

# **RBC C3 Phase II Seminar**

## **ACSW Spring Meeting 6/10/2005**

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**SLIDE**

**2**

**Introduction**

**Next 4**

**Joint CADTF/LHATF Subgroup**

**Next 12**

**LR023 RBC Calculations**

**Next 24**

**C3 Phase II RBC Report**

**Next**

**Comment letters**

**Next 3**

**CADTF/LHATF Peer Review**

**Last**

**Conclusion - Handouts**

# RBC C3 Phase II Seminar

## Introduction

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- “Principles Based” Valuation method, compared to historic formulaic reserves
- Regulatory challenge: need for Standards and Peer Review
- Stochastic Modeling
- Alternative Methodology (Factor Based)
- **Standard Scenario**
- LOTS of Acronyms – SS, AR, SOX, AM..

# **JOINT CADTF/LHATF Subgroup of the NAIC**

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- Regulatory Oversight of Proposed Valuations for Variable Annuities
- Works with the American Academy of Actuaries to review valuation proposals and to consider regulatory oversight issues

# **JOINT CADTF/LHATF Subgroup Three Approaches**

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- A principles based approach to Valuation, recommended by the SEC
- An Internal Risk Based Approach to Valuation, recommended in BASEL II
- A fair value approach to Valuation, being developed by the FASB

# **JOINT CADTF/LHATF Subgroup Regulatory Avenues**

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- Independent Peer Review
- Governance SOX for Insurers
- Consistent Integration of Valuation and Risk Management Processes
- Documentation/Reporting Standards
- Model Validation

# **JOINT CADTF/LHATF Subgroup Regulatory Avenues**

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- Regulatory Discretion
- Examination Procedures
- Training
- Guidance
- Centralized Expertise

# General Instruction LR023

## Market Risk

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- Calculation of RBC is a 5 step process
- **Step 1:** Apply methodology described in the AAA LCAS report, 3/2005 to calculate the **Total Asset Requirement (TAR)**.
- **Step 2:** Calculate the **Standard Scenario Amount (SSA)**.
- **Step 3:** Apply smoothing and transition rules to  $\text{Max}(\text{TAR}, \text{SSA})$

# General Instruction LR023

## Market Risk

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- **Step 4:** Deduct Statutory Reserves from the Step 3 amount.
- **Step 5:** Add tax adjustment to the step 4 amount, divide by .65 to gross up to pre-tax.



# General Instruction LR023

## TAR

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- Aggregate the results of running stochastic scenarios using **Prudent Best Estimate assumptions (PBE)** and calibrated fund performance distribution functions.
- For each scenario, calculate PV Accumulated Surplus, including taxes. The negative of the least PV is the **Asset Requirement (AR)** for that scenario.

# General Instruction LR023

## TAR

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- 90 Conditional Tail Expectation (90 CTE)  
= average of lowest 10% AR = TAR.
- $RBC = TAR - \text{Statutory Reserves}$
- Adjust RBC if needed to allow for SSA and any smoothing/transition
- Add capital for the interest rate risk of the guaranteed fixed fund option, if needed.

# **General Instruction LR023**

## **Market Risk - TAR**

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- The Actuary is responsible for the grouping funds or contracts, number of scenarios, simplifying methods, etc.
- However, all these must conform to the Actuarial Standards of Practice (ASOPs), with supporting documentation and justification.

# **General Instruction LR023**

## **Standard Scenario Amount**

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- The SSA is the sum of: TAR calculated using the Alternative Methodology (no model office) and 100% of the MGDB table, summed over each contract.
- Similarly for contracts without guaranteed death benefits.
- For other contracts (OC), use a single scenario projection based on specified asset returns.

# **General Instruction LR023**

## **Standard Scenario Amount**

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- Asset values experience an initial drop followed specified growth rates (less a margin).
- The projection includes cash flows for guaranteed living and death benefits, other costs, and projected revenues.
- The Discount Rate (DR) is the annual effective equivalent of the 10 year CMT rate reported by the Federal Reserve for the valuation month, plus 50 basis points.

# General Instruction LR023

## SSA Required Calculations

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- An aggregate valuation on the statement date of inforce contracts (OC)
- Seriatim valuation on the statement date of inforce contracts (OC)
- Aggregate valuation on the statement date on the *model office*
- Aggregate valuation on a *prior inforce date on prior inforce contracts*
- Aggregate valuation on a *prior inforce date of a model office.*

# General Instruction LR023

## SSA Basic Adjusted Reserve

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- One component of SSA
- **AG33**, disregarding GDB and GLB in excess of AV and free partial withdrawals
- Separate account returns based on valuation rates, less asset and benefit based charges.
- Separate account fixed and general account returns based on guaranteed rates
- Not less than Cash Surrender Value on the Valuation date

# General Instruction LR023

## Standard Scenario Amount

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- SSA = Basic Adjusted Reserve, summed over all contracts, plus
- Aggregate GPV, (**minimum zero**), all contracts, at end of each projection year, of the negative Accumulated Net Revenue at a discount rate equal to AR! less
- Value of hedges and Aggregate Reinsurance



# General Instruction LR023

## Standard Scenario Assumptions

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- Immediate Equity drop of 20%, zero return in year 1, 3% in years 2 and later
- Margins on Account Values Surrender Charge period: 10 bp + max(20bp, explicit charges for guarantees);  
Afterward, the prior amount + min(65bp,  $\frac{1}{2}$  (All contract charges – prior))
- Mortality is 80% of 1994 GMDB tables

# General Instruction LR023

## Value of Approved Hedges

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- Statement value of hedges and items being held is market value
- If hedges expire in less than 1 year from the valuation date, value is based on holding hedges until expiration.
- If expiration is greater than 1 year, value is based on liquidation on the valuation date.
- “There is no credit in the Standard Scenario for dynamic hedging beyond the credit that results from hedges actually held on the valuation date.”

## **C3 Phase II RBC Report**

### **Appendix 1 General Methodology**

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- Projections using stochastic scenarios
- Cash flows: expenses, fees, Federal Income Tax, hedging, reinsurance and any Fixed Account Options
- C-3 asset increase is min (PV Statutory Assets less liabilities)
- Discount factor based on after tax swap rates or One year Treasury rates

# **C3 Phase II RBC Report**

## **Appendix 2 Scenario Requirements**

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- ASOP 7 applies
- Calibration Points are gross returns, before the deduction of fees or charges
- State dependent models are not prohibited, but must be justified by historic data and meet calibration criteria
- If the model uses mean reversion or path dependent dynamics, it must be well supported by research

# **C3 Phase II RBC Report**

## **Appendix 2 Scenario Requirements**

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- Probability measures : Q and P
- Equity Market Returns
- Calibration Table 1 Percentile 2.5%  
1 Yr .78    5 Yr .72    10 Yr .79
- SLV (Standard log volatility model)
- S&P monthly total returns, 12/55 to 12/03
- Tables 5 and 6: other models considered

# **C3 Phase II RBC Report**

## **Appendix 2 Scenario Requirements**

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- Other markets/funds
- Discount Rates
- Correlation of Fund Returns
- Random Number Generator
- Number of scenarios and Efficiency in Estimation
- Frequency of Projection, time horizon
- Pre-Packaged Scenarios

## **C3 Phase II RBC Report Appendix 3 GMIB Purchase Rate Margins**

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- Definition:  $\text{Cost A} - \text{Cost B}$  where A is Price of Annuity, guaranteed basis and B is price of Annuity, time of annuitization basis
- Can use a “point estimate” or a statistical model to calculate the margin.

# **C3 Phase II RBC Report Appendix 5**

## **Changes from 12/02 LCAS**

### **Recommendation**

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- **Scope: Variable life excluded. Included:**  
Variable annuities no LB or DB guarantees  
Group annuities (as 401(k)s that include  
DB or LB that reference equity returns);  
Insurance contracts with DB for specified  
investment funds  
Products with similar benefits



# **C3 Phase II RBC Report Appendix 5 Significant Changes from 12/02 LCAS Recommendation**

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- Calibration: More recent time period, new points
- Starting assets = estimated Statutory Reserves
- Alternative Method (AM) updated factors
- Interest Rate component added for Fixed Account Options
- For interest rate risk of GA portion of VA, companies may combine products with C3 P1
- Modeling of Hedges expanded. Appendix 7 Principles added

## **C3 Phase II RBC Report Appendix 5 Changes from 12/02 LCAS Recommendation**

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- AM Mortality 65% tabular changed to Prudent Best Estimate (PBE) or 100% tabular
- Tax Adjustment specified
- Revenue Sharing expanded, clarified
- Mortality Assumptions – New Methodology Note re PBE, credibility

## **C3 Phase II RBC Report Appendix 6 RBC IRR Calculation Methods**

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- Integrated interest rate and equity return model desirable, not practical

Run 200 Interest rate scenarios, C3 P1 generator, assign to stochastic equity scenarios

Run variable annuity model with a fixed crediting rate, then run C3 P1 with that rate.

Run variable annuity with no guaranteed fund assets, then with all assets in that fund. Use a final average for fixed/equity C3 calculation

# **C3 Phase II RBC Report**

## **Appendix 7 Five Principles**

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- **1** Objective – quantify Statutory Capital needed to meet risks
- **2** TAR calculation – GPV accumulated deficiencies using PBE. Utilizes a projected total Statutory Balance Sheet approach.
- **3** Assumptions and modeling decisions should be chosen so that the final results approximates what should be obtained at the designated CTE level.

# **C3 Phase II RBC Report**

## **Appendix 7 Five Principles**

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- **4** Stochastic cash flow models have limitations – capital needs arise from all risks to which the company is exposed
- **5** Use of strategies designed to reduce TAR are inconsistent with these principles.

## C3 Phase II RBC Report Appendix 8 Alternative Method for GMDB Risks

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- Policy by Policy basis (Seriatim)
- Factor based, 90 CTE, after tax
- $TAR = \text{Cash Surrender Value} + AAR$  (Additional Asset Requirement)
- **AAR** is the sum of provisions for  
Amortization of unamortized surrender charges (**CA**)  
plus  
Fixed dollar expenses/costs net of fixed dollar revenue  
(**FE**) plus  
Claims under guaranteed benefits net of margin offset  
(**GC**)

## **C3 Phase II RBC Report Appendix 8 Alternative Method - AAR**

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- Total AAR = Sum of AAR for each policy
- Variable Annuities without guarantees, use the prior method.
- For Variable Annuities, with guarantees,  $AAR = R \text{ times } (CA+FE) \text{ plus } GC$
- CA and FE are based on single scenario calculations
- R is a scaling factor that depends on certain risk attributes of the policy and product portfolio

## **C3 Phase II RBC Report Appendix 8 Alternative Method - GC**

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- The AM factors and formulas for GC have been developed.
- GC factor table assumes 100% MGDB 94 ALB Table. Companies may use PBE mortality, but cannot revert.
- 5 Major steps in GC calculation



## **C3 Phase II RBC Report Appendix 8 Alternative Method - CA**

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- Project Unamortized Balance to the end of the Surrender Charge Period and discount.
- Net asset returns specified for seven funds
- Dynamic multiplier to adjust lapse rate for in-the-money (ITM)

## **C3 Phase II RBC Report Appendix 8 Alternative Method - FE**

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- A provision for fixed dollar costs less any fixed dollar revenue
- Project to earlier ( Contract maturity, 30 years)
- Use Dynamic Lapse multiplier for ITM
- Ultimate inflation rate 3% yrs 8 or later, grade linearly from current inflation rate

## **C3 Phase II RBC Report Appendix 9 Supplied Functions for AM**

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- Special functions for Microsoft VBA add-ins to call C++ routines
- Instillation instructions
- Factor files and a Factor Lookup Tool (FLT) which is an Excel add-in.

# **C3 Phase II RBC Report**

## **Appendix 10 Modeling of Hedges**

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- Clearly Defined Hedging Strategy (CDHS) must be followed
- Investment policy adopted by Board of Directors, a Committee of Board members, or Authorized Committee required
- “To give effect to these requirements, they must apply to the overall investment strategy and investment portfolio.”
- Effect of CDHS on TAR must recognize all risks, costs, mismatch tolerances.

# **C3 Phase II RBC Report**

## **Appendix 10 TAR Adjustment**

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- TAR (reported) = TAR best efforts plus an error factor times (TAR adjusted less TAR best efforts) (nonnegative)
- Error factor reflects the Actuary's views as to the level of sophistication of the model
- Caveats on evaluating the assumptions; discontinuous hedging strategies; and limitations on trading executions required by the hedging strategy.

## **C3 Phase II RBC Report Appendix 10 Certification and Documentation**

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- Certify that error factor, TAR best efforts were calculated using reasonable assumptions and specified methods.
- Document the methods and assumptions
- Certify that CDHS applies; a certification by a Financial Officer of the Company that actual trading of assets and derivatives takes place daily for risk mitigation.

# **C3 Phase II RBC Report Appendix 11 Certification**

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- A paragraph identifying the actuary and his or her qualifications
- A scope paragraph identifying the statement values and the methodology used for those values
- A reliance paragraph where the certifying actuary has relied on other experts

# **C3 Phase II RBC Report Appendix 11 Certification**

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- A reliance statement from each of those relied upon
- A paragraph certifying that required capital was determined in accordance with the principles and requirements of the NAIC RBC Instructions
- A paragraph certifying that the assumptions used are Prudent Best Estimate assumptions



## **C3 Phase II RBC Report Appendix 11 Certification**

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- A paragraph disclosing all material changes in the model or assumptions
- A paragraph stating that the qualified actuary is not opining on the adequacy of the company's surplus or its future financial condition.

# **C3 Phase II RBC Report Appendix 11 Certification**

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- A supporting memorandum shall be created to document the methodology and assumptions used to determine required capital.

# LCAS Recommendation Comment Letters

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- 11 companies, ACLI, American Academy
- Standard Scenario negative – concern is that SSA will dominate TAR
- Timing: is a 12/31/2005 filing reasonable? (LCAS priority)
- Transition and Smoothing Rules

# **JOINT CADTF/LHATF Subgroup Peer Review – Survey One**

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- The Commissioner should appoint and/or consent to the Reviewer;
- A Peer Review is required for both Reserve Valuation and RBC Valuation;
- Authorization should be implemented by a change in Insurance Law;
- the Review should have a very detailed focus and broad scope;
- Checks of systems, procedures, work products of others and data integrity are very important;

# **JOINT CADTF/LHATF Subgroup Peer Review – Survey One**

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- Review of eleven types of assumptions and Alternative Methodology factors were deemed important;
- Review of the Modeling process, Model construction and validation, Hedge Strategy and Reinsurance were deemed important; and
- Documentation and Governance were deemed very important.

# **JOINT CADTF/LHATF Subgroup Peer Review – Survey Two**

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- Who conducts the Peer Review?
- What is the relationship of the Peer Review to the Financial Examination?
- What degree of Independence should the Reviewer have?
- General Issues: E.g., who is the client? Should legal protections exist for the Reviewer?

# **RBC C3 Phase II Seminar**

## **ACSW Spring Meeting 6/10/2005**

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- Handout 1: Regulatory Review Framework Recommendations from AAA SVL II Work Group, Boston MA 6/2005
- Handout 2: **DRAFT** Practice Note for the Application of C-3 Phase II and VA CARVM, 3/11/2005