



# A M E R I C A N   A C A D E M Y   *of*   A C T U A R I E S

## Conceptual Framework of a Principle-based Approach for Life Insurance Products from the American Academy of Actuaries' Universal Life Work Group

Presented to the National Association of Insurance Commissioners'  
Life and Health Actuarial Task Force

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## **Conceptual Framework of a Principle-based Approach for Life Insurance Products**

### **I) Background Executive Summary**

This document establishes a conceptual framework for a standard for the valuation of reserves for life insurance policies under a principle-based approach (Approach) as defined below for the products in our scope (see section III). The Approach has been designed particularly for those contracts involving guaranteed benefits (e.g., no lapse guarantees, regardless of form) offered with universal life and variable universal life policies, but the resulting framework under the Approach is intended to be applicable to all life products.

For many years regulators and the industry have struggled with the issue of applying a uniform reserve standard to these contracts and in particular some of the guaranteed benefits referenced above. Current approaches make assumptions about product design, policyholder behavior and economic relationships and conditions. The economic volatility seen over the last few decades, combined with an increase in the complexity of these products, have made attempts to use these approaches for measuring economic-related risk less successful. The Valuation of Life Insurance Policies Model Regulation, Actuarial Guideline XXXVII and XXXVIII and proposed-revisions to Actuarial Guideline XXXVIII describe various methodologies to determine reserve levels. Currently, application of some these standards is not consistently applied. Many believe the resulting reserves are too high, others believe the reserve levels are too low. Most agree that the methodologies do not adequately address the benefits, revenue and risk characteristics of the plans being offered currently. Thus, a more permanent, principle-based solution is needed.

This Approach addresses these issues by applying principles of risk management, asset adequacy analysis and stochastic modeling directly to the risks associated with these products and guarantees. This new principle-based approach is designed to replace the current “rules-based” system with a more modern valuation system that more properly captures the underlying risks of the contract.

A **principle-based approach** is one that:

1. Captures all of the material risks, benefits and guarantees in the contract using basic risk analysis and risk management techniques.
2. Provides an appropriate level of conservatism that is consistent with the objectives of statutory reporting.
3. Only requires a modeling and/or stochastic approach be used when necessary to properly capture the risks of the contract.
  - a. For some products, a deterministic, single scenario approach is adequate to capture the risks of the contract.
  - b. For products with material “tail risk” of a high level of uncertainty in cash flows arising from optionabilities in the contract, a stochastic approach may be necessary.
  - c. A stochastic approach does not require that all assumptions be stochastically modeled.

The NAIC is currently considering a similar approach to calculate reserves for variable annuity products. The methodology used in the Approach, although similar to the approach used for variable annuities, reflects the unique considerations associated with life insurance plans.

The intent of the Approach is to, where possible; facilitate a framework whereby companies may determine both reserve and RBC requirements in a consistent calculation.

*[Note: The American Academy of Actuaries SVL 2 work group is addressing the regulatory and governance process. The ULWG will add appropriate wording related to their findings]*

The Approach requires that the aggregate reserve for contracts falling within its scope be based on the greater of an amount calculated using a seriatim deterministic method (Deterministic Reserve) and an amount calculated using a stochastic method when appropriate (Stochastic Reserve). Both the Deterministic Reserve and the Stochastic Reserve will be determined using a gross premium reserve calculation. This gross premium reserve calculation will be

determined by taking the present value of the projected benefit and expense cash flows (ignoring federal income taxes) less the present value of future gross premiums.

The Deterministic Reserve is calculated using prudent best estimate assumptions over a single deterministic future economic investment scenario. For products without material “tail risk” resulting from inadequate revenue due to either optionality in the contract or the impact of various economic scenarios, a company may only need to calculate the Deterministic Reserve Amount.

The Stochastic Reserve is calculated using a projection of the gross premium reserve over a broad range of stochastically generated economic scenarios, using prudent best estimate assumptions for all assumptions not stochastically modeled, and then applying a prescribed Conditional Tail Expectation (CTE) level, as defined below. The assumed general account returns and fund performance (for variable products) for these scenarios must meet the mandated calibration standards contained in the Approach.

*[Drafting Note: for “general account returns,” some discretion will be permitted when setting spread, default and prepayment assumptions, subject to an aggregate cap on net spreads. The intent is to provide constraints on the assumptions to determine general account returns, thus historical experience and mean reversions are issues to be addressed. The treasury rates used for both the Stochastic and Deterministic Reserves will be prescribed, or at least the generator and # of scenarios will be prescribed. See Appendix 6 when complete.]*

Conditional Tail Expectation (CTE) is a statistical risk measure that provides enhanced information about the tail of a distribution above that provided by the traditional use of percentiles. Instead of only identifying a value at a particular percentile and thus ignoring the possibility of extremely large values in the tail, CTE provides the average over all values in the tail beyond the CTE percentile. For losses that approximate a normal distribution, CTE (65) will approximate the 82.5<sup>th</sup> percentile. But for distributions with “fat tails” from low probability, high impact events, such as those covered by the Approach, the use of CTE will provide a more revealing measure than use of a single percentile requirement.

The methodology prescribed in the Approach is applied to a company’s portfolio of life insurance products to which this methodology is applicable, (whether or not they contain guaranteed benefits), as well as other affected products that contain guaranteed benefits. Current guaranteed benefits include no lapse guarantees, [add other]. It is also expected that the methodology in the Approach can be applied to future variations on these designs and to new guarantee designs.

Since statutory reporting requires companies to report reserves prior to reinsurance, the Approach clarifies standards for adjusting the various components of the reserve so that the reserve may be reported both prior to and net of reinsurance.

For variable products, the Approach also requires an allocation of the total reported reserve between the General and Separate Accounts and prescribes a method for doing this allocation.

Actuarial certification of the work done to calculate reserves is required by the Approach. A qualified actuary (referred to throughout this document as “the actuary”) shall certify that the work has been done in a way that meets all applicable Actuarial Standards of Practice.

*[Note: wording similar to the following should be considered: “The Approach and its Appendices require the actuary to make various determinations, verifications and certifications. The company is expected to provide the actuary with the necessary information sufficient to permit the actuary to fulfill the responsibilities set forth in this Guideline and its Appendices and responsibilities arising from applicable Actuarial Standards of Practice, including ASOP No. 23, Data Quality.”]*

An acceptable regulatory review and governance process must be established to enable the regulator to properly evaluate the appropriateness of the results. The methodology and assumptions used to determine the Deterministic and Stochastic Reserve include various controls and limits and margins.

*[Drafting Note: The American Academy of Actuaries SVL 2 work group is addressing the regulatory and governance process. The ULWG will add appropriate wording related to their findings.]*

## II) Principles for Valuation

This Approach is based on the following set of principles. These principles should be followed when applying the methodology in the Approach and analyzing the resulting reserves.<sup>1</sup>

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<sup>1</sup> Note the following when considering these principles:

**Principle 1:** Methodology The reserve will be based on a prospective valuation method that appropriately captures the degree of all material risks underlying the product being valued, particularly the magnitude of including the magnitude of “tail risk,” and the revenue to fund the risks. In other words, the higher the risk, the higher the reserve.

**Principle 2:** Methodology The Approach will provide a framework that can be applied to all individual life insurance products.

**Principle 3:** A deterministic reserve approach may be appropriate sufficient for certain products, depending on the level of nature of the risks, and stochastic approaches may be necessary for other products.

**Principle 4:** For risks that the company has some degree of control over (e.g., mortality), assumptions should reflect a blend of company experience (if credible data is available), and prescribed assumptions. For risks that the company has no control over (e.g., market interest rate movements), prescribed assumptions or methods for setting the assumption should be used that are the same for all companies.

**Principle 5:** For risks that are not stochastically modeled, assumptions should be based on “prudent best estimates” that incorporate appropriate margins for uncertainty. Generally, this means that assumptions are to be based on the conservative end of the actuary’s confidence interval. The choice of a conservative estimate for each assumption may result in a distorted measure of the total risk. Conceptually, the choice of assumptions and the modeling decisions should be made so that the final result approximates what would be obtained for the Stochastic Reserve at the required CTE risk level if it were possible to calculate results over the joint distribution of all future outcomes. In applying this concept to the actual calculation of the Stochastic Reserve and Deterministic Reserve, the actuary should be guided by the evolving practice and expanding knowledge base in the measurement and management of risk.

**Principle 6:** An acceptable regulatory review and governance process must be established (e.g., peer review, disclosure requirements, etc.) to enable the regulator to properly evaluate the appropriateness of the results.

**Principle 7:** Since this Approach will rely more heavily on actuarial judgment to establish assumptions and other related items than the current rules-based approach, appropriate controls, limits and caps will be incorporated throughout the methodology to establish boundaries on the degree of actuarial judgment that can be exercised.

**Principle 8:** Assumptions will not be locked in at issue, but will be allowed to change updated as expectations as to of future experience and economic conditions change.

**Principle 9:** While a stochastic cash flow model attempts to include all real world risks relevant to the objective of the stochastic cash flow model and relationships among the risks, it will still contain limitations because it is only a model. The calculation of the Stochastic Reserve is based on the results derived from the application of the stochastic cash flow model to scenarios while the actual statutory reserve needs of the company arise from the risks to which the company is (or will be) exposed in reality.

**Principle 10:** Neither a cash flow scenario model, nor a method based on factors calibrated to the results of a cash flow scenario model, can completely quantify a company’s exposure to risk. A model attempts to represent reality, but will always remain an approximation thereto and hence uncertainty in future experience is an important consideration when determining the Conditional Tail Expectation Stochastic Reserve Amount. As such:

- (i) The actuary must take the model’s limitations into consideration when setting assumptions, applying the methodology and determining the appropriateness of the resulting reserve levels.
- (ii) The use of assumptions and risk management strategies should be appropriate to the business and not merely constructed to exploit ‘foreknowledge’ of the components of the required methodology. Therefore, the use of assumptions, methods, models, risk management strategies (e.g., hedging), derivative instruments, structured investments or any other risk transfer arrangements (such as reinsurance) that serve solely to materially reduce the calculated statutory reserve without also

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- a. The principles should be considered in their entirety.
  - b. The Approach requires companies to meet these principles with respect to only those contracts that fall within the scope of the Approach and are in force as of the valuation date to which the requirements are applied.

reducing risk on scenarios similar to those used in the actual cash flow modeling are inconsistent with these principles.

### III) Scope

The Approach applies to contracts, whether directly written or assumed through reinsurance, falling into any of the following categories:

- 1) Universal Life Policies subject to the Commissioner's Reserve Valuation Method (CRVM), whether or not such contracts contain no lapse guarantees;
- 2) Variable Life and Variable Universal Life Policies subject to the Commissioner's Reserve Valuation Method (CRVM), whether or not such contracts contain no lapse guarantees;
- 3) Term Insurance Policies subject to the Commissioner's Reserve Valuation Method (CRVM), whether or not such contracts contain no lapse guarantees;

*[Drafting note Note: we believe the Approach would be suitable to value other life products and benefits. Treatment of supplemental benefits and riders have not been addressed to date.]*

### IV) Definitions

#### A) Definitions of Benefit Guarantees

1) No Lapse Guarantees (NLG) or Guaranteed Minimum Death Benefit (GMDB): A NLG or GMDB is a guaranteed benefit providing, or resulting in the provision that, an amount payable on the death of an insured, participant, or insured which would not have been payable without such guarantee. This definition is intended to be broad in order to include benefit designs not anticipated at the time this Approach was developed.

2) Add benefit guarantees as appropriate.

#### B) Definitions of Reserve Methodology Terminology

A.) Scenario: A scenario is a set of future interest rates and/or fund performance indices under which future gross premium, benefit, and expense cash flows are projected, and future investment returns are calculated for the purpose of computing a Scenario Gross Premium Reserve. Discount Rates: Rates used to discount cash flows when determining the Stochastic Reserve or Deterministic Reserve.

B.) Discount Rates: Rates used to discount cash flows when determining the Stochastic Reserve or Deterministic Reserve.

C.) Cash Surrender Value: For purposes of the Approach, the Cash Surrender Value for a contract is the amount available to the policyholder upon surrender of the contract, prior to a reduction as a result of any outstanding contract indebtedness. Generally, it is equal to the account value less any applicable surrender charges, where the surrender charge reflects the availability of any free partial surrender options.

D.) Deterministic Reserve: A seriatim gross premium reserve using a single set of Prudent Best Estimate assumptions.

E.) Secondary Guarantee: It is a guarantee providing or resulting in an amount payable on the death of an insured, participant, or beneficiary which would not have been payable without such guarantee. This definition is intended to be broad in order to include benefit designs not anticipated at the time Approach was developed.

F.) Non-Guaranteed Elements (NGE): Non-Guaranteed Elements are broadly defined as debits or credits to a policyholder's account value, benefit, or consideration that may be adjusted at the discretion of an insurance company. NGE's are generally subject to a guarantee minimum or maximum level.

NGE's include, but are not limited to:

- Credited interest rates
- Cost of insurance charges
- Expense charges
- Mortality and expenses ("M&E") charges, and

- Dividend rates.

G.) Scenario Gross Premium Reserve: For a given scenario, the Scenario Gross Premium Reserve is the net of:

- 1.) The present value, as of the valuation date, of the aggregate projected benefit and expense cash flows for all contracts (excluding federal income taxes) for the scenario; less
- 2.) The present value of the aggregate projected future gross premiums and/or applicable policy revenues for all contracts.

H.) Stochastic Reserve: The Stochastic Reserve is based on a 65 CTE level, which is determined by taking the numerical average of the 35 percent largest values of the Scenario Gross Premium Reserves. *[Drafting Note: The CTE limits listed above are consistent with the VACARM work, ultimately, LHTAF will need to set the appropriate level for these products.]*

I.) Starting Asset Amount: The Starting Asset Amount equals the value of the assets at the start of the projection, and is used to:

- 1.) Determine the discount rates for the gross premium reserve;
- 2.) project future asset balances and asset earned rates in order to determine projected benefit cash flows that are derived from asset balances (i.e. surrender values).

J.) Prudent Best Estimate: The deterministic assumptions to be used for projections are to be the actuary's Prudent Best Estimate. This means that they are to be set at the conservative end of the actuary's confidence interval as to the true underlying probabilities for the parameter(s) in question, based on the availability of relevant experience and its degree of credibility.

A Prudent Best Estimate assumption would normally be developed by applying a margin for estimation error and adverse deviation to the "best estimate" assumption. "Best estimate" would typically be the actuary's most reasonable estimate of future experience for a risk factor given all available, relevant information pertaining to the contingencies being valued. Recognizing that assumptions are simply assertions of future unknown experience, the margin for error should be directly related to uncertainty in the underlying risk factor. The greater the uncertainty, the larger the margin. Each margin should serve to increase the Aggregate Reserve that would otherwise be held in its absence (i.e., using only the best estimate assumption).

For example, assumptions for circumstances that have never been observed require more margins for error than those for which abundant and relevant experience data are available. Furthermore, larger margins are typically required for contingencies related to policyholder behavior when a given policyholder action results in the surrender or exercise of a valuable option. For some assumptions, (such as mortality), explicit margins may be specified to develop Prudent Best Estimate assumptions.

The actuary shall follow the principles discussed in Appendices 3, 4 and 5 in determining Prudent Best Estimate assumptions.

*[Drafting Note: This definition currently needs further discussion and clarification as it varies from the current definition used in VACARVM.]*

*[Add language relevant to equity scenarios and hedging strategies.]*

## V) Definition of General Reserve Methodology

A) General Description. The Aggregate Reserve for contracts falling within the scope of the Approach shall equal the greater of:

- 1) The Deterministic Reserve; and
- 2) The Stochastic Reserve.

At the option of the company, the Aggregate Reserve may be determined by applying the Approach to all contracts falling within the scope of the Approach or to sub-groupings of contracts, with the total reserve held equal to the sum of the reserves computed for each such sub-group.

B) Impact of Reinsurance Ceded. Where reinsurance is ceded for all or a portion of the contracts, both components in the above general description (and thus the Aggregate Reserve) shall be determined net of any reinsurance treaties that meet the requirements of the NAIC Life and Health Reinsurance Agreements Model Regulation.

An Aggregate Reserve before reinsurance shall also be calculated if needed for regulatory reporting or other purposes, using methods described in Appendix 7.

Given that assumptions of a Direct Writing Company and Reinsurer will likely vary from each other (due to differences in assets, investment strategy, aggregation, credibility and other factors) the reserve credit calculated by the Direct Writing Company will likely vary from the reserves calculated by a Reinsurer.

**C) Treatment of Non-Guaranteed Elements (NGE):**

[This section is currently being discussed by the work group.]

**D) The Deterministic Reserve.** The Deterministic Reserve is a seriatim reserve equal to the sum of the amounts determined by applying the Deterministic Reserve Method to each of the contracts falling within the scope of the Approach. For each policy, the Deterministic Reserve cannot be less than the cash surrender value of the policy. The Deterministic Reserve Method is outlined in Appendix 1.

**E) The Stochastic Reserve.** The Stochastic Reserve equals the amount determined by applying a 65 CTE measure to the Scenario Gross Premium Reserve amounts resulting from a broad range of stochastically generated interest rate and equity scenarios and Prudent Best Estimate assumptions. Since each Scenario Gross Premium Amount represents the aggregate reserve for all contracts, the Stochastic Reserve will reflect risk offsets across different contracts.

In performing the projections, the contracts may be grouped as described in section x.x.x in Appendix 2, Section A2.1.E. The stochastically generated projection scenarios shall meet the Scenario Calibration Criteria described in Appendix 8.

The Conditional Tail Expectation Amount Stochastic Reserve shall be determined using the following steps:

- 1) The Scenario Gross Premium Reserve is determined for each scenario
- 2) The Scenario Gross Premium Reserves for all scenarios are then ranked from smallest to largest and the Conditional Tail Expectation Amount is the average of the largest 35 percent of these ranked values.

The projections shall be performed in accordance with Appendix 2. The actuary shall document the assumptions and procedures used for the projections and summarize the results obtained as described in Appendix 10.

**E) Alternative Methodology.** For life insurance contracts that do not contain “no lapse” guarantee benefits, the Stochastic Reserve may be determined using the Alternative Methodology described in Appendix 11 rather than using the approach described in subsection D) above. However, in the event the approach described in subsection D) has been used in prior valuations, the Alternative Methodology may not be used without approval from the Domiciliary Commissioner.

The Stochastic Reserve for the group of contracts to which the Alternative Methodology is applied shall not be less than the aggregate Cash Surrender Value of those contracts.

The actuary shall document the assumptions and procedures used for the Alternative Methodology and summarize the results obtained as described in Appendix 10.

**F) Allocation of Results to Contracts.** The Aggregate Reserve shall be allocated to the contracts falling within the scope of the Approach using the method outlined in Appendix 9.

**VI) Regulatory Review and Guidance**

- A.) An acceptable regulatory review and governance process must be established to enable the regulator to properly evaluate the appropriateness of the results. The review and governance process should be consistent with the guidance provided by the Academy of Actuaries SVL 2 group.
- B.) The methodology and assumptions used to determine the Deterministic and Stochastic Reserve include various controls, limits and margins. The actuary must exercise care to assure that the additional margins or other limits have the intended impact of increasing the liability.

**VII) Effective Date**

The Approach affects all contracts issued on or after January 1, XXXX. Where the application of the Approach produces higher reserves than the company had otherwise established by their previously used interpretation, such company shall comply with the Approach effective \_\_\_\_\_. However, such company may request a grade-in period, of not to

exceed three (3) years, from the Domiciliary Commissioner upon satisfactory demonstration of the previous interpretation and that such delay of implementation will not cause a hazardous financial condition or potential harm to its policyholders. *[Note: LHFAT would need to determine the transition rules regarding application to this approach. Possible transition rules include limiting the application of this methodology to policies issued after a certain date and/or, establishing any a grade in period from current reserve levels to those under this methodology.]*

## APPENDIX 1 - DETERMINATION OF THE DETERMINISTIC RESERVE

~~Below is an outline of the Appendix for current thinking on the rationale and determination of the Deterministic Reserve. Over the next few months, this appendix will be updated as appropriate.~~

### A.1.1 Purpose of the Deterministic Reserve Overview

- Certain products with limited optionality or tail risk may not need a stochastic process to develop an appropriate reserve.
- The deterministic reserve is not meant to explicitly capture all of the risks embedded in a product. For products with significant amounts of certain types of risk, such as interest rate volatility risk, the stochastic reserve will capture risks that can't be captured in a deterministic reserve.
- It will retain the simplicity of a deterministic reserve for the many products that don't need a stochastic process.
- A deterministic reserve process will allow us to address from an overall level an appropriate relationship between reserves and cash surrender values.
- A deterministic reserve is more easily auditable.

A Intent. The guidance and requirements in this Appendix apply for determining the Deterministic Reserve. The intent is for the Deterministic Reserve to produce a reserve that is adequate to cover the product benefits, reflecting future revenue, under a single deterministic economic scenario. However, it is not meant to explicitly capture "tail" risk and other risks that have a high level of optionality that may be embedded in a product.

B General Description of Cash Flow Projections: A projection of cash flows under a single deterministic economic scenario shall be made ignoring Federal Income Tax that reflects the dynamics of the expected cash flows for the entire group of contracts. The projection will include the impact of all product features, including the guarantees provided under the contracts. Insurance company expenses (including overhead expenses), fund expenses, contractual fees and charges, revenue sharing income received by the company (net of applicable expenses) and cash flows associated with any reinsurance (or hedging instrument) are to be reflected on a basis consistent with the requirements herein. Cash flows from fixed account or general accounts shall also be included. Throughout the projection, where estimates are used, such estimates shall be on a Prudent Best Estimate Basis.

Two separate cash flow projections shall be made. The purpose of the first projection is to calculate the path of net asset earned rates to be used in the gross premium reserve calculation. This first projection will be performed for each Business Segment (defined below) reflecting the company's management of investments and associated interest crediting. Thus, this first projection will require a projection of cash flows arising from asset maturities and sales, and a projection of investment income, as well as a projection of benefits, expenses, and premiums.

A second projection of cash flows will be performed on each policy for the purpose of calculating the gross premium reserve. The methodology is the same as for the first projection except that the cash flows will exclude asset maturities and sales, and investment income, since the portfolio investment performance will be reflected in the reserve calculation through the net asset earned rates used to discount the liability cash flows.

C Aggregation/Grouping of Contracts: to be determined

D Reserve Calculation Description. The Deterministic Reserve is determined using the following steps:

- (1) Determine Business Segments;
- (2) Determine Prudent Best Estimate Assumptions
- (3) Calculate the path of net asset earned rates from a cash flow model of each Business Segment. The model will reflect the single deterministic scenario described in Appendix 8 and Prudent Best Estimate assumptions.
- (4) Calculate the deterministic reserve for each policy using the gross premium methodology defined below.
- (5) Calculate the Deterministic Reserve by summing the deterministic reserve calculated in (4) above.

E Business Segments. For purposes of setting Prudent Best Estimate, the products falling under the scope of the Guideline shall be grouped into business segments. The grouping should generally follow the pricing, marketing, investment strategies, management and/or reinsurance programs of the company. Where less refined segments are used for setting the assumptions than is used in business management the documentation should address the impact, if material, of the less refined segmentation on the resulting reserves.

A.1.2 Calculation of the Deterministic Reserve Determination of Prudent Best Estimate Assumptions. The actuary must determine the assumptions used to calculate the reserve for each policy. The following assumptions must be determined.

- The deterministic reserve will be calculated using a gross premium reserve approach employing prudent best estimate assumptions.
  - The reserve will be calculated for each contract on a seriatim basis and then summed.
  - Consistent with a gross premium reserve approach the Deterministic Reserve is defined as:
    - The Sum of:
      - The present value of future benefits, including but not limited to, death and cash surrender benefits;
      - The present value of future expenses, including but not limited to, commissions, general expenses, and premium taxes.
    - Less:
      - The present value of future gross premiums and/or other applicable revenue.
- A.) The mortality assumptions used are determined as described in Appendix 3.
- B.) The premium assumptions used are determined as described in Appendix 4. This includes the Premium level paid and the persistency of premium payments.
- C.) The withdrawal assumptions used are determined as described in Appendix 4. Withdrawal includes withdrawal of all funds (surrender) as well as partial withdrawal of policy funds.
- D.) The expense assumptions used are determined as described in Appendix 5.
- E.) The asset assumptions used are determined as described in Appendix 6 and Appendix 8.
- F.) Assumptions related to the use of Reinsurance are described in Appendix 7.
- G.) Other relevant assumptions. The actuary must consider other assumptions relevant to the determination of adequate reserves which may not be specifically referenced in this document. To the extent additional assumptions are made, these assumptions should be prudent best estimate assumptions and determined to be consistent with the Principles of this reserve methodology.

A.1.3 Assumptions Net Asset Earned Rate Calculation from Single Scenario Cash Flow Model:

- The types and level of margin are still being discussed for the various assumptions with a goal of ending up with an overall margin that produces adequate but not overly redundant reserves.
  - Mortality assumptions will reflect prudent best estimate assumptions as described in Appendix 3.
  - The expense assumptions are defined in Appendix 5.
- Discount rates will incorporate company specific experience, with defined limits and caps. See Appendix 6.
- A.) For each Business Segment, project the aggregate asset and liability cash flows and statutory asset values reflecting the single deterministic scenario described in Appendix 8 and the Prudent Best Estimate assumptions described above in A1.2.
- B.) For each Business Segment calculate the net asset earned rate for each time interval according to the guidance provided in Appendix 6.

A.1.4 Gross Premium Reserve Methodology and Calculation for Each Policy

Use the path of net asset earned rates determined in A.1.3 when needed to determine items (A) through (D) below. For example, earned rates are needed to determine the level of cash surrender benefits.

- A.) For each policy the future benefits, including but not limited to death and cash surrender benefits, are determined.
- B.) For each policy the future expenses, including but not limited to, commissions, general expenses, and premium taxes are determined. Federal income taxes are excluded.
- C.) For each policy future gross premium payments are determined.
- D.) For each policy future other applicable revenue such as fees and revenue on assets invested in sub-accounts are determined.

E.) The gross premium reserve for each policy is defined as the sum of (1) and (2) below minus (3) below.

- (1) The present value of future benefits is determined by discounting the future benefits using the path of net asset earned rates calculated in A1.3 for the corresponding Business Segment.
- (2) The present value of future expenses is determined by discounting the future expenses using the path of net asset earned rates calculated in A1.3 for the corresponding Business Segment.
- (3) The present value of future gross premium payments and/or other applicable revenue is determined by discounting these future premiums and other revenue using the path of net asset earned rates calculated in A1.3 for the corresponding Business Segment..

A1.5. The Deterministic Reserve equals the sum of the deterministic reserve for each policy. The deterministic reserve for each policy equals the greater of the cash surrender value for each policy and the gross premium reserve determined in A.1.4.

## APPENDIX 2 – DETERMINATION OF THE STOCHASTIC RESERVE [methodology subgroup]

### A2.1. Overview

- A.) Intent: The guidance and requirements in this Appendix apply for determining the Stochastic Reserve. The intent is for the Stochastic Reserve to produce a reserve that is adequate to cover the product benefits, reflecting future revenue over a broad range of stochastic investment and equity scenarios. It is meant to capture all material risks embedded in a product including those sensitive to the economic environment and optionality embedded in the products. The final reserve of a group of contracts will be the greater of the Stochastic Reserve determined for these contracts and the Deterministic Reserves for the same contracts.
- B.) Applicability: Stochastic Reserve for products whose liabilities and/or supporting assets do not possess significant optionality relative to various economic scenarios. As a result, the Stochastic Reserve requirement may not be necessary for such product risk profiles. [Note: this section is still under discussion]
- C.) General Description of Cash Flow Projections: The projection of cash flows under a range of stochastically generated economic scenarios shall be made ignoring Federal Income Tax that reflect the dynamics of the expected cash flows for the entire group of contracts. The projection will include the impact of all product features, including the guarantees provided under the contracts. Insurance company expenses (including overhead expenses), fund expenses, contractual fees and charges, revenue sharing income received by the company (net of applicable expenses) and cash flows associated with any reinsurance (or hedging instrument) are to be reflected on a basis consistent with the requirements herein. Cash flows from fixed account or general accounts shall also be included. Throughout the projection, where estimates are used, such estimates shall be on a Prudent Best Estimate Basis.
- D.) Aggregation: Stochastic reserves may be calculated separately for subsets of the contracts for which a Stochastic Reserve is required. The methodology allows for grouping of contracts as described below and also requires final reserves held determined based on a comparison between the Deterministic Reserve and the Stochastic Reserve. Both of these components of the methodology result in reserve levels which may be lower than what would otherwise be determined due to positive cash flow offsetting negative cash flows in the projections as well possible methodology differences in the deterministic and stochastic approaches.

*[Drafting Note: Although a certain level of aggregation effects are expected due to a modeling approach, LHATE may wish to consider the extent of aggregation which is allowed. For instance aggregation may be limited by issue years, product type, product form or other methods. This may also be considered a transition item.]*

- E.) Grouping of Contracts: Projection may be performed for each contract in force on the date of valuation or by grouping contracts into representative cells of model plans using all characteristics and criteria having a material impact on the size of the reserve.
- F.) Reserve Calculation Description: The Stochastic Reserve is determined using the following steps:
- (1) Determine Business Segments:
  - (2) Determine Contract Grouping
  - (3) Determine Prudent Best Estimate Assumptions
  - (4) Perform Stochastic Reserve calculations for each investment scenario using the gross premium methodology defined in section A2.3.
  - (5) Calculate the Stochastic Reserve as defined below in section A2.4.

- G.) Business Segments. For purposes of setting Prudent Best Estimate assumptions, the products falling under the scope of the Guideline shall be grouped into business segments. The grouping should generally follow the pricing, marketing, investment strategies, management and/or reinsurance programs of the company. Where less refined segments are used for setting the assumptions than is used in business management the documentation should address the impact, if material, of the less refined segmentation on the resulting reserves.

### A.2.2. Determination of Prudent Best Estimate Assumptions. The actuary must determine the following assumptions:

- A.) The mortality assumptions used are determined as described in Appendix 3. This assumption is deterministic.

- B.) The premium assumptions used are determined as described in Appendix 4. This includes the premium level paid and the persistency of premium payments. This assumption may be dynamic and vary based on the economic scenario tested.
- C.) The withdrawal assumptions used are determined as described in Appendix 4. Withdrawal includes withdrawal of all funds (surrender) as well as partial withdrawal of policy funds. This assumption may be dynamic and vary based on economic scenario tested.
- D.) The expense assumptions used are determined as described in Appendix 5. Federal income taxes are excluded. These may vary based on economic scenario due to inflation..
- E.) The asset assumptions used are determined as described in Appendix 6 and Appendix 8. These vary for each economic scenario.
- F.) Assumptions related to the use Reinsurance are described in Appendix 7. These may vary based on economic scenario.
- G.) Other relevant assumptions. The actuary must consider other assumptions relevant to the determination of adequate reserves which may not be specifically referenced in this document. To the extent additional assumptions are made, these assumptions should be prudent best estimate assumptions and determined to be consistent with the Principles of this reserve methodology.

#### A.2.3. Gross Premium Reserve Methodology and Calculation for each Economic Scenario

- A.) For each group of contracts determine the future benefits, including but not limited to death and cash surrender benefits.
- B.) For each group of contracts determine future expenses, including but not limited to, commissions, general expenses, and premium taxes.
- C.) For each group of contracts determine policy future gross premium payments.
- D.) For each group of contracts determine future other applicable revenue such as fees and revenue on assets invested in sub-accounts.
- E.) For each group of contracts determine the net asset earned rate for each time interval according to the guidance provided in Appendix 6.
- F.) The gross premium reserve for each economic scenario is defined as the sum of (1) and (2) below minus (3) below.
  - (1) The present value of future benefits is determined by discounting these future benefits using the path of net asset earned rates calculated in A2.3.E.
  - (2) The present value of future expenses is determined by discounting these future expenses using the path of net asset earned rates calculated in A2.3.E
  - (3) The present value of future gross premium payments and/or other applicable revenue is determined by discounting these future premiums and other revenue using the path of net asset earned rates calculated in A2.3.E.

#### A.2.4. The Stochastic Reserve equals the average of highest (100-CTE risk level)% of the gross premium reserves calculated as determined in A2.3 above. [Drafting Note: the CTE risk level currently specified in the document is 65%]

**A3.1) Overview**

- A) Intent. The guidance and requirements in this Appendix apply for setting Prudent Best Estimate mortality assumptions when determining the Stochastic Reserve or the Deterministic Reserve. The intent is for Prudent Best Estimate mortality assumptions to be based on facts, circumstances and appropriate actuarial practice (best practice if known) with only a limited role for unsupported actuarial judgment.
- B) Description. Prudent Best Estimate mortality assumptions are determined using the following steps:
  - 1) Develop experience mortality curves based on either a company's own available experience or other relevant experience (using the guidance and requirements in section A3.2).
  - 2) Using industry mortality experience, adjust the experience mortality curves reflecting the credibility of the experience used to determine the experience mortality curve (using the guidance and requirements in section A3.3).

*[Note: Industry mortality tables should be approved by the NAIC for statutory reserves. The approach taken is based on experience used to develop statutory valuation tables. However the approach starts with a table without mortality margins, adjusts this table for recent industry experience approved for use by the NAIC. This table is without mortality margins as mortality margins are added in the final step.]*
  - 3) Adjust the mortality curves if there is reasonable expectation that policy design, underwriting, risk selection or policyholder behavior will likely lead to mortality results which vary from underlying available experience or industry mortality experience. Section A3.4) addresses guidance and requirements for adjusting mortality curves.
  - 4) The credibility-adjusted tables shall be adjusted for mortality improvement (where such adjustment is permitted or required) using the guidance and requirements in section A3.5).
  - 5) Adjust the mortality curves to include a reasonable margin for adverse deviation. This is in addition to margins due to data uncertainty. Section A3.6) addresses margins for adverse deviation.
- C) Business Segments. Business segments are generally homogenous groups of life insurance policies that have generally homogenous mortality characteristics. For purposes of setting Prudent Best Estimate mortality assumptions, the products falling under the scope of the Guideline shall be grouped into business segments. The grouping should generally follow the pricing, marketing, management and/or reinsurance programs of the company. Where less refined segments are used for setting the mortality assumption than is used in business management the documentation should address the impact, if material, of the less refined segmentation on the resulting reserves.
- D) Margin for Data Uncertainty. The expected mortality curves that are determined in section A3.2) may need to include a margin for data uncertainty. This margin is not an adjustment for credibility described in section A3.5. The margin for data uncertainty could be in the form of an increase or a decrease in mortality, depending on the business segment under consideration. The margin shall be applied in a direction (i.e., increase or decrease in mortality) that results in a higher reserve. A sensitivity test may be needed to determine the appropriate direction of the provision for uncertainty to mortality. The test could be a prior year mortality sensitivity analysis of the business segment or an examination of current representative cells of the segment.

For purposes of this Appendix, if mortality must be increased (decreased) to provide for uncertainty the business segment is referred to as a plus (minus) segment.

*[Note: At this point, for life insurance products sold today, minus segments are unlikely; however, given these segments may exist for future designs, we felt it appropriate to distinguish between plus and minus segments.]*

It may be necessary, because of a change in the mortality risk profile of the segment, to reclassify a business segment from a plus (minus) segment to a minus (plus) segment to the extent compliance with this subsection requires such a reclassification.

**A3.2) Determination of Expected Mortality Curves**

- A) Experience Data. In determining expected mortality curves the company shall use actual experience data directly applicable to the business segment (i.e., company's own direct data) if it is available. In the absence of company's own direct data, the company should then look to use data from a segment that is consistent with the business segment (i.e., other than direct experience). See section B) below for additional considerations. Finally, if there is

no data, the company shall use the applicable table, as required in subsection C) below. Experience Data should be updated within reasonable timeframes.

- B) **Data Other than Direct Experience.** If expected mortality curves for a segment are being determined using data consistent with the business segment (whether or not directly written by the company), the actuary shall document any similarities or differences between the two business segments (e.g., type of underwriting, marketing channel, average policy size, etc.). A mortality table consistent with the business segment includes, but is not limited to, Society of Actuary intercompany studies, consultant studies, reinsurer studies, mortality studies from other countries, retirement plan studies, annuity studies and population studies. The actuary must document the appropriateness of using these tables and opine on the appropriateness of the table construction including underlying experience data, credibility of experience, appropriateness of late duration and older age mortality assumptions and other relevant information considered when selecting the assumption. Margins for data uncertainty shall be applied to the experience mortality curves to reflect any data uncertainty and/or differences between the business segments.
- C) **No Data Requirements.** When little or no experience or information is available on a business segment, the company shall use industry expected mortality curves. Margins shall be applied to the expected mortality curves to reflect any data uncertainty and/or differences between the business segments. If mortality experience on the business segment is expected to be atypical (e.g., demographics of target markets are known to have higher (lower) mortality than typical), these “no data” mortality requirements may not be adequate.
- D) **Additional Considerations Involving Data.** The following considerations shall apply to mortality data specific to the business segment for which assumptions are being determined (i.e., direct data discussed in subsection A) above or other than direct data discussed in subsection B) above). Within a business segment, mortality assumptions for direct and ceded business should be the same
  - 1) **Experience by contract duration.** If internal mortality data is available for a certain business segment for a limited number of durations or issue ages, then the result of that limited mortality data can be extended to the remaining durations or issue ages. However, margins should be applied to reflect data uncertainty or differences in business segments. The actuary must consider the absolute level of the mortality assumptions and the slope of the mortality curve when extending mortality results.
  - 2) **Modification and Relevance of data.** Even for a large company the quantity of life exposures and deaths are such that a significant amount of smoothing may be required to determine expected mortality curves from mortality experience. Expected mortality curves, when applied to the recent historic exposures (e.g., 3 to 7 years), should not result in an estimate of aggregate number of deaths less (greater) than the actual number deaths during the exposure period for plus (minus) segments. If this condition is not satisfied, the actuary must document the rationale in support of using expected mortality that differs from recent mortality experience.
- In determining expected mortality curves (and the credibility of the underlying data), older data may no longer be relevant. The "age" of the experience data used to determine expected mortality curves should be documented. There should be commentary in the documentation on the relevance of the data (e.g., any actual and expected changes in markets, products and economic conditions over the historic and projected experience).
- 3) **Other considerations.** In determining experience mortality curves, consideration should be given to factors that include, but are not limited to, trends in mortality experience, trends in exposure, volatility in year-to-year A/E mortality ratios, mortality by lives relative to mortality by amounts, changes in the mix of business and product features that could lead to mortality selection.

E) **Documentation Requirements.**

1) **All Segments.**

The documentation should include any material considerations necessary to understand the development of mortality assumptions for the statutory valuation even if such considerations are not explicitly mentioned in this section. The documentation should be explicit when material judgments were required and such judgments had to be made without supporting historic experience.

The documentation shall:

- (a) Explain the rationale for the grouping of contracts into different segments for the determination of mortality assumptions and characterize the type and quantity of business that constitute each segment.
- (b) Describe how each segment was determined to be a plus or minus segment.

- (c) Summarize any mortality studies used to support mortality assumptions, quantify the exposures and corresponding deaths, describe the important characteristics of the exposures and comment on unusual data points or trends
  - (d) Document the age of the experience data used to determine expected mortality curves and comment on the relevance of the data.
  - (e) Document the mathematics used to adjust mortality based on credibility and summarize the result of applying credibility to the mortality segments.
  - (f) Describe how the expected mortality curves compare to recent historic experience and comment on any differences.
  - (g) If the study was done on a similar business segment, identify the differences in the business segment on which the data was gathered and the business segment on which the data was used to determine mortality assumptions for the statutory valuation. Describe how these differences were reflected in the mortality used in modeling.
- 2) **Plus Segments.** For a plus segment, the documentation shall also discuss the examination of the mortality data for the underreporting of deaths and experience by duration, and describe any adjustments that were made as a result of the examination.
  - 3) **Minus Segments.** For a minus segment the documentation shall also discuss how the mortality deviations on minus segments compare to those on any plus segments. To the extent the overall margin is reduced, the documentation should include support for this assumption.

### A3.3) Adjustment for Credibility to Determine Prudent Best Estimate Mortality

- A) **Adjustment for Credibility.** The experience mortality curves determined in section A3.2) shall be adjusted based on the credibility of the experience used to determine the curves in order to arrive at Prudent Best Estimate mortality assumption. The adjustment for credibility shall result in blending the experience mortality curves with an Industry Mortality table specified as the 2001 VBT table (or other tables adopted by the NAIC for this purpose) adjusted for most recent Society of Actuaries intercompany study approved for use by the NAIC.<sup>2</sup>
- B) **Adjustment of Industry Mortality for Improvement.** For purposes of the adjustment for credibility, the industry mortality table for a plus segment may be; and the industry mortality table for a minus segment must be; adjusted for mortality improvement. Such adjustment shall reflect applicable published industrywide experience from the effective date of the respective industry mortality table to the experience weighted average date underlying the data used to develop the experience mortality curves (discussed in section A3.2).<sup>3</sup>
- C) **Credibility Procedure.** The statistical credibility of internal mortality data decreases as the number of sub-categories of the internal data increase. For example, aggregation of all experience from a block of business is more credible than one that breaks down experience by gender, duration or underwriting class. Credibility factors must be applied to the aggregated internal data as well as the sub-categorized data.<sup>4</sup>

When applying credibility to determine combined mortality curves by sub-categories, the actuary must reflect the portion of business in each sub-category to the extent known, or an estimate if not known. The actuary may also reflect mortality differentials by sub-category due to underwriting practices and requirements for a period of no

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<sup>2</sup> The NAIC may want to set up a process in place to routinely approve the use of the most recent SOA intercompany study in order to reflect emerging experience.

<sup>3</sup> The NAIC may want to set up a process in place to routinely approve the mortality improvement factors for this use.

<sup>4</sup> Two approaches to credibility are outlined in 1989 Canadian paper – “Valuation Techniques Paper No 6- Expected Mortality Experience for Individual Experience” and in the 2002 Canadian paper “Expected Mortality: Fully Underwritten Canadian Individual Life Insurance Policies.” Other approaches may also be acceptable. Pages 17 through 21 of the 2002 Canadian paper describe and recommend the “Normalized Method” as a method to allocate credibility to sub-categories of data.

greater than 20 years or to age 85, except that on any valuation date current experience differentials may be graded off over as many as 5 years even if this would result in passing the 20 year/age 85 limit.<sup>5</sup>

The credibility procedure used shall:

- 1) produce results that are reasonable in the professional judgment of the actuary,
- 2) ~~not tend to bias the results in any material way,~~
- ~~3)~~ be practical to implement,
- ~~4)~~ give consideration to the need to balance responsiveness and stability,
- ~~5)~~ take into account not only the level of aggregate claims but the shape of the mortality curve, and
- ~~6)~~ contain criteria for full credibility and partial credibility that have a sound statistical basis and be appropriately applied.

Documentation of the credibility procedure used shall include a description of the procedure, the statistical basis for the specific elements of the credibility procedure, and any material changes from prior credibility procedures.

- D) Further Adjustment of the Credibility-Adjusted Table for Mortality Improvement. The credibility-adjusted table used for plus segments may be; and the credibility adjusted date used for minus segments must be; adjusted for applicable published industrywide experience from the experience weighted average date underlying the company experience used in the credibility process to the valuation date.<sup>6</sup>

Any adjustment for mortality improvement beyond the valuation date is discussed in section A3.5).

#### A3.4) Adjustment to Mortality Curves

Additional adjustment to the Credibility Adjusted Mortality Table for Mortality Improvement determined in A3.3 (D) may be made to reflect the effect of risk selection (i.e., underwriting and grading off of underwriting differentials over time), substandard rating policy design or policy holder behavior not reflected in the underlying experience.

Any adjustment which reduces (increases) the mortality assumption for a plus (minus) segment must be based on relevant data which supports the adjustment.<sup>7</sup>

The actuary must also reflect any adjustment which increases (reduces) the mortality assumption for a plus (minus) segment. These include adjustments for policy provisions or policyholder behavior that suggest mortality anti-selection. Examples situations where adjustments are appropriate for plus segments include: term conversions, table shave programs, high lapse rates.

*[Note: The work group continues to discuss this issue. LHFATF should also carefully consider this adjustment and any limits they feel are appropriate.]*

The documentation shall:

- (a) Explain the rationale for any adjustment.
- (b) Summarize any studies used to support the adjustment.
- (c) Document the mathematics used to adjust the mortality.

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<sup>5</sup> When applying the “normalized methods” to separate risk classes, the actuary will consider the business in each of these risk classes and the mortality differentials between risk classes as a result of underwriting selection. LHFATF may wish to consider limiting the level of these differentials and the period of time these differentials remain. The working group discussed the limits noted.

<sup>6</sup> The NAIC may want to adopt or approve for use certain external tables.

<sup>7</sup> The NAIC may want to limit the amount of an adjustment as well as the period of time an adjustment is permissible for adjustments that reduce reserve levels.

### A3.5) Future Mortality Improvement

The mortality assumption resulting from the requirements of section A3.4) shall not be adjusted for mortality improvements beyond the valuation date unless such an adjustment would serve to increase the resulting Stochastic Reserve or Deterministic Reserve. This assumption is generally considered to result in additional margin in the reserves.

### A3.6) Margins for Adverse Deviation.

An explicit margin for adverse deviation shall be included in the prudent best estimate valuation assumption whether experience comes from external studies or internal company studies.

The actuary must select a margin for adverse deviation between a low and high margin. In general the low and high margin are 3.75 to 15 deaths per 1000 per year, each divided by the curtate expectation of life at the insured's attained age at each future point in time.

No margin for adverse deviation is required when the resulting mortality assumptions equals the most recent appropriate valuation table, or to the extent adverse deviation can be offset by additional revenue due to adjustments in policyholder non-guaranteed elements. In addition to a contractual right to make such adjustments, the actuary must consider any additional constraints to making such adjustments, including policyholder expectations, the company's non guaranteed element policy and historical company practices in making change to non guaranteed elements, as well as competition, regulation, administrative capabilities and additional product guarantees.

The documentation shall:

- (a) Explain the rationale for the level of margin;
- (b) Explain consistency of the margins for adverse deviation and modeling of benefits;
- (c) The amount of the margin for adverse deviation is calculated by subtracting the reserves calculated to exclude the margin for adverse deviation from the reserves calculated to include the margin for adverse deviation.

### A3.7) Additional Documentation Requirements:

An actuarial memorandum will be prepared and filed with regulatory authorities annually which will include a description for the valuation mortality assumptions. In addition to the documentation items listed in prior sections, the memorandum shall at least provide the following information:

- (a) Describe how the expected mortality curves compare to recent historic experience and comment on any differences;
- (b) Explain how the curve reflects the wearing off of underwriting over time;
- (c) Discuss any assumptions made on mortality improvements, the support for such assumptions and how such assumptions adjusted the modeled mortality;
- (d) ~~Discuss how the mortality assumptions are consistent with the goal of achieving the required CTE level over the joint distribution of all future outcomes, in keeping with Principle #5;~~
- (e)(d) Identification and quantification of any changes in mortality assumptions from the prior year;
- (f)(e) Any other relevant important information concerning the mortality assumption.<sup>8</sup>

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<sup>8</sup> Drafting note

1. *Guidance to the appointed actuary – ASOP and/or practice notes may need to be developed to provide additional guidance beyond that contained in this document to the appointed actuary in setting mortality assumptions.*
2. *Consistent disclosure of valuation assumptions – The overall academy group report should suggest that the actuarial memorandum also discuss other valuation assumptions in a manner consistent with the discussion of mortality*

## **APPENDIX 4: Guidance and Requirements for Setting Prudent Best Estimate Policyholder Behavior**

This document reflects a summary of the work to date on setting policyholder behavior assumptions. Over the next few months, this Appendix will be updated as appropriate.

1. Policy behavior assumptions include, but are not limited to:

- a. Future premium/deposits;
- b. Surrenders;
- c. Partial withdrawals;
- d. Fund transfers on variable products;
- e. Conversion of term products.

2. Basic principles underlying the recommended approach to establish policy behavior assumptions:

- a. Valuation assumptions should be appropriate to the circumstances of the company and the policies in force, and need not be the same for each company.
- b. Policyholder behavior to be modeled dynamically according to the simulated economic environment and/or other conditions.
- c. Policyholder utilization rate of options adverse to the company can be less than 100 %.
- d. Given premium flexibility, there is need to reflect wide variety of possible premium paths.
- e. No set of "rules" or guidance would be appropriate in all circumstances.
- f. The actuary is required to examine the sensitivity of results to understand the materiality of making alternate assumptions, considering, but not limited to, the following premium patterns:
  - Minimum premium scenario;
  - Non-payment of premium scenario;
  - Prepayment of premium scenario—single premium case;
  - Prepayment of premium scenario—level premium case.
- g. Withdrawal assumption to be Prudent Best Estimate with explicit additional margin appropriate to policy characteristics, subject to caps and floors.
- h.a. The actuary must provide demonstration that all material policyholder behavior driven risks inherent in the product have been considered.

### **A4.1 Overview**

A) Intent. The guidance and requirements in this Appendix apply for setting Prudent Best Estimate Policyholder Behavior assumptions when determining the Stochastic Reserve or the Deterministic Reserve. The intent is for Prudent Best Estimate Policyholder Behavior assumptions to be based on facts, circumstances and appropriate actuarial practice (best practice if known) with only a limited role for unsupported actuarial judgment.

Policyholder behavior assumptions encompass actions such as but not limited to lapses, withdrawals, transfers between fixed and separate accounts on variable products, recurring deposits, benefit utilization, and option election. Policyholder behavior is difficult to predict and behavior assumptions can significantly impact the results. In the absence of relevant and fully credible empirical data, the actuary should set behavior assumptions on the conservative end of the actuary's reasonable expectations (consistent with the definition of Prudent Best Estimate).

B) Granularity Considerations. In setting a behavior assumption the actuary needs to consider the appropriateness of that assumption as it pertains to the policy or block of policies being valued. The actuary will need to make a choice between setting a separate assumption specific and appropriate to each individual policy being valued, a single assumption to be applied to all policies being valued, or some degree of granularity within these two endpoints. In making that choice, the actuary needs to balance the volume of work in establishing a separate assumption specific and appropriate to each individual policy against the possible loss of precision and appropriateness in applying an assumption over a broader group of policies. The application of a single assumption over a group of policies may lead to the unintended premature cessation of projected benefits. The appropriate degree of granularity in the

assumptions will be determined by the sensitivity of the results to the level of granularity. The actuary should establish behavior assumptions at a sufficient level of granularity that a higher level of granularity will not materially impact the results. The actuary should be prepared to justify his/her choice of granularity and should retain on-hand sufficient documentation supporting that choice.

- C) Business Segments. For purposes of setting Prudent Best Estimate policyholder behavior assumptions, the products falling under the scope of the Guideline shall be grouped into business segments. The grouping should generally follow the pricing, marketing, management and/or reinsurance programs of the company. Where less refined segments are used for setting the policyholder behavior assumption than is used in business management the documentation should address the impact, if material, of the less refined segmentation on the resulting reserves.
- D) Margin for Uncertainty. The prudent best estimate withdrawal assumptions that are determined in section A4.4 may need to include a margin for data uncertainty. The margin for data uncertainty could be in the form of an increase or a decrease in withdrawals, depending on the business segment under consideration. The margin shall be applied in a direction (i.e., increase or decrease in withdrawals that results in a higher reserve. A sensitivity test may be needed to determine the appropriate direction of the provision for uncertainty to withdrawals. No formulaic additive or deductive margin is specified with respect to the premium assumption. Rather, the actuary is required to perform the prescribed sensitivity testing in section 4.3E in arriving at the prudent best estimate premium assumption.

#### A4.2) Policyholder Behavior Considerations:

- A) General Considerations. Policyholder behavior is difficult to predict and behavior assumptions can significantly impact the results. In the absence of relevant and fully credible empirical data, the actuary should set behavior assumptions on the conservative end of the actuary's reasonable expectations (consistent with the definition of Prudent Best Estimate). In setting behavior assumptions, the actuary should examine, but not be limited by the following considerations:
- 1) Behavior can vary by product, market, distribution channel, fund and policy performance, time/product duration, etc...
  - 2) Options embedded in the product may impact behavior.
  - 3) Options may be elective or non-elective in nature.
  - 4) Elective policyholder options may be more driven by economic conditions than non-elective options.
  - 5) As the value of a product option increases, there is an increased likelihood that policyholders will behave in a manner that maximizes their financial interest (e.g., lower lapses, higher benefit utilization, etc.).
  - 6) Behavior formulas may have both rational and irrational components. The rational component should be dynamic, but the concept of rationality need not be interpreted in strict financial terms and might change over time.
  - 7) Options that are ancillary to the primary product features may not be significant drivers of behavior. Whether an option is ancillary to the primary product features depends on many things such as:
    - For what purpose was the product purchased?
    - Is the option elective or non-elective?
    - Is the value of the option well known?
  - 8) The impact of behavior can vary by product, time period, etc. Sensitivity testing of assumptions will usually be necessary in establishing the Prudent Best Estimate.
  - 9) It may be acceptable to ignore certain items that might otherwise be explicitly modeled in an ideal world, particularly if the inclusion of such items reduces the calculated asset requirements or reserves.
  - 10) Normally, the underlying model assumptions would differ according to the attributes of the policy being valued. This would typically mean that policyholder behavior and persistency may be expected to vary according to such characteristics as (this is not an exhaustive list):
    - (a) Gender
    - (b) Attained age
    - (c) Issue age
    - (d) Policy duration

- (e) Time to maturity
- (f) Tax status
- (g) Level of account and cash value
- (h) Surrender charges, transaction fees or other policy charges
- (i) Distribution channel
- (j) Product features

- 11) Unless there is clear evidence to the contrary, policyholder behavior should be consistent with relevant past experience and reasonable future expectations. When such relevant experience is lacking, policyholder behavior assumptions may be derived in a reasonable and appropriate manner from actual experience and past trends in experience of other similar classes of business either in the same company, of other companies, or from other sources, generally in that order of preference.
- 12) Ideally, policyholder behavior would be modeled dynamically according to the simulated economic environment and/or other conditions. However, it is reasonable to assume a certain level of non-financially motivated behavior. The actuary need not assume that all policyholders act with 100% efficiency in a financially rational manner. Neither should the actuary assume that policyholders will always act irrationally.
- 13) The behavior assumptions should be logical and consistent both individually and in aggregate, especially in the scenarios that govern the results. In other words, the actuary should not set behavior assumptions in isolation, but give due consideration to other elements of the model. The interdependence of assumptions (particularly those governing customer behaviors) makes this task difficult and by definition requires professional judgment, but it is important that the model risk factors and assumptions:
  - Remain logically and internally consistent across the scenarios tested;
  - Represent reasonably expected outcomes; and
  - Lead to appropriate, but not excessive, asset requirements.

The actuary should remember that the continuum of “reasonability” should not be confined or constrained to the outcomes and events exhibited by historic experience.

Companies should attempt to track experience for all assumptions that materially affect its risk profile by collecting and maintaining the data required to conduct credible and meaningful studies of policyholder behavior.

- B) Dynamic Behavior. The actuary should exercise care in using static assumptions when it would be more natural and reasonable to use a dynamic model or other scenario-dependent formulation for behavior. With due regard to considerations of materiality and practicality, the use of dynamic models is encouraged, but not mandatory.

Risk factors which are not scenario tested, but could reasonably be expected to vary according to (a) a stochastic process, or (b) future states of the world (especially in response to economic drivers) may require additional margins and/or signal a need for higher margins for certain other assumptions.

Risk factors that are modeled dynamically should encompass the reasonable range of future expected behavior consistent with the economic scenarios and other variables in the model. In the absence of evidence to the contrary, it may not be necessary to model extreme or “catastrophic” forms of behavior. However, the actuary is encouraged to test the sensitivity of results to understand the materiality of making alternate assumptions.

For universal life with secondary guarantees, these “valuation” scenarios would typically reflect declining and/or prolonged periods of low interest rates.

- C) Consistency of PBE and the CTE Measure. All behaviors (i.e., dynamic, formulaic and static) should be consistent with the scenarios used in the CTE calculations (generally, the top 1/3 of the loss distribution). To maintain such consistency, it is not necessary to iterate (i.e., successive runs of the model) in order to determine exactly which scenario results are included in the CTE measure. Rather, in light of the products being valued, the actuary should be mindful of the general characteristics of those scenarios likely to represent the tail of the loss distribution and consequently use Prudent Best Estimate assumptions for behavior that are reasonable and appropriate in such

scenarios. The actuary should examine the results that occur when the base assumption, margin for adverse deviation and dynamic formula are brought together for the different policyholder behavior assumptions. It is expected that the assumptions used would cause the results to fall within the top 1/3 of the loss distribution scenarios.

- D) Prescribed Requirements. Prudent Best Estimate premium assumptions are determined following the requirements in A4.3. Prudent Best Estimate withdrawal assumptions are determined following the requirements in A4.6.

#### A4.3) Premium Assumption

- A) General Considerations. An important assumption in the valuation is the future premium deposit assumption. Depending upon the product structure, future premiums may be fixed, may be flexible at the discretion of the policyholder, or may be adjustable subject to discretion of the company.

For policies with fixed future premiums, no assumption is necessary as to the future premium deposit stream. In other situations, a premium persistency assumption is needed, subject to the limitations specified in the policy design.

A key consideration of the future premiums for a given policy is whether the policy was sold to primarily affect permanent coverage, or to primarily effect the accumulation of savings. For policies sold as permanent coverage it would be expected that the policyholder would tend to pay the minimum premium at the latest possible date to keep the policy in force to maturity. For policies sold as a savings vehicle it would be expected that the policyholder would tend to pay more than the minimum amount.

When premiums are not fixed, the future premiums that are assumed may produce significant differences in liabilities for different assumptions. The assumption chosen should be consistent with the information available from the policy administration system. The actual premium received could be compared to the amount of premium that would have been generated by the future premium assumption applied to the prior period in-force policies. This analysis may be valuable in determining the appropriateness of the future premium assumption.

- B) Premium Persistency. In determining the future premium persistency for a particular policy, the actuary should consider that low premium persistency rates could be expected if the following are present:

- Marketing material places emphasis on premium flexibility
- Sales illustrations feature quick-pay premiums (which could lead to low premium persistency rates in later years)
- Presence of large lump sum premiums in the past
- Interest rate crediting is based on portfolio rates and new money rates spike upwards

High premium persistency rates could be expected if the following are present:

- Most business is pre-authorized checking
- Marketing material places emphasis on credited interest rates, tax advantages and savings aspects of the plan
- Interest rate crediting is based on portfolio rates and new money rates decrease
- The existence of persistency bonuses
- The existence of other policyholder incentives not to reduce premium levels, e.g. the policy loses its secondary guarantee

For policies with regular periodic premiums required for the policy to remain in force, premium persistency should be consistent with expected future lapse rates and include policies moving to non-forfeiture options where applicable.

- C) Historical Data. All future projections of premiums should be based on historical premium payments, where available. However, the actuary should exercise caution in assuming that current behavior will be indefinitely maintained. For example, it might be appropriate to assume that future behavior will differ from historical experience to the extent that market, environmental or other changes make historical experience less relevant.

- D) Data Lacking. When historical experience is lacking, the future premium assumption may be derived in a reasonable and appropriate manner from actual experience and past trends in experience of other similar classes of business either in the same company, of other companies, or from other sources, generally in that order of preference.

For universal life policies and other flexible premium policies, illustrated premiums or target premiums can be used but the actuary should exercise caution in assuming the target premium will be paid for all years in the future. For universal life policies with secondary guarantees, the level of future expected premiums can have a large effect on the calculated asset requirements or reserves. The actuary should consider assuming the minimum premium to keep the policy in force is paid (either the stipulated premium or the minimum amount required to provide for a positive shadow account). Excess funding of universal life policies with secondary guarantees will tend to decrease the liability amount and should only be used where such specific policyholder behavior has previously been observed.

- E) Sensitivity Testing. The actuary is required to examine the sensitivity of results to understand the materiality of making alternate assumptions. For example, the actuary must examine, but not be limited by the following, premium assumptions:

- 1) Minimum premium scenario. At any point in the policy's lifetime, the policy provisions define a future stream of minimum premium payments that will keep the policy in force until policy expiry. The pattern of premium payments depends on the policy design, but could be level or annually increasing or a combination of the two. Reserves should be calculated assuming that the policyholder pays the minimum premium required by the policy terms to keep the policy in force each year.
- 2) Non-payment of premiums. When the **minimum premium is positive**, it is reasonable to assume that some policyholders fail to pay the minimum premium, especially when the minimum premium for the current year is greater than the premium actually paid in the prior year. If the minimum premium is increasing substantially compared to the prior year premium, it is reasonable to assume a "shock lapse", for example, where the minimum premium has been zero for a period of years and the next minimum premium is substantial. These non-payment lapse assumptions should be consistent with lapse experience on policies where no nonforfeiture option is available.
- 3) Pre-payment of premiums – Single premium case. Policyholders may elect to pay all of their premiums ahead of schedule. In this case the minimum premium will be zero and no non-payment lapses would be assumed. However, if the value of the cash surrender value is roughly equivalent to the value of the future death benefits (assuming no further premiums), then it would be reasonable to assume some policyholders will elect to surrender their policies. If the cash surrender value is substantially less than the value of the death benefits, as is often the case with policies with shadow accounts, it would be reasonable to assume that few or none would surrender their contracts.
- 4) Pre-payment of premiums – Level premium case. Policyholders may elect to pay a level premium which is guaranteed to keep the policy in force until the policyholder's death. Typically, in this case, the minimum premium will be zero followed by annually increasing premiums. However, it is reasonable to assume that some policyholders will continue the premium pattern that they have already established. It will be important to consider both of these premium payment scenarios since the value of the pre-payment option will depend on future interest rates compared to the interest rates guaranteed in any shadow account. Whenever the minimum premium is zero, surrender assumptions would be similar to those described for the single premium case.

Where the results are highly sensitive to the assumed premium pattern, the actuary should take care in the assumption chosen, consistent with the definition of Prudent Best Estimate.

In the absence of relevant and fully credible empirical data, the actuary should set behavior assumptions on the conservative end of the reasonable spectrum (consistent with the definition of "prudent best estimate")

#### A4.4) Setting the PBE premium payment assumptions – UL with Secondary Guarantees Example

ULSG products incorporate a flexible premium design and therefore require a future premium deposit assumption as well as a premium persistency assumption.

When setting the PBE for a ULSG policy, it is important to examine the manner in which it was sold. For example, if the ULSG was sold as the result of a conversion from a Term policy, it may be prudent for the actuary to assume that the policyholder is seeking permanent death benefit coverage and could therefore be expected to not pay more than the minimum premium to keep the death benefit in force. If the actuary can point to evidence that the policy was sold as an accumulation vehicle, the future deposit stream could be assumed to be more than the minimum amount. If the actuary chooses a future premium pattern that causes a significantly smaller liability, the actuary should be prepared to justify this decision.

When setting the PBE for ULSG products, the actuary will need to make an initial assumption about the future deposit stream. This could be broken down into the groups of policyholders who will pay the minimum amount and those who will pay something greater than the minimum.

These groups can be further divided into those who pre-pay and those who pay at the latest possible date. It is up to the actuary to determine the percentage of policyholders in each group, and should be based on historical experience. In the absence of credible experience, the actuary could form an opinion based on the company's sales strategy for the product. The actuary would be expected to compare the expected premium stream based on this assumption to the amount of premium actually coming from the administration system and adjust the premium accordingly. The actuary is also required to sensitivity test different premium deposit assumptions. If one premium deposit assumption will cause a significantly larger liability, the actuary should give more weight to that scenario in the absence of credible experience that proves otherwise.

Unlike Term, where the premium persistency assumption is relatively straightforward, ULSG policies will not necessarily lapse if non-payment occurs. That makes the premium persistency assumption more difficult to determine. The level of premium persistency will vary along with the future deposit assumption. The actuary should look at a variety of premium assumptions, as described above, and sensitivity test. Future deposit and premium assumptions that cause significantly higher liabilities should be given more weight when setting the PBE.

The actuary should examine the following premium assumptions:

#### 1. Minimum Premium Scenario

For ULSG products, this is the pattern that would be considered rational behavior for the policyholder who is looking for pure death benefit coverage. Premium persistency would be high for this group. The actuary should calculate the liability based on this pattern and 100% premium persistency, since this may represent a policyholder behavior that is most adverse to the company.

#### 2. Non-Payment of Premiums

Unlike Term, non-payment of premiums for ULSG products do necessarily lead to a surrender of the policy, as there may be adequate value in the policy to remain in force. If a policyholder has missed a premium and is relying upon the value of the shadow account to keep the policy in force, it may be reasonable to assume a "shock lapse" associated with the policy. This will occur when the minimum premium required to keep the policy in force is larger than the last premium paid by the policyholder.

#### 3. Pre-payment of premiums – Single Premiums

For ULSG policies, the policyholder may elect to pay a single premium to maintain coverage over the life of the policy. Since no future premiums would be required, lapses would be close to zero. Surrender activity can be linked to the interest scenario in that it may be reasonable to assume some surrenders in high interest rate scenarios, where the cash value in the policy is close to the value of the future death benefit.

It may be reasonable to assume some surrenders under all conditions as policyholders make decisions based on different economic criteria. It is not always necessary to assume the policyholder behaves in a manner most adverse to the company in every scenario, but the actuary should be prepared to justify such an assumption based on historical surrender experience.

#### 4. Pre-payment of premiums – Level Premiums

The policyholder may also elect to pay minimum level premiums to maintain coverage. This is typical way in which most ULSG policies are currently sold and therefore may be the basis for the PBE. After issue, the actuary would be expected to compare the assumption to what the policyholder is actually paying. In such a scenario, the policy would have enough value early on that it would be possible for the policyholder to stop paying premiums and keep the policy in force for some time. If the policyholder let the account value run out and wanted to continue coverage, the actuary could assume some shock lapse as the "catch-up" premium would be higher than what the customer was accustomed to paying.

After examining the above assumptions the actuary would develop the PBE. This may take the form of a blended premium assumption or segmenting the in force into blocks with each block having a premium assumption appropriate to its characteristics. Segmenting the in force into blocks may provide additional insight into the risks. Aggregation by the actuary into a blended premium pattern requires that the actuary consider all aspects of premium pattern risk. Any aggregation must meet the requirements of section A4.1B.

#### **A4.5) Setting the PBE premium payment assumptions – Term Example**

EXAMPLE: Term policy with level premiums for 10 years, then annual increasing premiums thereafter.

The actuary would need to develop a premium persistency assumption for the initial, level premium period, as well as a premium persistency assumption for after the level period has expired. No assumption for the future deposit stream is necessary.

For Term policies, an additional assumption regarding future premiums is not necessary. The policyholder will be billed for the premium required to keep the policy in force until the next billing cycle, the frequency of which is determined by the policyholder. The actuary should already be able to develop a distribution of premium modes based on historical experience. In the absence of credible experience, the actuary should utilize alternate sources as outlined above.

The premium assumption for the level period should be straightforward. The actuary should use historical experience, where credible experience is available, to develop a premium persistency assumption. Using a block of policies similar in design to the policies to be modeled, the actuary should be able to use the information from the administration system to extract the number of policies that lapse from non-payment and develop a credible lapse premium persistency assumption. When historical experience is lacking, the future premium assumption may be derived from alternate sources as outlined above.

The premium persistency assumption for after the level period may be less straightforward. Many companies may not have credible historical experience for the period following the level period, as they may not have developed this type of product design long enough ago to have a mature block of policies to examine. In this instance, the actuary could examine a block of policies that would tend to exhibit similar policyholder behavior. For example, the actuary may examine the premium persistency in year 11 for a 10 year level Term policy when developing an assumption for year 21 of a 20 year level Term policy.

Low premium persistency can be expected at the end of the level premium paying period if the billed increasing premiums are significantly higher than the level premiums. If the increasing premiums are greater than the premiums the policyholder would be charged on a new policy based on the policyholder's current age and underwriting status, the rational policyholder behavior would be to cease paying premiums. Policyholders who have also outlived their coverage needs, i.e. they truly desired term insurance coverage for the level period they purchased, would also be expected to discontinue premium payment. If the policyholder cannot obtain a new policy for less than the increasing rate, due to deteriorated health, but still has a short-term need for insurance, the rational policyholder behavior may be to pay several of the increasing premiums. In the absence of any credible experience to the contrary, the actuary should assume the policyholder will usually behave rationally, and should construct the premium persistency assumption accordingly. [Note that this example assumes the company charges the guaranteed increasing premiums after the level period. It does not address the issue of non-guaranteed elements, where the company reserves the right to charge less than the guaranteed premium. If the actuary has historical experience that demonstrates the company acting in this manner, s/he should adjust the premium persistency assumption accordingly]

If the actuary has credible historical experience that will demonstrate that the policyholder does not always behave rationally, i.e. the policyholder pays increasing premiums when it would be cheaper to purchase a new policy, the actuary may include this as part of the PBE, but should be prepared to justify this decision.

For Term policies, the actuary should develop a premium persistency assumption as described above. However, the actuary should be careful to re-evaluate the environment when appropriate. In a dynamic environment like the recent Term market, competitive forces (or other environmental factors such as the 2001 CSO table, off-shore reinsurance or securitization deals) have driven rates down to the point where a policyholder could replace his/her

Term policy with a cheaper policy despite being several years older. The actuary should examine these conditions when setting future assumptions, and not assume past behavior to continue.

When constructing the PBE, the actuary is required to sensitivity test results. The actuary should examine the following premium assumptions as described above:

#### 1. Minimum Premium Scenario

For term policies, the minimum premium scenario is the same as the billed premium for the level period and 0% persistency after the level period.

#### 2. Non-Payment of Premiums

The PBE for a Term policy would most likely include two non-payment of premium assumptions. For the level period, the actuary should include non-payment of premiums in the PBE as part of the regular premium persistency assumption (including policies that move to non-forfeiture options, if any). For the period after the level period, the actuary should assume a “shock lapse” caused by the increasing premiums. The severity of the shock lapse should be determined by historical experience where available. When not available, the actuary should follow the guidance outlined above for dealing with a lack of historical experience.

#### 3. Pre-payment of premiums – Single Premiums

This pattern is irrelevant for a level premium Term policy.

#### 4. Pre-payment of premiums – Level Premiums

For a Term policy, the policyholder will generally pay the billed premium. It is possible that the policyholder could elect monthly premiums at issue, and later change to paying annually. The actuary should examine emerging experience to determine if the modal distribution he/she developed when determining the original PBE should be adjusted.

After examining the above assumptions the actuary would develop the PBE.

### **A4.6) Withdrawal Assumption**

A) General Considerations. Withdrawal assumptions would typically be “deterministic” in nature rather than “stochastic”. However, the withdrawal assumption would typically have a dynamic component in response to the current interest rate environment, funding level, premium increases, and benefit triggers.

The actuary should exercise care in using static assumptions when it would be more natural and reasonable to use a dynamic model for behavior. Within materiality considerations, the use of dynamic models is encouraged, but not mandatory. Risk factors which are not scenario tested, *but* could reasonably be expected to vary according to (a) a stochastic process, or (b) future states of the world (especially in response to economic drivers) may require additional margins and/or signal a need for higher margins for certain other assumptions.

In setting a withdrawal assumption, the appointed actuary would generally consider items such as but not limited to:

- policy plan and options
- the policy's competitiveness, surrender charges, interest bonuses, persistency bonuses, taxation upon withdrawal and other incentives and disincentives to withdrawal
- the life insured's attained age, gender and duration since issue of the policy
- premium paying pattern
- method of payment and frequency of premiums
- policy fund value
- policy size

- policy tax status
- investment options (both internal to policy and external)
- guaranteed benefit amounts
- policyholder and sales representative sophistication
- the insurer's distribution system and its commission conversion replacement and other marketing practices
- the interest rate scenario
- external influences on withdrawals, e.g. emergence of viaticals/life settlement companies

and would include the effect of any anti-selection.

*[Drafting Note: further guidance as to the establishment of best estimate assumption may be useful either directly in this document or alternatively through reference to a practice note to be developed]*

- B) Cliff. A “cliff” is a sudden significant increase in the benefit available at withdrawal. That increase may result from increase in cash value, decrease in surrender charge, or availability of a maturity benefit or persistency bonus. Unless there is pertinent persistency experience data to the contrary, the actuary’s best estimate withdrawal rates would grade to zero as the cliff approaches and remains at zero for an interval before the cliff is reached. The same applies to a return of premium benefit in life insurance and to one in accident and sickness insurance, with modification in the latter case if the benefit is contingent upon zero claims or reduced by the amount of claims.
- C) Paid-Up Policies. The actuary’s best estimate withdrawal rate would be zero for a paid-up policy without nonforfeiture benefit.
- D) Consistency with Other Assumptions. It is important that the withdrawal assumptions are consistent with the other projection assumptions such as premiums, policyholder behavior, and mortality deterioration
- E) Sources and use of withdrawal data for setting valuation withdrawal assumptions.
  - 1) Internal studies should be used as input to the valuation withdrawal assumptions if such studies are statistically credible, whether the results of the internal study are more or less favorable than external studies.
  - 2) In the absence of statistically credible internal studies, external withdrawal studies should be used to set valuation withdrawal assumptions.
  - 3) If a company’s product design or other criteria are demonstrably different for the product being valued compared to the external withdrawal study, then the external withdrawal study should be adjusted for the purpose of establishing valuation withdrawal assumptions.
  - 4) Statistically credible internal studies may be combined with external information (as adjusted for design or other differences) for the purpose of setting valuation withdrawal assumptions. More weight should be given to the study leading to a more conservative result.
  - 5) In the case where there is neither an internal nor a relevant external withdrawal study, the actuary might consider the use of:
    - a zero withdrawal assumption
    - pricing withdrawal assumptions
- F) Sensitivity Testing. Where no such historical experience is available or relevant it is important that the actuary perform sensitivity testing on this assumption in order to understand and appropriately reflect the risk.
- G) Margin for Adverse Deviation. A margin for adverse deviation should be included in valuation withdrawal assumptions, whether the withdrawal experience comes from external studies or internal company studies. The actuary should select a margin for adverse deviation between a low and high margin a lower margin would be appropriate where withdrawal assumptions are supported by credible historical company experience. A higher margin for adverse deviations is appropriate where:
  - the company’s withdrawal experience is not credible
  - there is no market value adjustment at withdrawal

- the economic outlook is unstable
- the insurer's marketing practice provokes anti-selection.
- the assumption relates to an event further in the future

The low and high margins for adverse deviations are respectively an addition or subtraction, as appropriate of the best estimate withdrawal rates. In order to ensure that the margin for adverse deviations increases policy liabilities, the choice between addition and subtraction may need to vary by scenario, age, policy duration, and other parameters. In the case of partial withdrawal, two assumptions are needed – the amount withdrawn and the partial withdrawal rate.

The low and high margins are to be set at 20% and 40% respectively of best estimate assumptions; however in no event will the margin be less than a 1% addition or subtraction as necessary to the Prudent Best Estimate assumption. The margin is to be applied to the withdrawal assumption which results after the application of any dynamic behavior adjustment, if such adjustment is made. After application of the margin and any dynamic behavior adjustment the resulting withdrawal assumption should be greater than or equal to zero.

#### A4.7 Documentation Requirements

The documentation should include any material considerations necessary to understand the development of mortality assumptions for the statutory valuation even if such considerations are not explicitly mentioned in this section. The documentation should be explicit when material judgments were required and such judgments had to be made without supporting historic experience.

The documentation shall disclose/document the following items with respect to policyholder behavior assumptions:

- A). The premium persistency, lapse, withdrawal and other policyholder behavior assumptions used and any changes in these assumptions since the last valuation.
- B). A description of the process used to establish the prudent best estimate assumptions for policyholder behavior, and any change in process since the last valuation.
- C). If the actuary determines that a previously defined set of policyholder behavior assumptions is still appropriate, a description of the experience and analysis that led to that conclusion.
- D). A description of the framework for assigning assumptions to policies in the deterministic reserve calculation and in the stochastic reserve calculation, and any changes in the framework since the last valuation. This description should indicate how the actuary concluded that further refinement in granularity of the framework would not materially impact the reserves.
- E). A description of the sources of data used to develop PBE assumptions including recent historical company experience and relevant industry data, if any. This description should include commentary on the reasonableness and appropriateness of the data that were used.
- F). A description of the assumptions used in and results of sensitivity tests that underlie the PBE premium patterns. Sensitivity tests must include, but are not limited to, the following premium patterns:
  - 1). No further premiums are paid, coverage terminates according to the contract provisions.
  - 2). Minimum premium scenario: Each year the policyholder pays the minimum premium required to keep the policy in force until the end of the year. When the minimum premium is positive, it is reasonable to assume that some policyholders fail to pay the minimum premium, especially when the minimum premium for the current year is greater than the premium actually paid in the prior year. If the minimum premium is increasing substantially compared to the prior year premium, it is reasonable to assume a “shock lapse”, for example where the minimum premium has been zero for a period of years and the next minimum premium is substantial. These non-payment lapse assumptions should be consistent with lapse experience on policies where no nonforfeiture option is available.

- 3). Pre-payment of premiums – Single premium case. Policyholders may elect to pay all of their premiums ahead of schedule. In this case the minimum premium will be zero and no non-payment lapses would be assumed. However, if the value of the cash surrender value is roughly equivalent to the value of the future death benefits (assuming no further premiums), then it would be reasonable to assume some policyholders will elect to surrender their policies. If the cash surrender value is substantially less than the value of the death benefits, as is often the case with policies with shadow accounts, it would be reasonable to assume that few or none would surrender their contracts.
  - 4). Pre-payment of premiums – Level premium case. Policyholders may elect to pay a level premium which is guaranteed to keep the policy in force until the policyholder's death. Typically, in this case, the minimum premium will be zero followed by annually increasing premiums. However, it is reasonable to assume that some policyholders will continue the premium pattern that they have already established. It will be important to consider both of these premium payment scenarios since the value of the pre-payment option will depend on future interest rates compared to the interest rates guaranteed in any shadow account. Whenever the minimum premium is zero, surrender assumptions would be similar to those described for the single premium case.
- G). A description of the margins for adverse deviation included in withdrawal assumptions and the basis of determining these margins.
- H). Documentation that the PBE withdrawal assumption is zero for policies where coverage may be maintained without further premium payments.
- I). A description of the mechanism, if any, for varying withdrawal assumptions in response to changes in interest rates.

## **Appendix 5 – Guidance and Requirements for Setting Prudent Best Estimate Expense Assumptions**

This document reflects the work to date on setting expense assumptions. Over the next few months, this Appendix will be updated as appropriate.

### **A5.1. Methodology**

#### A.) General Methodology

Expenses should be set by use of Prudent Best Estimate assumptions. These assumptions are based on a company's own experience and derived from careful study that is within with the range of actuarial practice and methodology. Fully allocated expenses should be used, e.g. the expense assumptions should reflect the direct costs associated with the block of policies being modeled as well as indirect costs and overhead costs that have been appropriately allocated to the block of policies being modeled.

Future expense assumptions should also reflect the impact of inflation as part of the Prudent Best Estimate. The inflation rate should be set in a manner consistent with the methodology described in the Asset Appendix.

Assumptions for the Deterministic Scenario and the Stochastic Scenarios would be expected to be the same. Differences could occur with the application of the inflation factor.

#### C.) Expense Allocations

Expense allocations shall be done in a manner that is within the range of actuarial practice and methodology. The allocation method used shall be consistent across company lines of business. Allocations may not be done for the purpose of obtaining a competitive advantage. Overhead expenses that are allocated to the acquisition function shall be able to be supported by sound actuarial principles and where possible, by company experience.

#### D.) Expenses due to Non-recurring Events

Most significant, non-IT related expenditures are expected to occur prior to the valuation date and would therefore not be included in the reserve calculation. However, there may be some types of non-recurring expenses that are expected to occur for a limited time into the future. An example of this kind of cost would be severance costs anticipated in the next year or legal costs associated with class action suits. These expenses should be reflected in the assumption for the future period that they are anticipated to occur.

Expenses due to IT related investment should follow statutory accounting principles in determining whether or not they should be capitalized. Capitalized expenses should not receive unique treatment according to this methodology. The depreciation of those expenses is reflected in Exhibit 2 of the statement and captured in the validation tool which is used to verify the reasonableness of the expense assumption.

If there is a unique situation that has occurred whereby expenses can not be reasonably allocated among lines of business, regulatory approval should be sought for a reasonable application of the aforementioned principles.

#### E.) Mergers & Acquisitions

Expense efficiencies that are derived and realized from the combination of blocks of business due to a business acquisition or merger should be reflected in the expense assumption as long as any costs associated with achieving the efficiencies are also recognized. For example, the combining of two similar blocks of business on the same administrative system may yield some expense savings on a per unit basis, but any future cost of the system conversion should also be considered in the final assumption. If all costs for the conversion are in the past then there would be no future expenses to reflect in the valuation.

A5.1) A5.2. Principles Guidelines to be used in setting the expense assumption:

- A) The expense assumption should reflect all costs associated with the policies being modeled. In other words, the expense assumptions should reflect the direct costs associated with the policies being modeled as well as an appropriate portion of indirect costs and overhead, i.e., expense assumptions representing fully allocated expenses should be used.

B) Expenses categorized in the annual statement as ‘taxes, licenses and fees’ (Exhibit 3 of the Annual Statement) should be included in the expense assumption.

B)C) Acquisition expenses and significant non-recurring expenses expected to be incurred after the valuation date should be included in the expenses assumption.

C)D) Expense assumptions should be based on the assumption assume that the company is a going-concern.

D)E) Nonrecurring expenses, such as systems development costs, Certain IT development costs and other capital expenditures may be spread over a reasonable number of years (e.g., system lifetime) in determining the allocable expenses for a particular year (ASOP 24) accordance with accepted statutory accounting principles as defined in the Statements of Statutory Accounting Principles.

E)F) Appropriate expense basis should be chosen that properly aligns the actual expense to the assumption. For example, death benefit expenses should be modeled with an expense assumption that is per death incurred. If values are not significant they may be aggregated into a different base assumption.

F)G) In general, expenses should be increased by inflation. The inflation assumption should be determined in a manner consistent with what is described in the Asset Assumption Appendix.

G)H) Expense assumptions should not assume future decreases expense improvements.

H)I) The model used to determine reserve levels should be measured on a pre-FIT basis. Therefore, assumptions needed to determine federal or foreign income tax are not required.

I)A margin for adverse deviation should be included in the expense assumption. The margin should be set within the pre-defined range discussed in the Methodology section of this Appendix

J)Consistent with the concept of Prudent Best Estimate, the greater the uncertainty of the expense assumption, the greater the margin.

K)J) Rationale and support for the expense assumption should be fully documented in the Actuarial Memorandum accompanying the valuation.

L)K) The Company should reconcile actual expenses to those used for valuation purposes. A validation tool is provided under the Validation sSection A5.3. of this Appendix.

M)L) Expense assumptions should be consistent with other related assumptions. For example, the manner that investment expenses are handled should be consistent with the manner that asset returns are reflected in the model.

N)M) There may be circumstances where exceptions to these principles may be justified. Such exceptions should occur infrequently, be well documented and adhere to as many of the other principles as is reasonable. Additionally, any exceptions which result in a change to the methodology as outlined in Section A.5.2. should be discussed with and approved by a company’s state of domicile. All currently envisioned circumstances are identified under the Methodology section of this Appendix

#### A5.2)Methodology

##### A)General Methodology

Expenses should be set by use of Prudent Best Estimate assumptions. These assumptions are based on a company’s own experience and derived from study that is within with the range of actuarial practice and methodology. Fully allocated expenses should be used, e.g., the expense assumptions should reflect the direct costs associated with the block of policies being modeled as well as indirect costs and overhead costs that have been appropriately allocated to the block of policies being modeled.

~~Future expense assumptions should also reflect the impact of inflation as part of the Prudent Best Estimate. The inflation rate should be set in a manner consistent with the methodology described in the Asset Appendix.~~

~~Assumptions for the Deterministic Scenario and the Stochastic Scenarios would be expected to be the same. Differences could occur with the application of the inflation factor.~~

#### B) Margins for Adverse Deviation

~~Consistent with the definition of Prudent Best Estimate, Margins for Adverse Deviation (MfAD) should be included.~~

~~A lower margin would be appropriate where expense assumptions are supported by credible historical company experience. A higher margin for adverse deviations is appropriate where:~~

- ~~the company's expense experience is not credible;~~
- ~~the economic outlook is unstable;~~
- ~~the insurer's expenses have not been quantified by a study which follows accepted actuarial practice and principles;~~
- ~~sensitivity testing determines that the reserve is sensitive to the expense assumption.~~

~~The low and high margins are to be set at 5% and 20% respectively of best estimate assumptions. The margin is to be applied to the expense assumption which results after the application of any dynamic behavior adjustment, if such adjustment is made.<sup>9</sup>~~

#### C) Expense Allocations

~~Expense allocations to the business falling under the scope of the Approach shall be done in a manner that is within the range of actuarial practice and methodology. The allocation method used shall be consistent across company lines of business. Allocations may not be done for the purpose of obtaining a more favorable result. Overhead expenses that are allocated to the acquisition function shall be able to be supported by sound actuarial principles and where possible, by company experience.~~

#### D) Special Situations

##### 1) New blocks of business – TBD

~~2) One time costs (such as IT costs) – One time costs shall be spread over the expected life of the item. Expected lifetimes shall be set at a reasonably conservative level. It is important to distinguish between costs incurred in the acquisition of a policy and costs related to developmental work on a new block of business. The costs associated with the developmental work are able to be spread over the life of the business. If the one time expense has already been capitalized in the accounting system and thus is already represented in the expense assumption, then no additional expense needs to be added.~~

~~3) Run off blocks of business – For blocks of business that are in a run off mode, assumed expense levels must continue to validate to actual expenses. As expenses are reduced, unlocking of the expense assumption should occur.~~

~~4)i. Mergers & Acquisitions – Expense efficiencies that are realized and derived from the combination of blocks of business due to a business acquisition or merger may be reflected in the expense assumption as long as any costs associated with achieving the efficiencies are also recognized. For example, the combining of two similar blocks of business on the same administrative system may yield some expense savings on a per unit basis, but the cost of the system conversion should also be considered in the final assumption. Margin for uncertainty should be reflected when setting this assumption.~~

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<sup>9</sup> The limits referenced are suggested limits, LHAATF should set these limits.

A5.3) Validation of Expense Assumption to Actual Data

Objective: to assist the regulator in the review of the expense assumption by demonstrating that the appropriate level of fully allocated expenses (from the annual statement) are reflected in the valuation expense assumption. Expenses must be annually validated company expenses in the annual statement. The following table may be used for this purpose. We are considering making this table a standard tool for validation and review.

<u>Expenses</u>	Prior Year Actual	Current Year Actual	Current Year Modeled
(1) Exhibit 2 – General Expenses			
(2) Exhibit 3 – T, L & F's			
<u>(3) Nonrecurring Expenses</u>			
<u>(4) Overhead Expenses</u>			
<u>(5)(3) Expenses from Plans Not Covered in Model</u>			
<u>(4) Nonrecurring Expenses That Have Occurred Prior to Valuation</u>			
<u>(5) Acquisition Expenses That Have Occurred Prior to Valuation</u>			
<u>(6) Acquisition Expenses and Significant Non-recurring Expenses that are Expected to Occur in the Next Calendar Year That Have Occurred Prior to Valuation</u>			
(7) Equals (1) + (2) - (3) - (4) - (5) <u>±</u> (6)			
<u>(8) Portion of Nonrecurring Expenses Included in Modeled Plans</u>			
<u>(9) Allocation of Overhead to Modeled Plans</u>			
<u>(10) Equals (7) + (8) + (9)</u>			
<u>B)C) Commissions</u>			
<u>(11)(8) Exhibit 1, Part 2, Line 31, Col. 3 – Commissions (Direct Business Only)</u>			
<u>(12)(9) Commissions from Plans Not <u>Covered in</u> Modeled</u>			
<u>(13)(10) Commissions from Model Plans that are Paid Prior to Valuation Date</u>			
<u>(14)(10) Equals (118) – (129) – (1310)</u>			

- ❖ Current year modeled expenses are calculated by applying the model unit expenses to the actual average in force of the plans that are modeled.

[ *Instructions for completion of this table will be developed – define terms, outline procedures.* ]

Notes to include in the Instructions:

- The expectation is that non-recurring expenses in (4) above should be infrequent.

## APPENDIX 6 – Guidance and Requirements for Setting Asset Assumptions

**A.6.1. General.** The principle-based approach requires modeling of the current and future assets supporting the business being valued. Future asset balances and net asset earned rates are projected for the purpose of a) determining the discount rates for the gross premium reserve, and b) determining projected benefit cash flows that depend on the net earned rates of the asset portfolio (e.g. surrender values).

Both the stochastic and deterministic reserve calculations will generally require an asset model for the above purposes; however, for the deterministic reserve, simplified approaches may be acceptable if they can be shown to produce more conservative reserves than those produced by a full-blown asset model (more details on this concept, including the principles that need to be followed will be developed). For the deterministic reserve, the discount rates resulting from the asset modeling process will grade over time from the starting portfolio yield, net of assumed default costs, to a prescribed long-term ultimate rate. The exact path of these discount rates will depend on many factors as described below and will vary from company to company.

**A.6.2. Basic Components of Methodology.** For both the stochastic and deterministic reserve calculations, the asset model will reflect the following components:

1) Actual Starting Assets and future Reinvestment Assets (i.e., those assets that develop from projected asset and liability cash flows) are to be modeled in a manner consistent with the company's current investment strategy for the block of business;

2) The paths of future U.S. Treasury interest rates will be prescribed;

3) Prudent Best Estimates are to be used for all other investment characteristics such as spreads, default costs, prepayments, etc., subject to overall limitations as defined below. Current asset adequacy analysis practice will be relied on for many of the detailed aspects encountered in asset modeling.

### A.6.3. U.S. Treasury Rates

1) For the stochastic reserve, the C-3 Phase I (“C3P1”) interest rate generator must be used to project future U.S. Treasury interest rates. The number of scenarios will also be prescribed, with the objective that all companies use the same paths of Treasury rates.

*[Drafting note: The C3P1 generator has been recalibrated by the Asset Subgroup of the ULWG to reflect the last several years of data, resulting in a somewhat lower mean and a greater incidence of the low interest rate levels experienced the past few years. The recalibration is currently being reviewed by one of the original members of the group that developed the generator. The recalibration is based on the level and volatility of interest rates from 1954-2003. Adoption of a recalibrated generator would require coordination with Academy work groups responsible for C3P1 and C3P2 and ultimately the approval of both LHFATF and CADTF within the NAIC.]*

2) For the deterministic reserve, a single path of U.S. Treasury yield curves will be prescribed as of any valuation date. This path will start ~~at with the current rates-yield curve~~ in effect at the valuation date and grade over time to an ultimate ~~long term condition that is expected to be expressed as either a single fixed rate (i.e., a flat yield curve) or a fixed structure of rates static yield curve~~. The grading method, the length of the grading period, and the ~~(tentative) values of the ultimate yield curve are prescribed in Appendix 8-long term rate or rates have received considerable discussion but have not yet been finalized. Setting of these Final determination of these specified elements~~ is expected to involve significant collaboration with the Methodology and Modeling subgroups to assure consistency with the overarching principles of the project.

### A.6.4. Defaults, Spreads and Other Assumptions

For both the stochastic and deterministic reserve calculations:

1) Default cost assumptions for the various fixed income asset classes should reflect prudent best estimates of long-term losses consistent with the type of asset and quality rating. The assumptions should be consistent for Starting Assets and Reinvestment Assets. The risk of credit losses deviating from the prudent best estimates will not be reflected in this framework (both the reserve and the RBC requirement), but rather, will continue to be captured via the C1 capital charge in the RBC formula.

*[Drafting Note: The exact form of guidance on defaults, including the range of discretion given to the actuary in setting prudent best estimates for the variety of asset classes, is still under discussion. Also, the role of the Asset Valuation Reserve (AVR) in determining the Starting Asset Amount and the AVR's possible role in relationship to specific default cost recommendations are outstanding items. In general, we believe default assumptions should reflect long-term*

*expectations and should not fluctuate significantly from year-to-year based on market values. We have discussed, however, that an aggregate measure of the implied market spread of the Starting Asset portfolio, based on its aggregate market value as of the valuation date, could be calculated and disclosed in the memorandum as an aid to the regulator and/or peer reviewer in assessing the risk level of the portfolio.]*

- 2) Spreads over Treasuries reflected in the purchase yields of Reinvestment Assets are to be Prudent Best Estimates. The types, quality and tenors of such Reinvestment Assets should be consistent with the company's current investment strategy for the block of business being valued. The aggregate spread, net of assumed default costs, on the combined Reinvestment Assets purchased in any model year shall not exceed \_\_\_\_ basis points.
- 3) Generally, any uncertainty in the timing of asset cash flows related to movements in interest rates ("prepayment risk") should be reflected directly in the projection of asset cash flows under the various scenarios within the model. For example, prepayment, extension, call and put features should be specifically modeled in a manner consistent with current asset adequacy analysis practice.
- 4) Guidance on equity-type assets, such as common stock, equity real estate, and Schedule BA assets is still under discussion.
- 5) Assumptions for equity fund movements for variable products are still under discussion. Methods being considered include the use of a prescribed set of equity scenarios, or the method used for variable annuities that allows non-prescribed scenarios to be used if calibration standards are met.

#### **A.6.5. Interest Maintenance Reserve**

The Interest Maintenance Reserve allocable on the valuation date to the business being valued ("Starting IMR") should be reflected in the asset model. A positive Starting IMR will generally result in higher discount rates on average while a negative Starting IMR will generally result in lower discount rates on average. Specific treatment for both the stochastic and deterministic reserve calculation is as follows:

- 1) The Starting IMR should be treated as a contra-asset when selecting the assets for the model that will total to the Starting Asset Amount.
- 2) Amortization of the Starting IMR should be included in the investment income used to calculate the discount rates.
- 3) The unamortized portion of the Starting IMR balance at any model duration should be included as an offset to the net asset balance used to calculate the discount rates. This unamortized portion is allowed to go negative during the model.

[Drafting note: The IMR as established by current Statutory Accounting Principles already sets aside a liability to help fund future policy cash flows, so its existence should be taken into account when establishing the total balance sheet provision for those cash flows. Starting IMR allocable for the total of all blocks of business subject to principle-based reserve approaches may need to be adjusted in situations where the total of such IMR exceeds the statutory entity's total IMR or where the statutory entity's total IMR would otherwise be negative except for the existence of the statutory minimum of zero. Such considerations will be reflected in a section on Initial Asset Allocation which is under development.]

#### **A.6.6. Miscellaneous IssuesCalculations**

- 1) Determining the Starting Asset Amount at the valuation date is still under discussion.
- 2) Guidance on selection of the initial assets is under development.
- 3) Guidance on modeling and credit for hedges is under development.
- 2) A methodology for calculating the net earned rates and the resulting periodic discount rates must be developed taking into account asset balances, net investment income, default losses, other capital gains and losses, the impact of Starting IMR, the impact of hedges, and borrowing costs, if any. Some tolerance may need to be allowed in this regard for small variations between available software packages.

## **Appendix 7: Considerations for Guidance and Requirements for Reinsurance**

This draft is not yet complete and will continue to evolve with further discussion. It provides the framework for considerations to be made regarding reinsurance in a principle-based reserving approach.

This document discusses the impact on reserves held by ceding and assuming companies of reinsurance of life insurance policies that are valued using a principle-based reserving approach. It does not apply to reinsurance of policies that are outside this scope, nor does it apply to any form of reinsurance other than life reinsurance.

### **Section 1 - Reinsurance Ceded**

1. Reserves net of reinsurance ceded - Where reinsurance is ceded for all or a portion of insurance policies that are valued using a principle-based reserving approach, the cash flows used in calculating the reserves shall include the effect of cashflows received from or paid to reinsurers.

Comment – It is intended that the primary reserve calculation will be net of reinsurance, considering the effect of reinsurance cashflows.

2. Direct reserves and ceded reserves - If needed for regulatory reporting or other purposes, a direct reserve (that is, excluding the effect of cashflows to and from reinsurers) may be determined, and the credit for reinsurance ceded may be calculated as the difference between the reserve excluding the effect of reinsurance cashflows and the reserve including the effect of reinsurance cashflows. If a direct reserve is calculated, the assumptions should be consistent with those used in the calculation of the reserves net of reinsurance ceded. [Note: additional consideration must be given to current reinsurance regulation. To the extent this approach is inconsistent with current reinsurance regulation; LHMATF would need to address this inconsistency.]

Comment – It is intended that the calculation of either direct reserves or ceded reserves be a secondary calculation.

3. Ceding company and assuming company valuation assumptions - The valuation assumptions that are used by a direct-writing company that cedes reinsurance should be appropriate for the direct-writing company, and do not need to be the same as the valuation assumptions that are used by the assuming company.

Comment – There are a variety of reasons why the valuation assumptions that are used by the direct-writing company could differ from those that are used by the assuming company, such as aggregation techniques and credibility of mortality information.

4. Valuation assumptions for reinsurance – The valuation assumptions regarding cash flows to or from reinsurers should be consistent with other valuation assumptions, modified as necessary to reflect the terms of any reinsurance agreements. If needed in the actuary's judgment, the actuary should include a margin for adverse deviation reflecting uncertainty regarding reinsurance cashflows (which has the effect of increasing the reserve) if the current terms of the reinsurance ceded treaties are not guaranteed.

Comment – Items that should be considered by the actuary in deciding whether to use a margin for adverse deviation for non-guaranteed reinsurance, and how large the margin should be, include any limits placed upon the reinsurer's ability to change the terms of treaty, past practices concerning the changing of terms of reinsurers in general and the assuming reinsurer in particular, the ability of the direct company to modify the terms of its policies in response to changes in terms from its reinsurers, and actions that might be taken by the assuming company if the direct company has financial problems.

### **Section 2 - Reinsurance Assumed**

1. Valuation method - If a company assumes business that relates to policies that are valued by the direct company using a principle-based reserving approach, then the assuming company may use a principle-based reserving approach for the business that is assumed.

Comment – We expect that principle-based reserves will be adopted by all US life companies for products within the scope on a uniform date. If there is uneven adoption of principle-based reserves, then some relaxation of this concept until adoption is complete should be considered, based on administrative considerations.

When principle-based reserving methods are applied to all life products, then this section will no longer be needed.

2. Assuming company and ceding company valuation assumptions - The valuation assumptions that are used by an assuming company should be appropriate for the assuming company, and do not need to be the same as the valuation assumptions that are used by the ceding company.

Comment – See the comment on this topic in the Reinsurance Ceded section of this document.

3. Consideration of ceding company actions – The valuation assumptions that are used by an assuming company should take into account any actions that are taken by the ceding company that could affect the expected mortality on the business that is assumed.

Comment – Examples of actions that could be taken by the ceding company that could affect the expected mortality of the assuming company include internal replacement programs or table-shave programs, both of which could have the effect of increasing expected mortality for the assuming company.

#### Drafting notes

1. Coordination - The conclusions of the Academy reinsurance subgroup must be closely coordinated with the conclusions of the Academy subgroups that are dealing with mortality, methodology, policyholder behavior, expense, and assets.
2. Guidance to the appointed actuary – ASOPs and/or practice notes may need to be developed to provide additional guidance beyond that contained in this document to the actuary in calculating reserves for reinsurance ceded or reinsurance assumed.
3. Presentation of reserves - The presentation of the reserves for policies with reinsurance ceded in the insurer's financial statements is an accounting matter, rather than an actuarial matter. On the one hand (and consistent with current practice), ceded reserves could be displayed in the financial statements as a reduction to direct reserves.

## APPENDIX 8: – Definition of Investment Scenarios [TBD – asset sub-group]

### A8.1. The Deterministic Scenario:

The path of interest rates in the deterministic scenario will begin with the market yield curve on the valuation date (based on treasury yields reported by TBD). The yield curve 120 months or more after the valuation date will be the “ultimate” yield curve shown below. The yield curve on any date between the valuation date and 120 months after the valuation date will be linearly interpolated between the starting yield curve and the “ultimate” yield curve.

These rates are based on the distribution of treasury rates from 1954-2003 and approximate the 65CTE of the distribution of yield curves obtained from the recalibrated C3 Phase I generator (where the CTE is measured at the low end of the distribution of rates). The yield rates shown below for the ultimate yield curve are annual effective rates (not coupon rates or bond-equivalent yields) for a bond with semi-annual coupons.

1yr or less	3.33%	11	4.32%	21	4.45%
2	3.65%	12	4.35%	22	4.46%
3	3.84%	13	4.36%	23	4.47%
4	3.96%	14	4.38%	24	4.47%
5	4.05%	15	4.39%	25	4.48%
6	4.13%	16	4.41%	26	4.49%
7	4.19%	17	4.42%	27	4.49%
8	4.23%	18	4.43%	28	4.49%
9	4.27%	19	4.44%	29	4.50%
10	4.30%	20	4.45%	30yrs or more	4.50%

For example, if the 5-year treasury rate on the valuation date is 2.85%, then the 5-year treasury rate assumed in the deterministic scenario would increase by 0.01% each month for 120 months and then level off at 4.05%, which is the 5-year treasury rate in the ultimate yield curve shown above. The same linear interpolation would be performed for every point on the yield curve.

In the deterministic scenario, returns for reinvestment assets other than treasuries should be modeled using prudent best estimate spreads over the treasury yield curve. These spreads will be constrained in the aggregate as discussed in Appendix 6. For both Starting Assets and reinvestment assets, prudent best estimates for default costs and investment expenses should also be applied in the same manner as for the stochastic scenarios.

### A8.2. Stochastic Scenarios:

[The working assumptions are as follows:

- 1) U.S. Treasury Rates must be modeled using the AAA C3 Phase I interest rate generator, as recalibrated by the ULWG Asset Subgroup. That recalibration needs to be reviewed by the AAA at large for use with C3 Phase I and II as well as for principle-based reserves. It is anticipated that no other options for interest rate generators will be allowed.
- 2) For separate account fund returns and returns on equities held in the general account, it is anticipated currently that the Approach in this document will follow that being recommended by VARWG for variable annuities. Several members of the ULWG feel that one generator should be prescribed, presumably the AAA pre-packaged scenarios, and so this is still an open issue for ULWG.]

**APPENDIX 9: - Allocation of Reserve Amounts to Individual Contracts [TBD- methodology sub-group]**

**APPENDIX 10: Certification and Documentation Requirements [TBD- all]**

## **List of Issues to Discuss and Address**

### **1 Work Group Items:**

- 1.1 Scope: should we include other benefit riders on life contracts under the scope of this document such as reserves for active waiver of premium claims, AD&D, conversion, D&U, etc.
- 1.2 Scope: should other products be added such as group life and traditional life?
- 1.3 What types of review or governance will be required.
- 1.4 Definitions: need to add definition of “guaranteed benefits” or “no guaranteed benefits” to be clear on scope.

### **2 Policy Behavior Assumption:**

- 2.1 Consistent with Principle 4, Where does lapse, withdrawals, annuitizations fall in this spectrum. What will the "prescribed assumptions" be for lapses, withdrawal, annuitization be when a company doesn't have credible experience?
- 2.2 Additional margin to cover variability in result between Prudent Best Estimate and “worst-case” premium scenario
- 2.3 Use of non-zero withdrawal / lapse assumption in the valuation

### **3 Methodology**

#### **3.1 Alternative approach— which companies can use this**

3.23.1 Appropriateness of the discount rate reflecting starting asset yields.

3.33.2 Discuss more fully aggregation and its effect on reserve levels.

3.43.3 Include discussion of reserve levels relative to cash surrender values for the deterministic and stochastic methods.

3.53.4 Floor reserve: should there be one, if so at what level

3.63.5 Methodology/Assumption subgroups: reflecting non-guaranteed elements

3.73.6 The methodology can result in future profits offsetting earlier year losses. We may want to comment on how material a concern this is. If it is not considered material, then we should give a rationale as to why not.

3.83.7 In gross premium valuation methodology, consider explicitly stating treatment of reinsurance as expense or benefit.

### **4 Reinsurance:**

- 4.1 Need to address reserve credits in light of mirror reserve requirements in some states.
- 4.2 Consider more fully how reserves should be presented on the balance sheet.

### **5 Mortality:**

- 5.1 Industry mortality table is VBT reflecting most recent SOA study plus valuation margins rather than Statutory Valuation tables. Discuss acceptability.
- 5.2 No data requirement, appropriateness of industry mortality assumption in this case.
- 5.3 Should specific steps be added to address how credibility procedures reflect the differentials for underwriting?
- 5.4 Adjustment to Mortality Curves: discuss in more detail when this adjustment would be appropriate and how it would be applied.
- 5.5 Acceptance of margin ranges and quantification of these ranges.
- 5.6 Appropriateness of adjustment for preferred classes. Limits on the magnitude of these adjustments.

### **6 Expenses**

#### **None**

6.1 For non recurring expenses, when determining the PBE expense assumptions, if statutory accounting treatment is to expense these items, should the expense treat these by:

6.1(a) Spreading the expenses out (current thought)

6.1(b) Expense in the current year, but no expense in future year

**6.1(c)Another approach**

**6.2Address litigation costs. Assumption may vary for known vs. unknown costs.**

## **7 Assets:**

- 7.1 Does the company need to provide a formal document describing the investment strategy? Is so, where is this specified.
- 7.2 Method to determine ultimate treasury rate and/or treasury curve for deterministic scenario.
- 7.3 Method to grade current portfolio rate to ultimate portfolio rate for deterministic scenario.
- 7.4 The exact form of guidance on defaults, including the range of discretion given to the actuary in setting prudent best estimates for the variety of asset classes.
- 7.5 Aggregate cap on spread over treasuries to determine earned rates on future reinvestment assets.
- 7.6 Treatment of AVR and IMR
- 7.7 Guidance on investment return on equity-type assets, such as common stock, equity real estate, and Schedule BA assets to determine current portfolio rate.
- 7.8 Determining the starting asset amount.
- 7.9 Guidance on converting the modeled investment information to yields for determining discount rates.
- 7.10 Method to determine common stock equity return scenarios.