AVR) and Interest Maintenance Reserve (IMR) treatment for C-3 Phase II, which is simply the same treatment originally specified for C-3 Phase I. The second update provides instructions on the new requirement to omit the portion of the AVR used in asset adequacy analysis of reserves, from the determination of Total Adjusted Capital (TAC).

Appendix A has detailed instructions on generating the required 200 scenarios from the May 2014 Academy generator, as well as the calibration requirement for companies that voluntarily disclose the results using company-generated scenarios.

Appendix B has recommended changes to RBC instructions and formula pages.

An update to the current results calculation spreadsheet, which is posted on the NAIC website at http://naic.org/documents/committees_e_capad_lrbc_RbcC3Scn.xls, will be created by the C3 WG, to handle a 200 scenario calculation on a CTE 90 basis.

Appendix A - Instructions for producing the mandatory Academy 200 scenario set and the voluntary company-generated scenario set.

Academy Mandatory Scenarios - Detailed Generation Steps

1. Download Version 7.1.201405 of the Academy generator from:
<http://www.actuary.org/content/economic-scenario-generators> or
<http://www.soa.org/research/software-tools/research-scenario.aspx>
2. Update the historical yield curves in sheet “*Historical Curves*” with Constant Maturity Treasury Rates, through the desired projection start date.
3. Make sure the check box in sheet “*Parameters*” is unchecked, so the generator will set the Mean Reversion Point (MRP) as the default value.
4. In sheet “*Scenario Generator*,” update the starting date in cell “C3” and then click the “Get starting curve from historical curves” button.
5. Select “Full set of 10,000 scenarios,” choose time step as “Monthly,” output rate rates as “Bond Rates.” Make sure that “Years to project” is at least 30 years, as the scenarios are stratified over no more than 30 years. If “Years to project” is less than 30, you will not get the same scenarios as people who use 30 or more.
6. Set up an output folder and click “Generate Scenarios” to generate a new full set of 10,000 scenarios. This process takes around 12 minutes on a newer computer.
7. Go to sheet “*Scenario Subsets*” and click “Load subsets from a saved file,” choose the txt file in scenario output folder with filename “ScenarioSubsets_yyyymm.txt,” click “OK,” and then go back to sheet “*Scenario Generator*.”
8. Choose a new output folder and select generate “Subset with 200 scenarios,” then click button “Generate Scenarios” to generate a subset. Scenario files will be saved in the new folder.

Voluntary Company-Generated Scenarios

Company-generated scenario sets must meet the calibration criteria as specified in the December 2008 ESWG report.

Appendix B – RBC Instructions and Formula pages

Page	Topic
76	Instructions for LR027 Interest Rate Risk and Market Risk Line (37) – align C-3 Phase II treatment of AVR and IMR with C-3 Phase I
77	Instructions for new additional LR027 Formula page to collect C-3 Phase I update results This page indicates to follow the steps in this report to generate 200 scenarios and compute a CTE 90 measure, in addition to the current measure. At their option, companies may also submit results using a proprietary generator, the calibration criteria mentioned in this report, and a CTE 90 measure. Companies with \$10 billion or more of General Account Assets and \$1 billion or more of liabilities subject to C-3 Phase I testing are considered large companies and are required to submit results for 2014 models. Small companies will be required to submit results for 2015 models.
LR027	New additional Formula page
93	Instructions for LR033 Calculation of authorized Control Level Risk-Based Capital Only include AVR in TAC to the extent not used in CFT
LR033	Formula page

Line (36)

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

Line (37)

Overview

The amount reported on Line (37) is calculated using a nine-step process. As in Step 3 of the Single Scenario C-3 Measurement Considerations section of Appendix 1a – Cash Flow Testing for C-3 RBC Methodology, 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 C-3 modeling. (Deviations from expected are covered by both the AVR and C-1 risk capital).

IMR assets should be used for C-3 modeling. If negative cash flows are handled by selling assets, then appropriate modeling of contributions to and amortization of the IMR need to be reflected in the modeling.

- (1) The first step is determined by applying the methodology described 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 Task Force (June 2005)” to calculate the total asset requirement. Although Appendix 2 in the Report notes path dependent models under a different set of initialization parameters might produce scenarios that do not satisfy all the calibration points shown in Table 1, to be in compliance with the requirements in this first step, the actual scenarios used for diversified U.S. equity funds must meet the calibration criteria. The scenarios need not strictly satisfy all calibration points in Table 1 of Appendix 2, but the actuary should be satisfied that any differences do not materially reduce the resulting capital requirements. See the Preamble to the *Accounting Practices and Procedures Manual* for an explanation of materiality. Include the Tax Adjustment as described in the report.
- (2) The second step is to reduce the amount calculated in (1) above by the interest rate portion of the risk (i.e., only the separate account market risk is included in this step).
- (3) The third step is to calculate the Standard Scenario Amount.
- (4) Take the greater of the amounts from steps (2) and (3).
- (5) Apply the smoothing and transition rules (if applicable) to the amount in step (4).
- (6) Add the general account interest rate portion of the risk to the amount in step (5).
- (7) Subtract the reported statutory reserves for the business subject to the Report from the amount calculated in step (6). Floor this amount at \$0.
- (8) Divide the result from step (7) by 0.65 to arrive at a pre-tax amount.
- (9) Split the result from step (8) into an interest rate risk portion and a market risk portion. Note that the interest rate portion may not equal the interest rate portion of the risk used in steps (2) and (6) above even after adjusting these to a pre-tax basis. The interest rate portion of the risk should be included in Line (35) and the market risk portion in Line (37).

The lines on this page will not affect 2014 actual RBC requirements, but rather are for informational purposes. These lines are required for companies with more than \$10 billion in General Account Assets and more than \$1 billion of reserves subject to C-3 Phase I testing. For smaller companies, completing these lines is optional for 2014, but will be required for 2015.

Line (38)

C-3 RBC Cash Flow Testing Interest Rate Risk. For this new line, enter the value from the current LR027 Interest Rate Risk and Market Risk Column (3) Line (33).

Line (39)

Follow the instructions in the American Academy of Actuaries “Recommended Approach for Updating Regulatory Risk-Based Capital Requirements for Interest Rate Risk for Fixed Annuities and Single Premium Life Insurance (“C-3 Phase I”)", June 2014, available at www.actuary.org, to compute an equivalent value to Line (38), but using the updated American Academy of Actuaries interest rate generator and a CTE 90 measure.

Line (40)

At the company’s option, an equivalent value to Line (39), but using a proprietary interest rate generator, may be provided.

Line (41)

If a value is provided for Line (40), please describe the Proprietary Generator used, the Calibration Criteria results, and the Number of Scenarios. Additional comments may also be provided, at the company’s option.

INTEREST RATE RISK AND MARKET RISK (Alternative)

C-3 RBC Cash Flow Testing Alternative Calculations
(For Informational Purposes Only)

(1)

	<u>Source</u>	<u>RBC Requirement</u>
(1) C-3 RBC Cash Flow Testing Interest Rate Risk	LR027 Interest Rate Risk and Market Risk Column (3) Line (33)	_____
(2) C-3 RBC Cash Flow Testing Interest Rate Risk	The Line (1) Equivalent Calculated Using Version 7.1.201405 of the American Academy of Actuaries Scenario Generator †† §§	_____
(3) C-3 RBC Cash Flow Testing Interest Rate Risk	The Line (1) Equivalent Calculated Using a Proprietary Generator ‡‡ §§	_____
(4) Please Describe Proprietary Generator Used, Calibration Criteria, and Number of Scenarios:	_____	

†† This information is required for companies doing C-3 Phase I calculations in relation to reserves of at least \$1 billion and with statutory general account admitted assets in excess of \$10 billion as of year-end 2014.

‡‡ This information is requested, if applicable, on a voluntary basis.

§§ The completion of this calculation is subject to the adoption of specific instructions by 6/30/14.

_____ Denotes items that must be manually entered on the filing software.

CALCULATION OF AUTHORIZED CONTROL LEVEL RISK-BASED CAPITAL

LR031

Basis of Factors

The purpose of the formula is to estimate the risk-based capital levels required to manage losses that can be caused by a series of catastrophic financial events. However, it is remote that all such losses will occur simultaneously. The covariance adjustment states that the combined effect of the C-1o, C-1cs, C-2 and C-3 and a portion of the C-4 risks are not equal to their sum but are equal to the square root calculation described below. It is statistically assumed that the C-1o risk and a portion of the C-3 risk are correlated, while the C-1cs risk, the C-2 risk, the balance of the C-3 risk and a portion of the C-4 risk are independent of both. The split of the C-3 and C-4 risks allows for general consistency with the health RBC formula. This assumption provides a reasonable approximation of the capital requirements needed at any particular level of losses.

Authorized Control Level Risk-Based Capital is 50 percent of the sum of the C-0 plus the C-4a risk-based capital and the square root of the sum of the C-1o and C-3a risk-based capital squared, the C-1cs risk-based capital squared, the C-2 risk-based capital squared, the C-3b risk-based capital squared and the C-4b risk-based capital squared.

Mandatory Control Level Risk-Based Capital is 70 percent of Authorized Control Level Risk-Based Capital.

Specific Instructions for Application of the Formula

All amounts reflected for the calculation of Authorized Control Level Risk-Based Capital will be calculated automatically by the software.

In recognition of the exclusion of the carrying value of Alien Insurance Subsidiaries – Other from Total Adjusted Capital, the carrying value of these entities is also to be excluded from the calculation of C-O risk-based capital.

CALCULATION OF TOTAL ADJUSTED CAPITAL

(Including Total Adjusted Capital Tax Sensitivity Test)

LR033

Basis of Factors

In determining the C-1 risk factors, availability of the AVR and voluntary investment reserves to absorb specific losses was not assumed. Therefore, the AVR is counted as capital for the purposes of the formula although it represents a liability and is not usable against general contingencies. However, the portion of the AVR that is included in asset adequacy analysis of reserves is not included in Total Adjusted Capital. Voluntary investment reserves were eliminated from Total Adjusted Capital for the 1997 risk-based capital formula.

The annual statement provision for future dividends can provide a general cushion against potentially adverse future experience. As a reflection of this possible cushion, 50 percent of the annual statement dividend liability is included. However, when a block is reinsured, such credit to Total Adjusted Capital will not be allowed to either company unless the company has total control over the dividend decision and the full benefit of a change in the dividend scale flows to the company. A factor of 25 percent of the dividend liability is used in sensitivity testing.

Company Name

Cocode: 00000

**CALCULATION OF TOTAL ADJUSTED CAPITAL
(Including Total Adjusted Capital Tax Sensitivity Test)**

	Annual Statement Source	(1) Statement Value	Factor	(2) Adjusted Capital
<u>Company Amounts</u>				
(1) Capital and Surplus	Page 3 Column 1 Line 38	\$0 X	1.000 =	\$0
(2) Asset Valuation Reserve	Page 3 Column 1 Line 24.01, <u>in part (see Instructions)</u>	\$0 X	1.000 =	\$0
(3) Dividends Apportioned for Payment	Page 3 Column 1 Line 6.1, in part	\$0 X	0.500 =	\$0
(4) Dividends Not Yet Apportioned	Page 3 Column 1 Line 6.2, in part	\$0 X	0.500 =	\$0
(5) Hedging Fair Value Adjustment	Company Records	\$0 X	-1.000 =	\$0
<u>Life Subsidiary Company Amounts†</u>				
(6) Asset Valuation Reserve	Subsidiaries' Annual Statement Page 3 Column 1 Line 24.01‡	\$0 X	1.000 =	\$0
(7) Dividend Liability	Subsidiaries' Annual Statement Page 3 Column 1 Line 6.1 + Line 6.2‡	\$0 X	0.500 =	\$0
<u>Property and Casualty and Other Non-U.S. Affiliated Amounts</u>				
(8) Non-Tabular discount and/or Alien Insurance Subsidiaries: Other	Included in Subsidiaries' Annual Statement Page 3 Column 1 Line 1 + 3‡ and/or Schedule D Part 6, Section 1 Column 8 Line 0599999 and Line 1499999, in part	\$0 X	1.000 =	\$0
(9) Total Adjusted Capital Before Capital Notes	Sum of Lines (1) through (7) less Line (8)	\$0		\$0
<u>Credit for Capital Notes</u>				
(10.1) Surplus Notes	Page 3 Column 1 Line 32	\$0		
(10.2) Limitation on Capital Notes	0.5 x [Line (9) - Line (10.1)] - Line (10.1), but not less than 0	\$0		
(10.3) Capital Notes Before Limitation	LR032 Capital Notes Before Limitation Column (4) Line (18)	\$0		
(10.4) Credit for Capital Notes	Lesser of Column (1) Line (10.2) or Line (10.3)			\$0
(11) Total Adjusted Capital	Line (9) + Line (10.4)			\$0
<u>Tax Sensitivity Test</u>				
<u>Company Amounts</u>				
(12) Deferred Tax Asset (DTA) Value	Page 2, Column 3, Line 18.2	\$0 X	-1.000 =	\$0
(13) Deferred Tax Liability (DTL) Value	Page 3, Column 1, Line 15.2	\$0 X	1.000 =	\$0
<u>Subsidiary Amounts</u>				
(14) Deferred Tax Asset (DTA) Value	Company Records	\$0 X	-1.000 =	\$0
(15) Deferred Tax Liability (DTL) Value	Company Records	\$0 X	1.000 =	\$0
(16) Tax Sensitivity Test: Total Adjusted Capital	Line (11)+(12)+(13)+(14)+(15)			\$0
<u>Ex DTA ACL RBC Ratio Sensitivity Test</u>				
(17) Deferred Tax Asset-Company Amounts	Page 2 Column 3 Line 18.2	\$0 X	1.000 =	\$0
(18) Total Adjusted Capital Less Deferred Tax Asset Amounts	Line (11) less Line (17)			\$0
(19) Authorized Control Level RBC	LR034 Risk-Based Capital Level of Action Line (4)	\$0 X	1.000 =	\$0
(20) Ex DTA ACL RBC Ratio	Line (18) / Line (19)			0.000%

† Including subsidiaries owned by holding companies. For Asset Valuation Reserve, exclude portion included in asset adequacy analysis of reserves.

‡ Multiply statement value by percent of ownership.