Valuation Manual

2016

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VALUATION MANUAL

NAIC Adoptions through August 29, 2016

The National Association of Insurance Commissioners (NAIC) initially adopted the *Valuation Manual* on Dec. 2, 2012, with subsequent adoptions of amendments on June 18, 2015; Nov. 22, 1015; April 6, 2016; and Aug. 29, 2016.

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VM Amendments Adopted After 12/2/12

Amendments Adopted by Life Actuarial (A) Task Force	*Valuation Manual* Reference
Governance Process for Updating the *Valuation Manual*	Section I
Texas Proposal to Exempt Industrial Life Insurance from VM-20	Section II, Life Products
Allow election of the 2017 CSO tables by a company that has elected to use the PBR transition to continue using current reserve formulas	Section II, Reserve Requirements
VM-20 Companywide Exemption	Section II, Reserve Requirements
VM-30 Clarification of Intent	Section III, Actuarial Opinion and Report Requirements VM-30 Section 1
Treatment of Pre-Tax Interest Maintenance Reserve	VM-01 Definition #41 VM-20 Section 1 #15, 4A, 5F, 7D2, 7D4, 7D5, 7H2c and 7H2d
VM-20 Elimination of Reinsurance Aggregation	VM-01 VM-20 Section 1, 4A4 and 4C
Consolidated Edits for NPR & Sect. 3	VM-01 VM-20 Section 1 and 3
VM-20 Product Aggregation	VM-20 Section 2, 3, 4 and 5G Move Section 7B3 to Section 5A
ACLI Proposal to implement the 4% floor for policies issued after the VM operative date	VM-02 Section 4
Adopt the 2017 tables for nonforfeiture, available for policies issued on or after Jan. 1 , 2017 and required for policies issued after Jan. 1 2020	VM-02 Section 5A
Removal of the references to the “seriatim reserve”.	VM-20 Section 1C, 2G and 7H VM-31 Section 3E3
ACLI proposal on small company exemption	VM-20 Section 1C and 6A1
Definition and Clarification of the Term “Modeled Reserve”	VM-20 Section 1C, 7D, 7E, 7F, 7L, 8C, 9A, 9D and 9E
Academy Proposal for the Treatment of Due Premiums	VM-20 Section 2A, 6B3b and 7B1a
Valuation guidance for product and small companies to use methods form VM-A, VM-C. Allows use of the 2017 tables for valuation for policies issued on or after Jan. 1 , 2017 and required for policies issued after Jan. 1 2020	VM-20 Section 3 and 6
ACLI Proposal for Net Premium Reserve Clarification	VM-20 Section 3A2
VM-20 Delete Unisex Provision	VM-20 Section 3C1
Academy Proposal for the Direct Iteration Method	VM-20 Section 4 and 4B
Proposal clarifying the modeling of policy loan cash flows in the DR and SR calculations	VM-20 Section 4A3d, 4A4c, Guidance Note and 7F3
Modifications to Deterministic Reserve Exclusion Test	VM-20 Section 6
YRT Treatment in the SERT	VM-20 Section 6B2
VM-20 Section 6B Changes	VM-20 Section 6B2
Using Asset Adequacy Analysis for the Stochastic Exclusion Ratio Test	VM-20 Section 6B2a and 6B2bii
VM-20 Sections 7B & 7H Changes	VM-20 Section 7B1b–7B1c, 7B1e–7B1j, 7H2 and 7H3

VM Amendments Adopted After 12/2/12

Amendments Adopted by Life Actuarial (A) Task Force	*Valuation Manual* Reference
VM-20 Section 7F Changes	VM-20 Section 7F
VM-20 Section 9C Changes	VM-20 Section 9C
Defines the 2015 Valuation Basic Table and recognizes it as the applicable industry table. References the 2015 VBT as the replacement for the 2008 VBT, where appropriate.	VM-20 Section 9C VM-M Section 2
Underwriting Criteria Scoring Tool	VM-20 Section 9C3d
PBR Margins	VM-20 Section 9C4 and 9C5
Mortality Credibility	VM-20 Section 9C4a and 9C6-Tables
Update VM-20 to clarify Credibility Grading	VM-20 Section 9C6biiiC
Modification of Post-term Profits	VM-20 Section 9D6
Clarification to the Determination of Credit Rating	VM-20 Section 9F3 and Appendix 2
Commercial Mortgage Risk Classifications	VM-20 Appendix 1
Sep. 30, 2014, VM-20 Spread Tables	VM-20 Appendix 2
Dec. 31, 2013, VM-20 Spread Tables	Replaced by previous Amendment (9/30 VM-20 Spreads)
December 31, 2014 VM-20 Spread Tables	VM-20 Appendix 2
VM-21 Aggregation	VM-21 Section A
VM-25 Amendment	VM-25
VM-30 Reference to AG 48	VM-30 Section 1A3
Consolidation of Changes to Revise, Reorder and Clarify VM-31	VM-31
VM-31 Changes	VM-31
VM-31 ERM	VM-31
Revised Appendix 6, Policyholder Behavior Data Format	VM-51 Appendix 6
Add Appendix A-814 to recognized 2001 CSO for valuation and nonforfeiture	VM-A Appendix A
Combined VM-G Proposal	VM-G TOC and Sections 1–4
VM-G Introduction Governance Description	VM-G Introduction
VM-M Addition of 2012 IAR	VM-M
Define the 2017 CSO Tables for use in other sections for valuation and nonforfeiture	VM-M Appendix M

The NAIC initially adopted the *Valuation Manual* on Dec. 2, 2012, with subsequent adoptions of amendments on June 18, 2015; Nov. 22, 2015; April 6, 2016; and Aug. 29, 2016.

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I. Introduction

Authority and Applicability

The *Valuation Manual* sets forth the minimum reserve and related requirements for jurisdictions where the Standard Valuation Law, as amended by the National Association of Insurance Commissioners (NAIC) in 2009, or legislation including substantially similar terms and provisions has been enacted by jurisdictions, and this *Valuation Manual* (VM) is operative. The NAIC Standard Valuation Law (SVL) is provided in VM-05 of this *Valuation Manual*. The reserve requirements in the *Valuation Manual* satisfy the minimum valuation requirements of the Standard Valuation Law.

Requirements in the *Valuation Manual* are applicable to life insurance, accident and health insurance, and deposit-type contracts as provided in the *Valuation Manual*. These contracts include the definition provided by *Statement of Statutory Accounting Principles (SSAP) No. 50—Classifications of Insurance or Managed Care Contracts* (SSAP No. 50) as found in the NAIC *Accounting Practices and Procedures Manual* (AP&P Manual). Annuity contracts are, therefore, included within the term life insurance contracts unless specifically indicated otherwise in this *Valuation Manual*.

Minimum reserve requirements are provided in this *Valuation Manual* for contracts issued on or after the *Valuation Manual* operative date of Jan. 1, 2017. Other requirements are applicable as provided pursuant to the Standard Valuation Law and this *Valuation Manual*.

Background

As insurance products have increased in their complexity, and as companies have developed new and innovative product designs that change their risk profile, the need to develop new valuation methodologies or revisions to existing requirements to address these changes has led to the development of the *Valuation Manual*. In addition, the *Valuation Manual* addresses the need to develop a valuation standard that enhances uniformity among the principle-based valuation requirements across states and insurance departments. Finally, the *Valuation Manual* defines a process to facilitate future changes in valuation requirements on a more uniform, timely and efficient basis.

The goals of the NAIC in developing the *Valuation Manual* are:

1. To consolidate into one document the minimum reserve requirements for life insurance, accident and health insurance, and deposit-type contracts pursuant to the Standard Valuation Law, including those products subject to principle-based valuation requirements and those not subject to principle-based valuation requirements.

2. To promote uniformity among states' valuation requirements.

3. To provide for an efficient, consistent and timely process to update valuation requirements as the need arises.

4. To mandate and facilitate the specific reporting requirements of experience data.

5. To enhance industry compliance with the 2009 Standard Valuation Law and subsequent revisions, as adopted in various states.

Description of the *Valuation Manual*

The *Valuation Manual* contains five sections that provide requirements covered in Authority and Applicability above, and that discuss principles and concepts underlying these requirements.

1. Section I is an introductory section that includes the general concepts underlying the reserve requirements in the *Valuation Manual*.

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2. Section II summarizes the minimum reserve requirements that apply to a product or type of product, including which products or categories of products are subject to principle-based valuation requirements and documentation. As minimum reserve requirements are developed for various products or categories of products, those requirements will be incorporated into this section. The applicability of the minimum reserve requirements to particular products will be clarified in the appropriate subsection. For example, the minimum reserve requirements that apply to a life insurance product will be identified in the subsection addressing life insurance reserve requirements.

3. Section III sets forth the requirements for the actuarial opinion and memorandum and the principle-based report.

4. Section IV sets forth the experience reporting requirements.

5. Section V contains *Valuation Manual* minimum standards. These standards contain the specific requirements that are referenced in Sections II – IV.

Operative Date of the *Valuation Manual*

The requirements in the *Valuation Manual* become operative pursuant to Section 11 of the Standard Valuation Law.

PBR Review and Updating Process

A well-conceived and designed principle-based reserve (PBR) review and updating process is needed to ensure ongoing evaluation of the effectiveness of the PBR methodology, including prescribed assumptions defined in this *Valuation Manual*. This process will involve and provide ongoing feedback to regulators and interested parties, for the purpose of updating, improving, enhancing and modifying the PBR reserve requirements. These changes are necessary due to, for example, making adjustments as appropriate to margins for conservatism, future improvements in cash-flow modeling techniques, future development of new policy benefits and guarantees, future changes in assumptions due to emerging experience, improved methods to assess risk, etc.

A key element of the PBR review and updating process is to provide support for state insurance regulators regarding the necessary expertise, resources, data and tools to effectively review PBR models and reporting required in the *Valuation Manual* for products subject to PBR requirements.

Goals for the PBR review and updating process include achieving consistency in regulatory requirements among states, as well as assessing and making changes as appropriate.

Process for Updating the *Valuation Manual*

A. Task Force Procedures

The NAIC is responsible for the process of updating the *Valuation Manual*. The Life Actuarial (A) Task Force is primarily charged with maintenance of the *Valuation Manual* for adoption by the NAIC Plenary. The Life Actuarial (A) Task Force will coordinate with the Health Actuarial (B) Task Force, the Statutory Accounting Principles (E) Working Group and other NAIC groups as necessary when considering changes. The Health Actuarial (B) Task Force will be charged primarily with developing and maintaining the health insurance sections of the *Valuation Manual*, with approval by the Health Insurance and Managed Care (B) Committee. However, all changes to the *Valuation Manual*, including changes with respect to health insurance, must also be reviewed by the Life Actuarial (A) Task Force as gatekeeper under this process. As provided under Section 11C of the *Standard Valuation Law* (#820), any change to the *Valuation Manual* ultimately requires adoption by the NAIC by an affirmative vote representing: 1) at least three-

fourths of the members of the NAIC voting, but not less than a majority of the total membership; and 2) members of the NAIC representing jurisdictions totaling more than 75% of the relevant direct premiums written.

Guidance Note: To maximize the efficiency of the NAIC process and to promote consistency among amendments to the *Valuation Manual*, it was determined a single gatekeeper would work best. The Life Actuarial (A) Task Force was chosen as it was most directly involved in the *Valuation Manual*'s development. The Life Actuarial (A) Task Force's review of the Health Actuarial (B) Task Force's amendments would not focus on health-related content.

Information and issues with respect to amendment of the *Valuation Manual* can be presented to the Life Actuarial (A) Task Force/Health Actuarial (B) Task Force in a variety of ways. Issues can be recommended or forwarded from other NAIC working groups or task forces, or from interested parties. In order for an issue or proposed change to the *Valuation Manual* to be placed on a Pending List, the recommending party shall submit an amendment proposal form. An amendment form should be submitted 20 days prior to the next scheduled Life Actuarial (A) Task Force/Health Actuarial (B) Task Force meeting to be placed on the agenda for that meeting.

The Life Actuarial (A) Task Force/Health Actuarial (B) Task Force can move an item on the Pending List to either the Rejected List or to the Active List. Any disposition of items will occur in an open meeting. Items moved to the Active List will be categorized as Substantive, Non-Substantive or an Update to a Table.

1. Substantive Items

   Substantive changes to the *Valuation Manual* are proposed amendments to the *Valuation Manual* that would change or alter the meaning, application or interpretation of a provision. All changes to the *Valuation Manual* will be considered Substantive, unless specifically identified as either a Non-Substantive Item or an Update to a Table by simple majority vote of the Life Actuarial (A) Task Force/Health Actuarial (B) Task Force. Any item placed on the Active List as Substantive will be exposed by the Life Actuarial (A) Task Force/Health Actuarial (B) Task Force for a comment period commensurate with the length of the draft and the complexities of the issue, but for no less than 21 days. The comment period will be deemed to have begun when the draft has been placed on the appropriate public NAIC web page. The Life Actuarial (A) Task Force/Health Actuarial (B) Task Force will hold at least one open meeting (in person or via conference call) to consider comments before holding a final vote on any Substantive Items. Subsequent exposures of Substantive Items will be for a minimum of seven days. Meeting notices for Life Actuarial (A) Task Force/Health Actuarial (B) Task Force meetings will indicate if a vote is anticipated on any Substantive Items. Adoption of all changes at the Life Actuarial (A) Task Force/Health Actuarial (B) Task Force will be by simple majority.

2. Non-Substantive Items

   Non-substantive changes to the *Valuation Manual* are changes that primarily pertain to technical revisions such as changes to titles, words, definitions, procedures, grammar corrections, reference errors, making individual sections of the *Valuation Manual* consistent with each other, etc. that are necessary in order to clarify an intent that has already been thoroughly documented either in the NAIC *Proceedings*, the *Valuation Manual* or other NAIC guidance. The Life Actuarial (A) Task Force/Health Actuarial (B) Task Force must adopt the change with an affirmative vote of a simple majority of the Life Actuarial (A) Task Force/Health Actuarial (B) Task Force membership voting. Meeting notices for Life Actuarial (A) Task Force/Health Actuarial (B) Task Force meetings will indicate if a vote is anticipated on any Non-Substantive Items. Non-

Substantive Items will be exposed for comment with a period of time commensurate with the complexity of the change.

3. Updates to Designated Tables

Certain designated tables contained in the *Valuation Manual* are intended to be updated on a periodic basis, as they provide current reference data integral to annual calculations (e.g., those tables located in Appendix 2 of VM-20, Requirements for Principle-Based Reserves for Life Products, which have a process for annual and quarterly updates specifically prescribed in the *Valuation Manual*). Updates to these tables in accordance with this process are not considered to be an amendment of the *Valuation Manual* itself, and are not subject to the requirements of Section 11C of Model #820 for the amendment of the *Valuation Manual*. Updates to these designated tables will be exposed by the Life Actuarial (A) Task Force/Health Actuarial (B) Task Force for a minimum 14-day public comment period. If no comments are received, the Life Actuarial (A) Task Force/Health Actuarial (B) Task Force will vote on the item at the next regularly scheduled meeting. If comments are received, the Life Actuarial (A) Task Force/Health Actuarial (B) Task Force will hold at least one open meeting (in person or by conference call) to consider comments. Meeting notices for Life Actuarial (A) Task Force/Health Actuarial (B) Task Force meetings will indicate if a vote is anticipated on any update to designated tables.

4. Waiver of Task Force Procedure

If the Life Actuarial (A) Task Force/Health Actuarial (B) Task Force determines that a waiver of the above procedures is necessary to expeditiously consider modification of the *Valuation Manual* in order to advance a valid regulatory purpose, it may, upon a three-fourths majority vote of its members present and voting, modify the above procedures. However, in no event will Substantive Items be considered for adoption without a 14-day comment period.

5. Coordination with the Statutory Accounting Principles (E) Working Group

Proposed changes to the *Valuation Manual* must be consistent with existing model laws, including the Standard Valuation Law, and, to the extent determinable, with models in development. To the extent that proposed changes to the *Valuation Manual* could have an impact on accounting and reporting guidance and other requirements as referenced by the AP&P Manual, proposed changes must be reviewed by the Statutory Accounting Principles (E) Working Group for consistency with the AP&P Manual, including as to implementation dates. The Life Actuarial (A) Task Force or its support staff will prepare a summary recommendation that will include as appropriate an analysis of the impact of proposed changes.

If the Statutory Accounting Principles (E) Working Group reaches the conclusion that the proposed changes to the *Valuation Manual* are inconsistent with the authoritative guidance in the AP&P Manual, the Life Actuarial (A) Task Force will work with Statutory Accounting Principles (E) Working Group to resolve such inconsistencies.

B. Committee Procedures

The Life Insurance and Annuities (A) Committee (A Committee) or the Health Insurance and Managed Care (B) Committee (B Committee) will consider any *Valuation Manual* amendments (whether Substantive or Non-Substantive) as a separate agenda item at any regularly scheduled meeting. Amendments to the life and annuity sections of the *Valuation Manual* must first be approved by Life Actuarial (A) Task Force, which, as gatekeeper under this process, shall then review and prepare for consideration by the A Committee any changes to the life and annuity

sections of the *Valuation Manual*. Amendments to the health insurance sections of the *Valuation Manual* must first be approved by the Health Actuarial (B) Task Force and Life Actuarial (A) Task Force, which, as gatekeeper under this process, shall then review and prepare for the B Committee's consideration any changes to the health insurance sections of the *Valuation Manual*. No additional exposure period is required for review by the Life Actuarial (A) Task Force. Updates to Tables will be reported to the appropriate Committee but will not require a separate vote. In order to allow for additional input, the A Committee and B Committee generally will not vote on adoption of any Substantive Items unless 14 days have elapsed since adoption by the Life Actuarial (A) Task Force. Adoption of all changes by the A Committee and B Committee will be by simple majority.

C. Executive (EX) Committee and Plenary Procedures

The NAIC Executive (EX) Committee and Plenary generally will consider *Valuation Manual* amendments at the national meeting following adoption by the appropriate Committee. To allow sufficient time to implement Substantive Items, final action by the Executive (EX) Committee and Plenary on Substantive Items will generally be taken at the Summer National Meeting. The voting requirements for adoption at the Executive (EX) Committee and Plenary are as set out in Section 11C of Model #820. Unless otherwise specified, all *Valuation Manual* amendments shall be effective Jan. 1 following adoption by the NAIC.

Overview of Review Concepts

Reserve requirements prescribed in the *Valuation Manual* are intended to support a statutory objective of conservative valuation to provide protection to policyholders and promote solvency of companies against adverse fluctuations in financial condition or operating results pursuant to requirements of the Standard Valuation Law.

A principle-based valuation is a reserve valuation that uses one or more methods or one or more assumptions determined by the insurer pursuant to requirements of the Standard Valuation Law and the *Valuation Manual*. This is in contrast to valuation approaches that use only prescribed assumptions and methods. Although a reserve valuation may involve a method or assumption determined by the insurer, such valuation is a principle-based valuation only as specified in the *Valuation Manual* for a product or category of products.

A PBR valuation must only reflect risks that are:

1. Associated with the policies or contracts being valued, or their supporting assets.

2. Determined to be capable of materially affecting the reserve.

Risks not to be included in reserves are those of a general business nature, those that are not associated with the policies or contracts being valued, or those that are best viewed from the company perspective as opposed to the policy or contract perspective. These risks may involve the need for a liability separate from the reserve, or may be provided for in capital and surplus.

Because no list can be comprehensive and applicable to all types of products, this section of the *Valuation Manual* provides examples of the general approach to the determination of the meaning of "associated with the policies or contracts" while recognizing that each relevant section of the *Valuation Manual* will deal with this issue from the perspective of the products subject to that section. Examples of risks to be included in a principle-based valuation include risks associated with policyholder behavior (such as lapse and utilization risk), mortality risk, interest rate risk, asset default risk, separate account fund performance and the risk related to the performance of indices for contractual guarantees.

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Corporate Governance Requirements for Principle-Based Reserves

The requirements found in VM Appendix G (VM-G) provide corporate governance requirements applicable to policies or contracts subject to a PBR valuation as specified in this *Valuation Manual*.

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II. Reserve Requirements

This section provides the minimum reserve requirements by type of product. All reserve requirements provided by this section relate to business issued on or after the operative date of the *Valuation Manual*. All reserves must be developed in a manner consistent with the requirements and concepts stated in the Overview of Reserve Concepts in Section I of the *Valuation Manual*.

Guidance Note: The words "policies" and "contracts" are used interchangeably.

Life Insurance Products

A. This subsection establishes reserve requirements for all contracts issued on and after the operative date of the *Valuation Manual* that are classified as life contracts defined in SSAP No. 50 in the AP&P Manual, with the exception of annuity contracts and credit life contracts. Minimum reserve requirements for annuity contracts and credit life contracts are provided in other subsections of the *Valuation Manual*.

B. Minimum reserve requirements for variable and nonvariable individual life contracts—excluding preneed life contracts, industrial life contracts,[1] credit life contracts and policies of companies exempt pursuant to the companywide exemption in paragraph D below—are provided by VM-20, except for election of the transition period in paragraph C of this subsection.

Minimum reserve requirements of VM-20 are considered PBR requirements for purposes of the *Valuation Manual* and VM-31, PBR Actuarial Report Requirements for Business Subject to a Principle-Based Reserve Valuation, unless VM-20 or other requirements apply only the net premium reserve method or applicable requirements in VM-A, Appendix A – Requirements, and VM-C, Appendix C – Actuarial Guidelines.

Minimum reserve requirements for life contracts not subject to VM-20 are those pursuant to applicable requirements in VM-A and VM-C.

C. A company may elect to establish minimum reserves pursuant to applicable requirements in VM-A and VM-C for business otherwise subject to VM-20 requirements and issued during the first three years following the operative date of the *Valuation Manual*. A company electing to establish reserves using the requirements of VM-A and VM-C may elect to use the 2017 Commissioners' Standard Ordinary (CSO) Tables as the mortality standard following the conditions outlined in VM-20 Section 3. If a company during the three years elects to apply VM-20 to a block of such business, then a company must continue to apply the requirements of VM-20 for future issues of this business.

D. Companywide Exemption

1. A company meeting all of the following conditions may file a statement of exemption for the current calendar year with its domestic commissioner prior to July 1 of that year certifying that these conditions are met based on premiums and other values from the prior calendar year financial statements and that any universal life policies with secondary guarantees (ULSG) business issued since the operative date of the *Valuation Manual* meets the definition for nonmaterial secondary guarantee. The statement of exemption must also be included with the NAIC filing for the second quarter of that year. The commissioner may reject such statement prior to Sept. 1 and require the company to

[1] An industrial life contract is a life insurance contract that is required to comply with the minimum reserve standard for industrial life insurance policies as provided by the *Valuation Manual* and which meet the requirements of the state where issued for industrial life insurance policies.

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follow the requirements of VM-20 for the Ordinary Life policies. Otherwise, the minimum reserve requirements for its Ordinary Life policies are those pursuant to applicable methods required in VM-A and VM-C using the mortality as defined in Section 3.C.1 and VM-M Section 1.H.

2. Conditions for Exemption:

   a. The company has less than $300 million of ordinary life premiums[2] and, if the company is a member of an NAIC group of life insurers, the group has combined ordinary life premiums[2] of less than $600 million,

      and

   b. The company reported total adjusted capital (TAC) of at least 450% of the authorized control level RBC in the most recent risk-based capital (RBC) report, and the appointed actuary has provided an unqualified opinion on the reserves,

      and

   c. Any ULSG policies issued or assumed by the company with an issue date on or after the operative date of the *Valuation Manual* meet the definition of a nonmaterial secondary guarantee ULSG product.

Annuity Products

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

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

C. Minimum reserve requirements for fixed annuity contracts are those requirements as found in VM-A and VM-C as applicable.

Deposit-Type Contracts

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

B. Minimum reserve requirements for deposit-type contracts are those requirements as found in VM-A and VM-C as applicable.

Health Insurance Products

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

B. Minimum reserve requirements for accident and health insurance contracts, other than Credit Disability, are those requirements provided by VM-25, Health Insurance Reserves Minimum Reserve Requirements, and VM-A and VM-C requirements, as applicable.

[2] Premiums are measured as direct plus reinsurance assumed from an unaffiliated company from the Ordinary Life line of business reported in the prior calendar year L & H annual statement, Exhibit 1 Part 1.

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Credit Life and Disability Products

A. This subsection establishes reserve requirements for all credit life, credit disability products and other credit-related products defined as follows:

B. "Credit life insurance" means insurance on a debtor or debtors, pursuant to or in connection with a specific loan or other credit transaction, to provide for satisfaction of a debt, in whole or in part, upon the death of an insured debtor.

Credit life insurance does NOT include:

1. Insurance written in connection with a credit transaction that is:

    a. Secured by a first mortgage or deed of trust.

    b. Made to finance the purchase of real property or the construction of a dwelling thereon, or to refinance a prior credit transaction made for such a purpose.

2. Insurance sold as an isolated transaction on the part of the insurer and not related to an agreement or a plan for insuring debtors of the creditor.

3. Insurance on accounts receivable.

C. "Credit disability insurance" means insurance on a debtor or debtors to or in connection with a specific loan or other credit transaction, to provide for lump sum or periodic payments on a specific loan or other credit transaction due to the disability of the insured debtor.

D. "Other credit-related insurance" means insurance on a debtor or debtors, pursuant to or in connection with a specific loan or other credit transaction, including a real estate secured loan, to provide for satisfaction of a debt, in whole or in part, upon the death or disability of an insured debtor.

1. Other credit-related insurance includes insurance written in connection with a credit transaction that is:

    a. Secured by a first mortgage or deed of trust written as credit insurance, debtor group insurance or group mortgage insurance.

    b. Made to finance the purchase of real property or the construction of a dwelling thereon, or to refinance a prior credit transaction made for such a purpose.

2. Other credit-related insurance DOES NOT include:

    a. Insurance sold as an isolated transaction on the part of the insurer and not related to an agreement or a plan for insuring debtors of the creditor.

    b. Insurance on accounts receivable.

E. Minimum reserve requirements for credit life, credit disability contracts and other credit-related insurance issued on or after the operative date of the *Valuation Manual* are provided in VM-26, Credit Life and Disability Reserve Requirements. For purposes of reserves for "other credit-related insurance" within VM-26, the terms "credit life insurance" and "credit disability insurance" shall include benefits provided under contracts defined herein as "other credit-related insurance."

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Riders and Supplemental Benefits

A. If a rider or supplemental benefit to one of the above types of products has a separately identified premium or charge, then the following apply:

1. For supplemental benefits—e.g., Disability Waiver of Premium, Accidental Death Benefits, Convertibility or Guaranteed Insurability—the reserves may be computed separate from the base contract following the reserves requirements for that benefit.

2. For term life insurance riders on persons other than the named insured[s] on the base policy, the reserve may be computed separate from the base policy following the reserve requirements for that benefit.

3. For term life insurance riders on the named insured[s] on the base policy, the reserve shall be valued as part of the base policy.

4. For riders that enhance or modify the terms of the base contract—e.g., a secondary guarantee rider or a cash value enhancement rider—the reserve shall be valued as part of the base policy.

5. For any riders not addressed by paragraph 1.b through paragraph 1.d above, the reserve shall be valued as part of the base policy.

B. If a rider or supplemental benefit does not have a separately identified premium or charge, all cash flows associated with the rider or supplemental benefit must be included in the calculation of the reserve for the base policy. For example, reserves for a universal life policy with an accelerated benefit for long-term care (LTC) must include cash flows from the LTC benefit in determining minimum reserves in compliance with VM-20. A separate reserve is not determined for the rider or supplemental benefit.

Claim Reserves

Regardless of the requirement for use of the PBR approach to policy reserves, the claim reserves, including waiver of premium claims, are not subject to PBR requirements of the *Valuation Manual*.

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III. Actuarial Opinion and Report Requirements

Requirements regarding the annual actuarial opinion and memorandum pursuant to Section 3 of the NAIC Model Standard Valuation Law (VM-05) are provided in VM-30, Actuarial Opinion and Memorandum Requirements. The requirements in VM-30 are applicable to all annual statements with a year-ending date on or after the operative date of the *Valuation Manual*. Existing actuarial opinion and memorandum requirements continue to apply to all annual statements with a year-ending date before the operative date of the *Valuation Manual*.

PBR Report requirements applicable to products or types of products subject to PBR as specified in the *Valuation Manual* are provided in VM-31.

IV. Experience Reporting Requirements

Experience reporting requirements are provided in VM-50, Experience Reporting Requirements. The associated experience reporting formats and additional instructions are provided in VM-51, Experience Reporting Formats.

V. *Valuation Manual* Minimum Standards

This section provides the specific minimum reserve standards as referenced by the preceding sections.

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VM-01: Definitions for Terms in Requirements

Guidance Note: VMs where a term is used are listed in parentheses at the end of the definition for that term. Any terms defined in VM-05 are noted.

1. The term "accident and health insurance" means contracts that incorporate morbidity risk and provide protection against economic loss resulting from accident, sickness or medical conditions and as may be specified in the *Valuation Manual*. (Standard Valuation Law definition. Used in Section I, *Introduction*; Section II, *Reserve Requirements*; VM-05; VM-25; and VM-31.)

2. The term "accumulated deficiency" means an amount measured as of the end of a projection period and equal to the Working Reserve less the amount of projected assets. Accumulated deficiencies may be positive or negative. (Used in VM-20 and VM-21.)

3. The term "actuarial opinion" means the opinion of an appointed actuary regarding the adequacy of reserves and related actuarial items. (Used in Section III, *Actuarial Opinion and Report Requirements*; VM-05; VM-21; and VM-30.)

4. The term "Actuarial Standards Board" means the board established by the American Academy of Actuaries (Academy) to develop and promulgate actuarial standards of practice (ASOPs). (Used in VM-05, VM-20, VM-21 and VM-30.)

5. The term "annual statement" means the statutory financial statements a company must file using the annual blank with a state insurance commissioner as required under state insurance law. (Used in VM-20, VM-21, VM-25, VM-30 and VM-31.)

6. The term "anticipated experience assumption" means an expectation of future experience for a risk factor given available, relevant information pertaining to the assumption being estimated. (Used in VM-20 and VM-21.)

7. The term "appointed actuary" means a qualified actuary who is appointed or retained in accordance with the *Valuation Manual* to prepare the actuarial opinion required in Section 3A of VM-05. (Standard Valuation Law definition. Used in VM-05, VM-20, VM-30 and VM-31.)

8. The term "asset adequacy analysis" means an analysis that meets the standards and other requirements referred to in VM-30. (Used in VM-20 and VM-30.)

9. The term "asset-associated derivative" means a derivative program whose derivative instrument cash flows are combined with asset cash flows in performing the reserve calculations.

10. The term "cash flows" means any receipt, disbursement, or transfer of cash or asset equivalents. (Used in Section I, *Introduction*; Section II, *Reserve Requirements*; VM-20; VM-21; VM-30; and VM-31.)

11. The term "cash-flow model" means a model designed to simulate asset and liability cash flows. (Used in VM-20 and VM-31.)

12. The term "cash surrender value" means, for purposes of these requirements, the amount available to the contract holder upon surrender of the contract, prior to any outstanding contract indebtedness and net of any applicable surrender charges, where the surrender charge is reduced to reflect the impact of available free partial surrender options. For contracts where all or a portion of the amount available to the contract holder upon surrender is subject to a market value adjustment, however, the cash surrender value shall reflect the market value adjustment consistent with the required treatment of the underlying assets. That is, the cash surrender value shall reflect any market value adjustments where the underlying assets are reported at market value, but shall

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not reflect any market value adjustments where the underlying assets are reported at book value. (Used in VM-05, VM-20 and VM-21.)

13. The term "clearly defined hedging strategy" means a strategy undertaken by a company to manage risks that meet the criteria specified in the applicable requirement. (Used in VM-20, VM-21 and VM-31.)

14. The term "commissioner" means the chief insurance regulator of a state, district or territory of the U.S. (Used in Section II, *Reserve Requirements*; VM-05; VM-20; VM-21; VM-25; VM-26; VM-30; VM-31; and VM-50.)

15. The term "company" means an entity that (a) has written, issued or reinsured life insurance contracts, accident and health insurance contracts, or deposit-type contracts in this state and has at least one such policy in force or on claim; or (b) has written, issued or reinsured life insurance contracts, accident and health insurance contracts, or deposit-type contracts in any state and is required to hold a certificate of authority to write life insurance, accident and health insurance or deposit-type contracts in this state. (Standard Valuation Law definition. Used in Section I, *Introduction*; Section II, *Reserve Requirements*; VM-05; VM-20; VM-21; VM-25; VM-26; VM-30; VM-31; VM-50; and VM-51.)

16. The term "conditional tail expectation" (CTE) means a risk measure that is calculated as the average of all modeled outcomes (ranked from lowest to highest) above a prescribed percentile. For example, CTE 70 is the average of the highest 30% modeled outcomes. (Used in VM-20 and VM-21.)

17. The term "deposit-type contract" means contracts that do not incorporate mortality or morbidity risks and as may be specified in the *Valuation Manual*. (Standard Valuation Law definition. Used in Section I, *Introduction*; Section II, *Reserve Requirements*; VM-05; and VM-31.)

18. The term "derivative instrument" means an agreement, option, instrument or a series or combination thereof:

    a. To make or take delivery of, or assume or relinquish, a specified amount of one or more underlying interests, or to make a cash settlement in lieu thereof.

    b. That has a price, performance, value or cash flow based primarily upon the actual or expected price, level, performance, value or cash flow of one or more underlying interests. (Source: AP&P Manual.)

    This includes, but is not limited to, an option, warrant, cap, floor, collar, swap, forward or future, or any other agreement or instrument substantially similar thereto or any series or combination thereof. Each derivative instrument shall be viewed as part of a specific derivative program. (Used in VM-20 and VM-21.)

19. The term "derivative program" means a program to buy or sell one or more derivative instruments or open or close hedging positions to achieve a specific objective. Both hedging and non-hedging programs (e.g., for replication or income generation objectives) are included in this definition. (Used in VM-20 and VM-31.)

20. The term "deterministic reserve" means a reserve amount calculated under a defined scenario and a single set of assumptions. (Used in VM-20 and VM-31.)

21. The term "discount rates" means the path of rates used to derive the present value. (Used in VM-20 and VM-21.)

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22. The term “domiciliary commissioner” means the chief insurance regulatory official of the state of domicile of the company. (Used in VM-21, VM-30 and VM-50.)

23. The term “fraternal benefits” means payments made for charitable purposes by a fraternal life insurance company that are consistent with and/or support the fraternal purposes of the company. (Used in VM-20.)

24. The term “pre-reinsurance-ceded minimum gross reserve” means the amount of the minimum reserve that would have been held in the absence of any ceded reinsurance. This includes direct and assumed business. (Used in VM-20.)

25. The term “gross wealth ratio” means the cumulative return for the indicated time period and percentile (e.g., 1.0 indicates that the index is at its original level). (Used in VM-21.)

26. The term “guaranteed minimum death benefit” (GMDB) is a guaranteed benefit providing, or resulting in the provision that, an amount payable on the death of a contract holder, annuitant, participant or insured will be increased and/or will be at least a minimum amount. Only such guarantees having the potential to produce a contractual total amount payable on death that exceeds the account value—or in the case of an annuity providing income payments, an amount payable on death other than continuation of any guaranteed income payments—are included in this definition. GMDBs that are based on a portion of the excess of the account value over the net of premiums paid less partial withdrawals made (e.g., an earnings enhanced death benefit) also are included in this definition. (Used in VM-21.)

27. The term “guaranteed minimum income benefit” (GMIB) is a variable annuity guaranteed living benefit (VAGLB) design for which the benefit is contingent on annuitization of a variable deferred annuity or similar contract. The benefit is typically expressed as a contract-holder option, on one or more option dates, to have a minimum amount applied to provide periodic income using a specified purchase basis. (Used in VM-21.)

28. The term “guaranteed payout annuity floor” (GPAF) is a VAGLB design guaranteeing that one or more of the periodic payments under a variable immediate annuity will not be less than a minimum amount. (Used in VM-21.)

29. The term “industry basic table” means an NAIC-approved industry experience mortality table (without the valuation margins). (Used in VM-20.)

30. The term “life insurance” means contracts that incorporate mortality risk, including annuity and pure endowment contracts, and as may be specified in the *Valuation Manual*. (Standard Valuation Law definition. Used in Section I, *Introduction*; Section II, *Reserve Requirements*; VM-05, VM-20; VM-25; VM-26; VM-30; VM-31; VM-50; and VM-51.)

31. The term “margin” means an amount included in the assumptions, except when the assumptions are prescribed, used to determine modeled reserve that incorporates conservatism in the calculated value consistent with the requirements of the various sections of the *Valuation Manual*. It is intended to provide for estimation error and adverse deviation. (Used in VM-05, VM-20, VM-21, VM-25, VM-26 and VM-31.)

32. The term “model segment” means a group of policies and associated assets that are modeled together to determine the path of net asset earned rates. (Used in VM-20 and VM-31.)

33. The term “mortality segment” means a subset of policies for which a separate mortality table representing the prudent estimate assumption will be determined. (Used in VM-20, VM-21 and VM-31.)

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34. The term “NAIC” means the National Association of Insurance Commissioners. (Standard Valuation Law definition. Used in Section I, *Introduction*; Section II, *Reserve Requirements*; Section III, *Actuarial Opinion and Report Requirements*; VM-05; VM-20; VM-21; VM-25; VM-26; VM-30; VM-31; VM-50; and VM-51.)

35. The term “net asset earned rates” (NAER) means the path of earned rates reflecting the net general account portfolio rate in each projection interval (net of appropriate default costs and investment expenses). (Used in VM-20 and VM-31.)

36. The term “net premium reserve” (NPR) means the amount determined in Section 3 of VM-20. (Used in Section II, *Reserve Requirements*.)

37. The term “non-guaranteed elements” (NGE) means either: (a) dividends under participating policies or contracts; or (b) other elements affecting life insurance or annuity policyholder/contract-holder costs or values that are both established and subject to change at the discretion of the insurer. (Used in VM-20 and VM-31.)

38. The term “path” means a time-indexed sequence of a set of values. (Used in VM-20, VM-21 and VM-31.)

39. The term “Principle Based Reserve Actuarial Report” (PBR Actuarial Report) means the supporting information prepared by the company as required by VM-31. (Used in VM-20.)

40. The term “policyholder behavior” means any action a policyholder, contract holder or any other person with the right to elect options, such as a certificate holder, may take under a policy or contract subject to the Standard Valuation Law (VM-05) including, but not limited to, lapse, withdrawal, transfer, deposit, premium payment, loan, annuitization, or benefit elections prescribed by the policy or contract but excluding events of mortality or morbidity that result in benefits prescribed in their essential aspects by the terms of the policy or contract. (Standard Valuation Law definition. Used in Section I, *Introduction*; VM-05; VM-20; VM-31; VM-50; and VM-51.)

41. The term “pretax interest maintenance reserve” (PIMR) means the statutory interest maintenance reserve liability adjusted to a pretax basis for each model segment at the projection start date. (Used in VM-20.)

42. The term “principle-based valuation” means a reserve valuation that uses one or more methods or one or more assumptions determined by the insurer and is required to comply with Section 12 of the Standard Valuation Law (VM-05) as specified in the *Valuation Manual*. (Standard Valuation Law definition. Used in Section I, *Introduction*; VM-05; VM-20; VM-31; VM-50; and VM-51.)

43. The term “projection interval” means the time interval used in the cash-flow model to project the cash-flow amounts (e.g., monthly, quarterly, annually). (Used in VM-20 and 21.)

44. The term “projection period” means the period over which the cash-flow model is run. (This definition applies to life and annuity products only.) (Used in VM-20, VM-21 and VM-31.)

45. The term “projection start date” means the date on which the projection period begins. (Used in VM-20 and VM-21.)

46. The term “projection year” means a 12-month period starting on the projection start date or an anniversary of the projection start date. (Used in VM-20 and VM-21.)

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47. The term “prudent estimate assumption” means a risk factor assumption developed by applying a margin to the anticipated experience assumption for that risk factor. (Used in VM-20, VM-21 and VM-31.)

48. The term “qualified actuary” means an individual who is qualified to sign the applicable statement of actuarial opinion in accordance with the Academy qualification standards for actuaries signing such statements and who meets the requirements specified in the *Valuation Manual*. (Standard Valuation Law definition. Used in VM-05, VM-20, VM-21, VM-25 and VM-30.)

49. The term “reinsurance cash flows” means the amount paid under a reinsurance agreement between a ceding company and an assuming company. Positive reinsurance cash flows shall represent amounts payable from the assuming company to the ceding company; negative reinsurance cash flows shall represent amounts payable from the ceding company to the assuming company. (Used in VM-20 and VM-31.)

50. The term “revenue sharing” means any arrangement or understanding by which an entity responsible for providing investment or other types of services makes payments to the company or to one of its affiliates. Such payments are typically in exchange for administrative services provided by the company or its affiliate, such as marketing, distribution and recordkeeping. Only payments that are attributable to charges or fees from the underlying variable funds or mutual funds supporting the policies or contracts that fall under the scope of the given standard shall be included in the definition of “revenue sharing.” (Used in VM-20, VM-21 and VM-31.)

51. The term “risk factor” means an aspect of future experience that is not fully predictable on the valuation date. (Used in VM-21 and VM-31.)

52. The term “scenario” means a projected sequence of events used in the cash-flow model, such as future interest rates, equity performance or mortality. (Used in VM-05, VM-20, VM-21 and VM-31.)

53. The term “scenario reserve” means the amount determined on an aggregated basis for a given scenario that is used as a step in the calculation of the stochastic reserve. (Used in VM-20, VM-21, VM-30 and VM-31.)

54. A “secondary guarantee” is a conditional guarantee that a policy will remain in force for either:

    a. More than five years (the secondary guarantee period).

    b. Five years or less (the secondary guarantee period) if the specified premium for the secondary guarantee period is less than the net level reserve premium for the secondary guarantee period based on the CSO valuation tables defined in VM-20 Section 3.C and VM-M and the valuation interest rates defined in this Section, or if the initial surrender charge is less than 100% of the first year annualized specified premium for the secondary guaranteed period, even if its fund value is exhausted. (Used in Section II, *Reserve Requirements*; and VM-20.)

55. The term “stochastic exclusion test” means a test to determine whether a group of policies is required to comply with stochastic modeling requirements. (Used in VM-20.)

56. The term “stochastic reserve” means the amount determined by applying a measure (e.g., a prescribed CTE level) to the distribution of scenario reserves over a broad range of stochastically generated scenarios and using prudent estimate assumptions for all assumptions not stochastically modeled. (Used in VM-20 and VM-31.)

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57. The term “tail risk” means a risk that occurs either where the frequency of low probability events is higher than expected under a normal probability distribution or where there are observed events of very significant size or magnitude. (Standard Valuation Law definition. Used in VM-05 and VM-20.)

58. The term “universal life insurance policy” means a life insurance policy where separately identified interest credits (other than in connection with dividend accumulations, premium deposit funds or other supplementary accounts) and mortality and expense charges are made to the policy. A universal life insurance policy may provide for other credits and charges, such as charges for cost of benefits provided by rider. (Used in VM-20.)

59. The term “valuation date” means the date when the reserve is to be valued as required by the Standard Valuation Law. (Used in VM-05, VM-20, VM-21, VM-25, VM-26, VM-30 and VM-31.)

60. The term “*Valuation Manual*” means the manual of valuation instructions adopted by the NAIC as specified in the Standard Valuation Law (VM-05) or as subsequently amended. (Standard Valuation Law definition. Used in Section I, *Introduction*; Section II, *Reserve Requirements*,; Section III, *Actuarial Opinion and Report Requirements*; Section V, *Valuation Manual Minimum Standards*; VM-5; VM-20; VM-21; VM-25; VM-26; VM-30; VM-31; VM-50; and VM-51.)

61. The term “variable annuity guaranteed living benefit” (VAGLB) is a guaranteed benefit providing, or resulting in the provision that, one or more guaranteed benefit amounts payable or accruing to a living contract holder or living annuitant, under contractually specified conditions (e.g., at the end of a specified waiting period, upon annuitization or upon withdrawal of premium over a period of time), will increase contractual benefits should the contract value referenced by the guarantee (e.g., account value) fall below a given level or fail to achieve certain performance levels. Only such guarantees having the potential to provide benefits with a present value as of the benefit commencement date that exceeds the contract value referenced by the guarantee are included in this definition. Payout annuities without minimum payout or performance guarantees are neither considered to contain nor to be VAGLBs. (Used in VM-21.)

62. The term “variable life insurance policy” means a policy that provides for life insurance the amount or duration of which varies according to the investment experience of any separate account or accounts established and maintained by the insurer as to the policy. (Used in VM-20.)

63. The term “working reserve” is the assumed reserve used in the projections of Accumulated Deficiencies supporting the calculation of the scenario greatest present values. (Used in VM-21.)

64. The term “non-material secondary guarantee” is a secondary guarantee (SG) that meets the following parameters at time of issue:

    a. The policy has only one SG and that SG is in the form of a required premium (specified annual or cumulative premium),

    b. The duration of the SG for each policy is no longer than 20 years from issue through issue age 60, grading down by 2/3-year for each higher issue age to age 82, thereafter five years.

    c. The present value of the required premium under the SG must be at least as great as the present value of net premiums resulting from the appropriate Valuation Basic Table (VBT) over the maximum SG duration allowable under the contract (in aggregate and subject to above duration limit).

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i. Present values use minimum allowable VBT rates (preferred tables are subject to existing qualification requirements) and the maximum valuation interest rate as defined in VM-20 Section 3.C.2.

ii. The minimum premium consists of the annual required premium over the maximum SG duration.

Guidance Note: VBT is the Valuation Basic Table, which is the unloaded version of the applicable CSO table.

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VM-02: Minimum Nonforfeiture Mortality and Interest

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Section 1: Purpose

A. The purpose of this VM-02 is to assign the appropriate Commissioners' Standard mortality table and interest rate for use in determining the minimum nonforfeiture standard for life insurance policies issued on and after the operative date of this *Valuation Manual* as authorized by applicable state requirements.

Section 2: Applicability

A. Any state requirements shall supersede requirements of this VM-02 if conflicted.

B. Requirements in this VM-02 apply to life insurance policies issued on and after the operative date of this *Valuation Manual*.

Section 3: Definitions

A. Industrial Life Insurance — That form of life insurance written under policies under which premiums are payable monthly or more often, bearing the words "industrial policy" or "weekly premium policy" or words of similar import imprinted upon the policies as part of the descriptive matter, and issued by an insurer which, as to such industrial life insurance, is operating under a system of collecting a debit by its agent.

B. Pre-Need — Any life insurance policy or certificate that is issued in combination with, in support of, with an assignment to, or as a guarantee for a prearrangement agreement for goods and services to be provided at the time of and immediately following the death of the insured. Goods and services may include, but are not limited to, embalming, cremation, body preparation, viewing or visitation, coffin or urn, memorial stone and transportation of the deceased. The status of the policy or contract as preneed insurance is determined at the time of issue in accordance with the policy form filing. (Note: Preceding definition taken from the *Preneed Life Insurance Minimum Standards for Determining Reserve Liabilities and Nonforfeiture Values Model Regulation* [#817].) The definition of pre-need shall be subject to that definition of pre-need in a particular state of issue if such definition is different in that state. [Note: To be completed.]

C. Ordinary Life [to be completed].

Section 4: Interest

A. The nonforfeiture interest rate for any life insurance policy issued in a particular calendar year beginning on and after the operative date of the *Valuation Manual* shall be equal to 125% of the calendar year statutory valuation interest rate defined for the NPR in the *Valuation Manual* for a life insurance policy with nonforfeiture values, whether or not such sections apply to such policy for valuation purposes, rounded to the nearer one-quarter of 1%, provided, however, that the nonforfeiture interest rate shall not be less than 4%.

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Guidance Note: For flexible premium universal life insurance policies as defined in Section 3.D. of the *Universal Life Insurance Model Regulation* (#585), this is not intended to prevent an interest rate guarantee less than the nonforfeiture interest rate.

Section 5: Mortality

Guidance Note: As any new Commissioners' Standard tables are adopted in the future, language or paragraphs will need to be added here to define what business is to use which tables. This will need to be coordinated with the valuation requirements contained in other sections of the *Valuation Manual*. Because of the various implications to systems, form filings and related issues (such as product tax issues), lead time is needed to implement new requirements without market disruption. Thus, it is recommended that the transition period referenced in the guidance note in Section 3.C.1.b of VM-20 be adopted; that is, that there be a transition period of about 4.5 years, that the table be adopted by July 1 of a given year, that it be permitted to be used starting Jan. 1 of the second following calendar year; that it be optional until Jan. 1 of the fifth following calendar year, thereafter mandatory.

A. Ordinary Life Insurance Policies

1. For ordinary life insurance policies issued on or after Jan. 1, 2017, and prior to Jan. 1, 2020, except as provided in paragraph 2 and in Subsection B below, the minimum nonforfeiture standard shall be determined using the 2001 CSP Mortality Table as defined in Appendix M of this manual and subject to the conditions defined in VM-A-814 in Appendix A of this manual for using this mortality table and subject for minimum standards. The 2001 CSO Preferred Class Structure Tables shall not be used to determine the minimum nonforfeiture standard.

2. Subject to the conditions stated below, the 2017 CSO Mortality Table as defined in VM-M Section 1.H.:

   a. May, at the election of the company, for one or more specified plans of insurance issued on or after Jan. 1, 2017.

   b. Shall, for policies issued on or after Jan. 1, 2020, to which section 5cH(6) of the *Standard Nonforfeiture Law for Life Insurance* (#808) is applicable, be used to determine minimum nonforfeiture standards according to the Model #808 or the state's equivalent statute. The 2017 CSO Preferred Structure Tables shall not be used to determine the minimum nonforfeiture standard.

3. The following conditions shall apply with respect to the use of the 2017 CSO Mortality Table:

   a. For each plan of insurance with separate rates for smokers and nonsmokers, an insurer may use:

      i. Composite mortality tables to determine minimum cash surrender values and amounts of paid-up nonforfeiture benefits.

      ii. Smoker and nonsmoker mortality to determine minimum cash surrender values and amounts of paid-up nonforfeiture benefits.

   b. For plans of insurance without separate rates for smokers and nonsmokers, the composite mortality tables shall be used.

   c. For the purpose of determining minimum cash surrender values and amounts of paid-up nonforfeiture benefits, the 2017 CSO Mortality Table may, at the option

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of the company for each plan of insurance, be used in its ultimate or select and ultimate form.

d. Gender-blended tables shall apply in the following circumstances:

For any ordinary life insurance policy delivered or issued for delivery that uses the same premium rates and charges for male and female lives or is issued in circumstances where applicable law does not permit distinctions on the basis of gender, a mortality table that is a blend of the 2017 CSO Mortality Table (M) and the 2017 CSO Mortality Table (F) may, at the option of the company for each plan of insurance, be used in determining minimum cash surrender values and amounts of paid-up nonforfeiture benefits.

B. Pre-Need Life Insurance Policies

Pre-need life insurance policies issued on or after the operative date of this *Valuation Manual* shall have the minimum nonforfeiture standard computed based on the 1980 CSO Mortality Tables as defined in Appendix M.

C. Same Minimum Nonforfeiture Standard for Men and Women

For any ordinary life insurance policy that uses the same premium rates and charges for male and female lives or is issued in circumstances where applicable law does not permit distinctions on the basis of gender, the minimum nonforfeiture standard shall use the gender-blended mortality derived from the mortality table assigned in this VM-02 for use in determining the minimum nonforfeiture standard. Weights used to determine the gender-blended table shall follow those provided in the *NAIC Procedure for Permitting Same Minimum Nonforfeiture Standards for Men and Women Insured Under 1980 CSO and CET Tables* (#811). The company may choose from among the blended tables, as appropriate, developed by the Academy CSO Task Force and adopted by the NAIC in December 2002 (preceding sentence taken from the Recognition of the 2001 CSO Mortality Table for Use in Determining Minimum Reserve Liabilities and Nonforfeiture Benefits Model Regulation [#814], Section 7, B). These tables are defined in Appendix M under Gender Blended Tables.

D. Industrial Life Insurance

The minimum nonforfeiture standard values for industrial life insurance policies shall be determined using the 1961 Industrial Standard Mortality Tables as defined in Appendix M.

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VM-05: NAIC Model Standard Valuation Law

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Section 1: Title and Definitions

A. This Act shall be known as the Standard Valuation Law.

B. For the purposes of this Act, the following definitions shall apply on or after the operative date of the *Valuation Manual*:

1. The term “accident and health insurance” means contracts that incorporate morbidity risk and provide protection against economic loss resulting from accident, sickness or medical conditions and as may be specified in the *Valuation Manual*.

2. The term “appointed actuary” means a qualified actuary who is appointed in accordance with the *Valuation Manual* to prepare the actuarial opinion required in Section 3A of this Act.

3. The term “company” means an entity, which (a) has written, issued or reinsured life insurance contracts, accident and health insurance contracts, or deposit-type contracts in this state and has at least one such policy in force or on claim; or (b) has written, issued or reinsured life insurance contracts, accident and health insurance contracts, or deposit-type contracts in any state and is required to hold a certificate of authority to write life insurance, accident and health insurance, or deposit-type contracts in this state.

4. The term “deposit-type contract” means contracts that do not incorporate mortality or morbidity risks and as may be specified in the *Valuation Manual*.

5. The term “life insurance” means contracts that incorporate mortality risk, including annuity and pure endowment contracts, and as may be specified in the *Valuation Manual*.

6. The term “NAIC” means the National Association of Insurance Commissioners.

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7. The term “policyholder behavior” means any action a policyholder, contract holder or any other person with the right to elect options, such as a certificate holder, may take under a policy or contract subject to this Act including, but not limited to, lapse, withdrawal, transfer, deposit, premium payment, loan, annuitization or benefit elections prescribed by the policy or contract but excluding events of mortality or morbidity that result in benefits prescribed in their essential aspects by the terms of the policy or contract.

8. The term “principle-based valuation” means a reserve valuation that uses one or more methods or one or more assumptions determined by the insurer and is required to comply with Section 12 of this Act as specified in the *Valuation Manual*.

9. The term “qualified actuary” means an individual who is qualified to sign the applicable statement of actuarial opinion in accordance with the Academy qualification standards for actuaries signing such statements and who meets the requirements specified in the *Valuation Manual*.

10. The term “tail risk” means a risk that occurs either where the frequency of low probability events is higher than expected under a normal probability distribution or where there are observed events of very significant size or magnitude.

11. The term “*Valuation Manual*” means the manual of valuation instructions adopted by the NAIC as specified in this Act or as subsequently amended.

Section 2: Reserve Valuation

A. Policies and Contracts Issued Prior to the Operative Date of the *Valuation Manual*

B. Policies and Contracts Issued On or After the Operative Date of the *Valuation Manual*

Section 3: Actuarial Opinion of Reserves

A. Actuarial Opinion Prior to the Operative Date of the *Valuation Manual*

B. Actuarial Opinion of Reserves After the Operative Date of the *Valuation Manual*

Section 4: Computation of Minimum Standard

Section 4a: Computation of Minimum Standard for Annuities

Section 4b: Computation of Minimum Standard by Calendar Year of Issue

Section 5: Reserve Valuation Method—Life Insurance and Endowment Benefits

Section 5a: Reserve Valuation Method—Annuity and Pure Endowment Benefits

Section 6: Minimum Reserves

Section 7: Optional Reserve Calculation

Section 8: Reserve Calculation—Valuation Net Premium Exceeding the Gross Premium Charged

Section 9: Reserve Calculation—Indeterminate Premium Plans

Section 10: Minimum Standard for Accident and Health Insurance Contracts

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Section 11: *Valuation Manual* for Policies Issued On or After the Operative Date of the *Valuation Manual*

A. The *Valuation Manual* must specify all of the following:

1. Minimum valuation standards for and definitions of the policies or contracts subject to Section 2B.

   Such minimum valuation standards shall be.

   a. The commissioner's reserve valuation method for life insurance contracts, other than annuity contracts, subject to Section 2B.

   b. The commissioner's annuity reserve valuation method for annuity contracts subject to Section 2B.

   c. Minimum reserves for all other policies or contracts subject to Section 2B.

2. Which policies or contracts or types of policies or contracts that are subject to the requirements of a principle-based valuation in Section 12A and the minimum valuation standards consistent with those requirements.

3. For policies and contracts subject to a principle-based valuation under Section 12:

   a. Requirements for the format of reports to the commissioner under Section 12B(2) and which shall include information necessary to determine if the valuation is appropriate and in compliance with this Act.

   b. Assumptions shall be prescribed for risks over which the company does not have significant control or influence.

   c. Procedures for corporate governance and oversight of the actuarial function, and a process for appropriate waiver or modification of such procedures.

4. For policies not subject to a principle-based valuation under Section 12, the minimum valuation standard shall either:

   a. Be consistent with the minimum standard of valuation prior to the operative date of the *Valuation Manual*.

   b. Develop reserves that quantify the benefits and guarantees, and the funding, associated with the contracts and their risks at a level of conservatism that reflects conditions that include unfavorable events that have a reasonable probability of occurring.

   Guidance Note: The wording of 11D(4)(b) does not preclude, for policies with significant tail risk, reflecting in the reserve conditions appropriately adverse to quantify the tail risk.

5. Other requirements, including, but not limited to, those relating to reserve methods, models for measuring risk, generation of economic scenarios, assumptions, margins, use of company experience, risk measurement, disclosure, certifications, reports, actuarial opinions and memorandums, transition rules, and internal controls.

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6. The data and form of the data required under Section 13, with which the data must be submitted, and may specify other requirements including data analyses and reporting of analyses.

B. In the absence of a specific valuation requirement or if a specific valuation requirement in the *Valuation Manual* is not, in the opinion of the commissioner, in compliance with this Act, then the company shall, with respect to such requirements, comply with minimum valuation standards prescribed by the commissioner by regulation.

C. The commissioner may engage a qualified actuary, at the expense of the company, to perform an actuarial examination of the company and opine on the appropriateness of any reserve assumption or method used by the company, or to review and opine on a company's compliance with any requirement set forth in this Act. The commissioner may rely upon the opinion, regarding provisions contained within this Act, of a qualified actuary engaged by the commissioner of another state, district or territory of the U.S. As used in this paragraph, the term "engage" includes employment and contracting.

D. The commissioner may require a company to change any assumption or method that in the opinion of the commissioner is necessary in order to comply with the requirements of the *Valuation Manual* or this Act; and the company shall adjust the reserves as required by the commissioner. The commissioner may take other disciplinary action as permitted pursuant to [insert applicable law].

Section 12: Requirements of a Principle-Based Valuation

A. A company must establish reserves using a principle-based valuation that meets the following conditions for policies or contracts as specified in the *Valuation Manual*:

1. Quantify the benefits and guarantees, and the funding, associated with the contracts and their risks at a level of conservatism that reflects conditions that include unfavorable events that have a reasonable probability of occurring during the lifetime of the contracts. For policies or contracts with significant tail risk, reflects conditions appropriately adverse to quantify the tail risk.

2. Incorporate assumptions, risk analysis methods and financial models, and management techniques that are consistent with, but not necessarily identical to, those used within the company's overall risk assessment process, while recognizing potential differences in financial reporting structures and any prescribed assumptions or methods.

3. Incorporate assumptions that are derived in one of the following manners:

a. The assumption is prescribed in the *Valuation Manual*.

b. For assumptions that are not prescribed, the assumptions shall:

i. Be established using the company's available experience, to the extent it is relevant and statistically credible.

ii. To the extent that company data is not available, relevant or statistically credible, be established using other relevant, statistically credible experience.

4. Provide margins for uncertainty, including adverse deviation and estimation error, such that the greater the uncertainty the larger the margin and resulting reserve.

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B. A company using a principle-based valuation for one or more policies or contracts subject to this section as specified in the *Valuation Manual* shall:

1. Establish procedures for corporate governance and oversight of the actuarial valuation function consistent with those described in the *Valuation Manual*.

2. Provide to the commissioner and the board of directors an annual certification of the effectiveness of the internal controls with respect to the principle-based valuation. Such controls shall be designed to ensure that all material risks inherent in the liabilities and associated assets subject to such valuation are included in the valuation, and that valuations are made in accordance with the *Valuation Manual*. The certification shall be based on the controls in place as of the end of the preceding calendar year.

3. Develop, and file with the commissioner upon request, a principle-based valuation report that complies with standards prescribed in the *Valuation Manual*.

C. A principle-based valuation may include a prescribed formulaic reserve component.

Section 13: Experience Reporting for Policies In Force On or After the Operative Date of the Valuation Manual

Section 14: Confidentiality

Section 15: Effective Date

A. All acts and parts of acts inconsistent with the provision of this Act are hereby repealed as of [insert original effective date of the Standard Valuation Law in this state]. This Act shall take effect [insert original effective date of the Standard Valuation Law in this state].

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VM-20: Requirements for Principle-Based Reserves for Life Products

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Section 1: Purpose and Definitions

A. These requirements establish the minimum reserve valuation standard for individual life insurance policies issued on or after the operative date of the *Valuation Manual* and subject to a PBR valuation with an NPR floor under the Standard Valuation Law.

B. These requirements constitute the Commissioners Reserve Valuation Method (CRVM) for policies of individual life insurance.

C. Definitions

1. The term “anticipated experience assumption” means an expectation of future experience for a risk factor given available, relevant information pertaining to the assumption being estimated.

2. The term “clearly defined hedging strategy” means a strategy undertaken by a company to manage risks that meet the criteria specified in the applicable requirement.

3. The term “deterministic reserve” means a reserve amount calculated under a defined scenario and a single set of assumptions.

4. The term “industry basic table” means an NAIC-approved industry experience mortality table (without the valuation margin).

5. The term “gross reserve” means the minimum reserve held in the absence of any ceded reinsurance.

6. The term “margin” means an amount included in the assumptions, except when the assumptions are prescribed, used to determine the modeled reserve that incorporates conservatism in the calculated value consistent with the requirements of the various sections of the *Valuation Manual*. It is intended to provide for estimation error and adverse deviation.

7. The term “model segment” means a group of policies and associated assets that are modeled together to determine the path of net asset earned rates.

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8. The term "modeled reserve" means the deterministic reserve on the policies determined under Section 2.A.2 plus the greater of the deterministic reserve and the stochastic reserve on the policies determined under Section 2.A.3.

Guidance Note: Examples include, but are not limited to:

a. Choosing a reduced set of scenarios from a larger set or an alternative set consistent with prescribed models and parameters.

b. Generating a smaller liability or asset model to represent the full seriatim model using grouping compression techniques or other similar simplifications.

9. The term "mortality segment" means a subset of policies for which a separate mortality table representing the prudent estimate assumption will be determined.

10. The term "net asset earned rates" means the path of earned rates reflecting the net general account portfolio rate in each projection interval (net of appropriate default costs and investment expenses).

11. The term "net premium reserve" (NPR) means the amount determined in Section 3.

12. The term "non-guaranteed element" (NGE) means either: (a) dividends under participating policies or contracts; or (b) other elements affecting life insurance or annuity policyholder/contract-holder costs or values that are both established and subject to change at the discretion of the insurer.

13. The term "policy" means an individual life insurance policy included in the scope of these requirements.

14. The term "policyholder efficiency" means the phenomenon that policyholders will act in their best interest with regard to the value of their policy. A policyholder acting with high policyholder efficiency would take actions permitted in their contract that would provide the greatest relative value. Such actions include, but are not limited to, not lapsing a low value or no value contract, persisting, surrendering, applying additional premium, and exercising loan and partial surrender provisions.

15. The term "pretax interest maintenance reserve" (PIMR) means the statutory interest maintenance reserve liability adjusted to a pre-tax basis for each model segment at the projection start date.

16. The term "Principle-Based Reserve Actuarial Report" (PBR Actuarial Report) means the document containing supporting information prepared by the company as required by VM-31.

17. The term "prudent estimate assumption" means a risk factor assumption developed by applying a margin to the anticipated experience assumption for that risk factor.

18. The term "reinsurance cash flows" means the amount paid under a reinsurance agreement between a ceding company and an assuming company. Positive reinsurance cash flows shall represent amounts payable from the assuming company to the ceding company; negative reinsurance cash flows shall represent amounts payable from the ceding company to the assuming company.

19. The term "scenario" means a projected sequence of events used in the cash-flow model, such as future interest rates, equity performance or mortality.

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20. The term "scenario reserve" means the amount determined on an aggregated basis for a given scenario that is used as a step in the calculation of the stochastic reserve.

21. A "secondary guarantee" is a conditional guarantee that a policy will remain in force for either:

    a. More than five years (the secondary guarantee period).

    b. Five years or less (the secondary guarantee period) if the specified premium for the secondary guarantee period is less than the net level reserve premium for the secondary guarantee period based on the CSO valuation tables defined in VM-20 Section 3.C and VM-M and the valuation interest rates defined in this Section, or if the initial surrender charge is less than 100% of the first year annualized specified premium for the secondary guaranteed period even if its fund value is exhausted.

22. The term "stochastic reserve" means the amount determined in Section 5.

23. The term "stochastic exclusion test" means a test to determine whether a group of policies is required to comply with stochastic modeling requirements.

24. The term "universal life insurance policy" means a life insurance policy where separately identified interest credits (other than in connection with dividend accumulations, premium deposit funds or other supplementary accounts) and mortality and expense charges are made to the policy. A universal life insurance policy may provide for other credits and charges, such as charges for cost of benefits provided by rider.

25. The term "variable life insurance policy" means a policy that provides for life insurance, the amount or duration of which varies according to the investment experience of any separate account or accounts established and maintained by the insurer as to the policy.

Section 2: Minimum Reserve

A. All policies subject to these requirements shall be included in one of the product groups defined by paragraphs 1 – 3 below. The company may elect to exclude one or more groups of policies from the stochastic reserve calculation and/or the deterministic reserve calculation. When excluding a group of policies from a reserve calculation, the company must document that the applicable exclusion test defined in Section 6 is passed for that group of policies. The minimum reserve for each product group is defined by paragraphs 1 – 3, and the total minimum reserve equals the sum of 1, 2 and 3 below, defined as:

1. Term Policies — All term policies are to be included in b. unless the company has elected to exclude a group of policies from the stochastic reserve calculation and has applied the stochastic exclusion test defined in Section 6, passed the test and documented the results.

    a. For the group of term policies subject to Section 3.A.1 for which the company did not compute the stochastic reserve: the product minimum NPR plus the excess, if any, of the deterministic reserve determined pursuant to Section 4 over the quantity (A–B) where A = the product minimum NPR for those policies, and B = any due and deferred premium asset held on account of those policies.

    b. For the group of term policies subject to Section 3.A.1 for which the company computes all three reserve calculations: the product minimum NPR plus the excess, if any, of the greater of the deterministic reserve determined pursuant to

Section 4 and the stochastic reserve determined pursuant to Section 5 over the quantity (A–B) where A = the product minimum NPR for those policies, and B = any due and deferred premium asset held on account of those policies.

2. Universal Life with Secondary Guarantee (ULSG) Policies — All ULSG policies are to be included in b. unless the company has elected to exclude a group of policies from the stochastic reserve calculation and has applied the stochastic exclusion test defined in Section 6, passed the test and documented the results.

   a. For the group of ULSG policies subject to Section 3.A.1 for which the company did not compute the stochastic reserve: the product minimum NPR plus the excess, if any, of the deterministic reserve determined pursuant to Section 4 over the quantity (A–B) where A = the product minimum NPR for those policies, and B = any due and deferred premium asset held on account of those policies.

   b. For the group of universal life insurance with secondary guarantee policies subject to Section 3.A.1 for which the company computes all three reserve calculations: the product minimum reserve plus the excess, if any, of the greater of the deterministic reserve determined pursuant to Section 4 and the stochastic reserve determined pursuant to Section 5 over the quantity (A–B) where A = the product minimum NPR for those policies, and B = any due and deferred premium asset held on account of those policies.

3. Life Insurance Policies Subject to Section 3.A.2. – All life insurance policies subject to 3.A.2. are to be included in c. unless the company has elected to exclude the group of policies from the stochastic reserve calculation or both the deterministic and stochastic reserve calculations and has applied the applicable exclusion test defined in Section 6, passed the test and documented the results.

   a. For the group of policies subject to Section 3.A.2 for which the company did not compute the deterministic reserve nor the stochastic reserve: the product minimum NPR for those policies.

   b. For the group of policies subject to Section 3.A.2. for which the company did not compute the stochastic reserve but did compute the deterministic reserve: the product minimum net premium reserve plus the excess, if any, of the deterministic reserve determined pursuant to Section 4 over the quantity (A–B) where A = the product minimum reserve for those policies, and B = any due and deferred premium asset held on account of those policies.

   c. For the group of policies subject to Section 3.A.2. for which the company computes all three reserve calculations: the product minimum NPR plus the excess, if any, of the greater of the deterministic reserve determined pursuant to Section 4 and the stochastic reserve determined pursuant to Section 5 over the quantity (A–B) where A = the product minimum net premium reserve for those policies, and B = any due and deferred premium asset held on account of those policies.

B. Section 3 defines the requirements for the policy NPR, and Subsection 3.F. defines how that reserve is attributed to a product group. Section 4 defines the requirements for the deterministic reserve, and Subsection 4.C. defines how that reserve is attributed to a product group. Section 5 defines the requirements for the stochastic reserve, and Subsection 5.G. defines how that reserve is apportioned among product groups.

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C. The reserve for each product group as determined in A.1., A.2. or A.3. shall be allocated to each policy within that product group in the same proportion as the minimum NPR for that policy to the minimum NPR for the product group.

D. A group of policies for which neither deterministic nor stochastic reserves are required or calculated are not subject to principle-based valuation as defined under the Standard Valuation Law.

E. The company may calculate the deterministic reserve and the stochastic reserve as of a date no earlier than three months before the valuation date, using relevant company data, provided an appropriate method is used to adjust those reserves to the valuation date. Company data used for experience studies to determine prudent estimate assumptions are not subject to this three-month limitation.

F. If a company has separate account business, the company shall allocate the minimum reserve between the general and separate accounts subject to the following:

1. The amount allocated to the general account shall not be less than zero and shall include any liability related to contractual guarantees provided by the general account.

2. The amount allocated to the separate account shall not be less than the sum of the cash surrender values and not be greater than the sum of the account values attributable to the separate account portion of all such contracts.

G. A company may use simplifications, approximations and modeling efficiency techniques to calculate the NPR, the deterministic reserve and/or the stochastic reserve required by this section if the company can demonstrate that the use of such techniques does not understate the reserve by a material amount, and the expected value of the reserve calculated using simplifications, approximations and modeling efficiency techniques is not less than the expected value of the reserve calculated that does not use them. This does not preclude use of model segmentation for purposes of determining discount rates.

H. The reserves for supplemental benefits and riders shall be calculated consistent with the requirements for "Riders and Supplemental Benefits" in Section II – Reserve Requirements.

Section 3: Net Premium Reserve

A. Applicability

1. The NPR for each term policy and for each ULSG policy must be determined pursuant to Section 3.

> **Guidance Note:** When valuing term riders pursuant to Section II, the reserve requirements for term policies are applicable.

2. Except for policies subject to Section 3.A.1, the NPR shall be determined pursuant to applicable methods in VM-A and VM-C for the basic reserve. The mortality tables to be used are those defined in Section 3.C.1 and in VM-M Section 1.H.

B. For purposes of this Section 3 and Section 6, the following definitions apply:

1. The "fully funded secondary guarantee" at any time is:

a. For a shadow account secondary guarantee, the minimum shadow account fund value necessary to fully fund the secondary guarantee for the policy at that time.

b. For a cumulative premium secondary guarantee, the amount of cumulative premiums required to have been paid to that time that would result in no future premium requirements to fully fund the guarantee, accumulated with any interest or accumulation factors per the contract provisions for the secondary guarantee.

2. The "actual secondary guarantee" at any time is:

a. For a shadow account secondary guarantee, the actual shadow account fund value at that time.

b. For a cumulative premium secondary guarantee, the actual premiums paid to that point in time, accumulated with any interest or accumulation factors per the contract provisions for the secondary guarantee.

3. The "level secondary guarantee" at any time is:

a. For a shadow account secondary guarantee, the shadow account fund value at that time assuming payment of the level gross premium determined according to Subsection 3.B.6.c.i.

b. For a cumulative premium secondary guarantee, the amount of cumulative level gross premiums determined according to Section 3.B.6.c.i, accumulated with any interest or accumulation factors per the contract provisions for the secondary guarantee.

Guidance Note: The definition of the NPR in Subsection 4, Subsection 5 and Subsection 6 is intended to result in a terminal NPR under the assumption of an annual mode gross premium. The gross premium referenced should be the gross premium for the policy assuming an annual premium mode. The reported reserve as of any valuation date should reflect the actual premium mode for the policy and the actual valuation date relative to the policy issue date either directly or through adjusting accounting entries.

4. For all term policies, on any valuation date the NPR shall be equal to the actuarial present value of future benefits less the actuarial present value of future annual valuation net premiums as follows:

a. The annual valuation net premiums shall be a uniform percent of the respective adjusted gross premiums, described in Section 3.B.4.b, such that at issue the actuarial present value of future valuation net premiums shall equal the actuarial present value of future benefits plus an amount equal to $2.50 per $1,000 of insurance for the first policy year only.

Guidance Note: When calculating the present values under Section 3.B.4.a.ii and 3.B.4.a.iii, benefits and premiums during the years following the end of the level term period should be projected assuming that the policies subject to the shock lapse in each year do not pay the higher premium in that year.

For policies subject to the shock lapse provisions of Section 3.C.3.b.v, valuation net premiums for policy years after the shock lapse shall be limited and may result in two uniform percentages, one applicable to policy years prior to the shock lapse and one applicable to policy years following the shock lapse. For these policies, these percentages shall be determined as follows:

i. Compute the actuarial present value of benefits for policy years following the shock lapse.

ii. Compute the actuarial present value of valuation net premiums for policy years following the shock lapse.

iii. If iii/ii is greater than 135%, reduce the net valuation premiums in iii uniformly to produce a ratio of iii/ii of 135%.

iv. If the application of iv produces an adjustment to the net valuation premiums following the shock lapse, increase the net valuation premiums for policy years prior to the shock lapse by a uniform percentage such that at issue the actuarial present value of future valuation net premiums equals the actuarial present value of future benefits plus $2.50 per $1,000 of insurance for the first policy year only.

b. Adjusted gross premiums shall be determined as follows:

i. The adjusted gross premium for the first policy year shall be set at zero.

ii. The adjusted gross premium for any year from the second through fifth policy year shall be set at 90% of the corresponding gross premium for that policy year.

iii. The adjusted gross premium for any year after the fifth policy year shall be set equal to the corresponding gross premium for that policy year.

c. The gross premium in any policy year is the maximum guaranteed gross premium for that policy year.

d. Actuarial present values are calculated using the interest, mortality and lapse assumptions prescribed in Section 3.C.

5. For any ULSG policy, a reserve shall be determined by the policy features and guarantees of the policy without considering any secondary guarantee provisions. The NPR shall be calculated as follows:

a. Determine the level gross premium at issue, assuming payments are made each year for which premiums are permitted to be paid, such period defined as "s" in this subsection, that would keep the policy in force for the entire period coverage is to be provided based on the policy guarantees of mortality, interest and expenses.

b. Using the level gross premium from Section 3.B.5.a, determine the value of the expense allowance components for the policy at issue as x_1, $y_{2\text{-}5}$ and z_1 defined below.

x_1 = a first year expense equal to the level gross premium at issue

$y_{2\text{-}5}$ = an expense equal to 10% of the level gross premium and applied in each year from the second through fifth policy year

z_1 = a first year expense of $2.50 per $1,000 of insurance issued

The expense allowance balance, E_{x+t}, shall be calculated as follows over the period for which premiums are permitted to be paid:

$E_{x+t} = VNPR \bullet \ddot{a}_{x+t:\overline{s-t}|}\left[(x_1 + z_1)/\ddot{a}_{x:\overline{s}|} + y_{2-5} \bullet C_{x+t}\right]$ for t < s

= 0 for t ≥ s

Where:

$$VNPR = Valuation\ Net\ Premium\ Ratio\ from\ 3.B.5.c.$$

C_{x+t} = 0 when t = 1

$= \sum_{w=1}^{t-1}(1/\ddot{a}_{x+w:\overline{s-w}|})$ when 2 ≤ t ≤ 5

$= C_{x+5}$ when t > 5

c. Determine the annual valuation net premiums as that uniform percentage (the valuation net premium ratio) of the respective gross premiums, such that at issue the actuarial present value of future valuation net premiums shall equal the actuarial present value of future benefits.

d. For a policy issued at age *x*, on any valuation date *t*, the net premium reserve shall equal:

$m_{x+t} \bullet r_{x+t}$ Where:

i. m_{x+t} = the actuarial present value of future benefits less the actuarial present value of future valuation net premiums and less the unamortized expense allowance for the policy, E_{x+t} ,

ii. r_{x+t} = the ratio e_{x+t}/f_{x+t} , but not greater than 1, with (e_{x+t}) and (f_{x+t}) defined as below:

e_{x+t} = the actual policy fund value on the valuation date *t*

f_{x+t} = the policy fund value on the valuation date *t* is that amount which, together with the payment of the future level gross premiums determined in Subsection 3.B.5.a above, keeps the policy in force for the entire period coverage is to be provided, based on the policy guarantees of mortality, interest and expenses.

e. The future benefits used in determining the value of m_{x+t} shall be based on the greater of e_{x+t} and f_{x+t} together with the future payment of the level gross premiums determined in Subsection 3.B.5.a above, and assuming the policy guarantees of mortality, interest and expenses.

f. The values of $\ddot{a}$ are determined using the NPR interest, mortality and lapse assumptions applicable on the valuation date.

g. Actuarial present values referenced in this Subsection 3.B.5 are calculated using the interest, mortality, and lapse assumptions prescribed in Subsection C of this section.

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6. For any ULSG policy, during the secondary guarantee period, the NPR shall be the greater of the reserve amount determined according to Subsection 3.B.5, assuming the policy has no secondary guarantees, and the reserve amount for the policy determined according to the methodology and requirements Subsection 3.B.6.b through Subsection 3.B.6.e below.

   a. After the expiration of the secondary guarantee period, the NPR shall be the NPR determined according to Subsection 3.B.5 only.

   b. If the policy has multiple secondary guarantees, the NPR shall be calculated as below for the secondary guarantee that provides the longest period for which the policy can remain in force under the provisions of the secondary guarantee, such period defined as "n" in this subsection. The resulting NPR shall be used in the comparison with the NPR calculated in accordance with Subsection 3.B.5.

   c. As of the policy issue date:

      i. Determine the level gross premium at issue, assuming payments are made each year for which premiums are permitted to be paid, such period defined as "v" in this subsection that would keep the policy in force to the end of the secondary guarantee period, based on policy provisions, including the secondary guarantee provisions, such as mortality, interest and expenses. In no event shall "v" be greater than "n" for purposes of the NPR calculated in this subsection.

      ii. Using the level gross premium from Subsection 3.B.6.c.i above, determine the value of the expense allowance components for the policy at issue as x_1 , y_{2-5} and z_1 defined below.

      x_1= a first-year expense equal to the level gross premium at issue

      y_{2-5}= an expense equal to 10% of the level gross premium and applied in each year from the second through fifth policy year

      z_1= a first-year expense of $2.50 per $1,000 of insurance issued

      The expense allowance, E_{x+t}, shall be amortized as follows over the period for which premium are permitted to be paid:

      $E_{x+t} = VNPR * \ddot{a}_{x+t:\overline{v-t}|} \left[(x_1 + z_1)/\ddot{a}_{x:\overline{v}|} + y_{2-5} \bullet C_{x+t}\right]$ For t < v

      = 0 for t ≥ v

      Where:

      VNPR = Valuation Net Premium Ratio from 3.B.6.c.iii

      C_{x+t} = 0 when t = 1

      $=\sum_{w=1}^{t-1}(1/\ddot{a}_{x+w:\overline{v-w}|})$ when 2≤ t ≤5

      $= C_{x+5}$ when t>5

      iii. Determine the annual valuation net premiums at issue as that uniform percentage (the valuation NPR) of the respective gross premiums such that at issue and over the secondary guarantee period the actuarial present value of future valuation net premiums shall equal the actuarial

present value of future benefits. The valuation net premium ratio determined shall not change for the policy.

d. After the policy issue date, on each future valuation date, *t*, the NPR shall be determined as follows:

i. For policies using a cumulative premium secondary guarantee, determination should be made, per the policy provisions for the secondary guarantee of the actual secondary guarantee as of the valuation date, ASGx+t, as defined in 3.B.2.b. and the fully funded secondary guarantee, FFSGx+t, as defined in 3.B.1.b.

ii. As of the valuation date for the policy being valued, for policies using shadow accounts, determine the amount of actual secondary guarantee as of the valuation date, ASGx+t, as defined in 3.B.2.a and the minimum amount of shadow account required to fully fund the guarantee, FFSGx+t, as defined in 3.B.1.a. For any policy for which the secondary guarantee cannot be fully funded in advance, solve for the minimum sum of any possible excess funding and the present value of future premiums (using the maximum allowable valuation interest rate and the minimum mortality standards allowable for calculating basic reserves) that would fully fund the guarantee.

iii. Divide ASGx+t by FFSGx+t, with the resulting ratio capped at 1.00. The ratio is intended to measure the level of prefunding for a secondary guarantee which is used to establish reserves. Assumptions within the numerator and denominator of the ratio, therefore, must be consistent in order to appropriately reflect the level of prefunding. As used here, "assumptions" include any factor or value, whether assumed or known, which is used to calculate the numerator or denominator of the ratio.

iv. Compute the net single premium (NSPx+t) on the valuation date for the coverage provided by the secondary guarantee for the remainder of the secondary guarantee period, using the interest, lapse and mortality assumptions prescribed in Subsection C of this section. The NSP shall include consideration for death benefits only.

v. The NPR for an insured age x at issue at time t shall be according to the formula below:

$$Min\left[\frac{ASG_{x+t}}{FFSG_{x+t}}, 1\right] \bullet NSP_{x+t} - E_{x+t}$$

e. Actuarial present values referenced in this Subsection B.6 are calculated using the interest, mortality and lapse assumptions prescribed in Subsection C of this section.

7. The actuarial present value of future benefits equals the present value of future benefits including, but not limited to, death, endowment (including endowments intermediate to the term of coverage) and cash surrender benefits. Future benefits are before reinsurance and before netting the repayment of any policy loans.

C. Net Premium Reserve Assumptions

1. Mortality Rates

a. Except as indicated in Subsection 3.C.1.b, and subject to the conditions outlined for reserves in VM-A-814 and A-815 in Appendix A of this manual, the mortality standard used in determining the present values described in Subsection B of this section shall be the 2001 CSO Mortality Table as defined in VM-M Section 1.G. of this manual.

b. Subject to the conditions defined in 3.C.1.c., the 2017 CSO Mortality Tables as defined in VM-M Section 1.H. is required as the valuation standard for ordinary life policies issued on or after Jan. 1, 2020, and subject to this Section. A company may elect to apply this table to determine minimum reserve standards to one or more plans of insurance for policies issued on or after Jan. 1, 2017.

c. Conditions for application of the 2017 CSO:

   i. For each plan of insurance with separate rates for smokers and nonsmokers, an insurer may use:

      a) Composite mortality tables to determine minimum reserve liabilities; or

      b) Smoker and nonsmoker mortality to determine minimum reserve liabilities if nonforfeiture values are also determined using smoker and nonsmoker mortality.

   ii. For plans of insurance without separate rates for smokers and nonsmokers, the composite mortality tables shall be used.

   iii. For the purpose of determining minimum reserve values and amounts of paid-up nonforfeiture benefits, the 2017 CSO Mortality Table may, at the option of the company for each plan of insurance, be used in its ultimate or select and ultimate form.

d. At the election of the company, for any one or more specified plans of insurance and subject to satisfying the conditions stated in 3.C.1.e., the 2017 CSO Preferred Class Structure Mortality Table may be substituted in place of the 2017 CSO Smoker or Nonsmoker Mortality Table as the minimum valuation standard for policies issued on or after Jan. 1, 2017.

e. Conditions for preferred structure tables:

   i. For each plan of insurance with separate rates for preferred and standard nonsmoker lives, an insurer may use the super preferred nonsmoker, preferred nonsmoker and residual standard nonsmoker tables to substitute for the nonsmoker mortality table found in the 2017 CSO Mortality Table to determine minimum reserves. At the time of election and annually thereafter, except for business valued under the residual standard nonsmoker table, the appointed actuary shall certify that:

      a) The present value of death benefits over the next 10 years after the valuation date, using the anticipated mortality experience without recognition of mortality improvement beyond the valuation date for each class, is less than the present value of death benefits using the VBT corresponding to the valuation table being used for that class.

b) The present value of death benefits over the future life of the contracts, using anticipated mortality experience without recognition of mortality improvement beyond the valuation date for each class, is less than the present value of death benefits using the VBT corresponding to the valuation table being used for that class.

ii. For each plan of insurance with separate rates for preferred and standard smoker lives, an insurer may use the preferred smoker and residual standard smoker tables to substitute for the smoker mortality table found in the 2017 CSO Mortality Table to determine minimum reserves. At the time of election and annually thereafter, for business valued under the preferred smoker table, the appointed actuary shall certify that:

a) The present value of death benefits over the next 10 years after the valuation date, using the anticipated mortality experience without recognition of mortality improvement beyond the valuation date for each class, is less than the present value of death benefits using the preferred smoker VBT corresponding to the valuation table being used for that class.

b) The present value of death benefits over the future life of the contracts, using anticipated mortality experience without recognition of mortality improvement beyond the valuation date for each class, is less than the present value of death benefits using the preferred smoker VBT.

iii. Selection of the proper set of mortality rates when a company chooses to use a permitted preferred class structure mortality table shall be subject to *Actuarial Guideline XLII—The Application of the Model Regulation Permitting the Recognition of Preferred Mortality Tables for Use in Determining Minimum Reserve Liabilities* (AG 42) and applied to the 2017 CSO consistently with the 2001 CSO.

Guidance Note: The *Valuation Manual* can be updated by the NAIC to define a new valuation table. Because of the various implications to systems, form filings and related issues (such as product tax issues), lead time is needed to implement new requirements without market disruption. It is recommended that this transition be for a period of about 4.5 years—that is, that the table be adopted by July 1 of a given year, that it be permitted to be used starting Jan. 1 of the second following calendar year, that it be optional until Jan. 1 of the fifth following calendar year, thereafter mandatory. It is further intended that the adoption of such tables would apply to all business issued since the adoption of this *Valuation Manual*. The details of how to implement any unlocking of mortality tables will need to be addressed in the future.

2. Interest Rates

Guidance Note: This section describing the determination of the "calendar year net premium reserve interest rate" is intended to communicate that, unlike the "unlocking" of the NPR mortality and lapse assumptions, the interest rate used in the NPR calculation for a block of policies issued in a particular calendar year does not change for the duration of each of the policies in that issue year block.

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a. For NPR amounts calculated according to Section 3.B.5:

The calendar year NPR interest rate *I* shall be determined according to this Subsection 3.C.2.a and the results rounded to the nearest one-quarter of 1%.. This rate shall be used in determining the present values described in Section 3.B.5 for all policies issued in the calendar year next following its determination.

i. $I = .03 + W * (R_1 - .03) + (W/2) * (R_2 - .09)$

Where: R_1 is the lesser of *R* and .09

R_2 is the greater of *R* and .09

R is the reference interest rate defined in Subsection 2.a.ii below

W is the weighting factor for a policy, as defined in Subsection 2.a.iii below

However, if the calendar year NPR interest rate *I* in any calendar year determined without reference to this sentence differs from the corresponding actual rate for the immediately preceding calendar year by less than one-half of 1%, the calendar year NPR interest rate shall be set equal to the corresponding actual rate for the immediately preceding calendar year.

ii. The reference interest rate *R* for a calendar year shall equal the lesser of the average over a period of 36 months and the average over a period of l2 months, ending on June 30 of the calendar year preceding the year of issue, of the monthly average of the composite yield on seasoned corporate bonds, as published by Moody's Investors Service (MIS).

iii. The weighting factor *W* for a policy shall be determined from the table below:

Guarantee Duration (Years)	Weighting Factor
10 or less	0.50
More than 10 but not more than 20	0.45
More than 20	0.35

The guarantee duration for the coverage guarantee is the maximum number of years the life insurance can remain in force on the basis guaranteed in the policy or under options to convert to plans of life insurance with premium rates or nonforfeiture values or both which are guaranteed in the original policy.

b. For NPR amounts calculated according to Section 3.B.4 or Section 3.B.6:

The calendar year NPR interest rate shall be calculated by increasing the rate determined according to Subsection 3.C.2.a above by 1.5%, but in no event greater than 125% of the rate determined according to Subsection 3.C.2.a above rounded to the nearer one-quarter of 1%.

Guidance Note: If a policy contains multiple coverage guarantees and each coverage guarantee stream is valued separately, it may be important to define which reserve interest rate(s) should be used for reporting and analysis purposes.

3. Lapse Rates

a. For NPR amounts calculated according to Section 3.B.5, the lapse rates used shall be 0% per year during the premium paying period and 0% per year thereafter.

b. For NPR amounts calculated according to Section 3.B.4, the annual lapse rates used shall vary by level premium period as stated below:

i. 10% per year during any level premium period of less than five years, except as noted in iii and iv.

ii. 6% per year during any level premium period of five or more years, except as noted in iii and iv.

iii. For any policy with values subject to the requirements of *Actuarial Guideline XLV—The Application of the Standard Nonforfeiture Law For Life Insurance to Certain Policies Having Intermediate Cash Benefits* (AG 45) in Appendix C of the AP&P Manual, the annual lapse rate is 6% for the first half of the initial level premium period and 0% for the remainder of the initial level premium period.

iv. 10% per year during any premium paying period after an initial level premium period of less than five years.

v. The lapse rate for the first year following a rate increase shall be determined based on the length of the level premium periods before and after the increase, as well as the percent increase in the gross premium as shown in the table below instead of what would otherwise apply from i through iv above.

Length of Premium Period Prior to Increase	Length of Premium Period After Increase	Percent Increase in Gross Premium per $1000	Lapse for the Year After Premium Increase (Shock Lapse)
1<PP≤5	1	Any	50%
1<PP≤5	1<PP	Any	25%
5<PP≤10	1	< 400%	70%
5<PP≤10	1	Over 400%	80%
5<PP≤10	1<PP≤5	Any	50%
5<PP≤10	5<PP	Any	25%
10<PP	1	< 400%	70%
10<PP	1	Over 400%	80%
10<PP	1<PP≤5	Any	70%
10<PP	5<PP≤10	Any	50%
10<PP	10<PP	Any	50%

c. For NPR amounts calculated according to Section 3.B.6, the lapse rate, L_{x+t}, used at time *t* for an insured age *x* at issue shall be determined as follows:

i. Determine the ratio R_{x+t} where:

$R_{x+t} = [FFSG_{x+t} - ASG_{x+t}] / [FFSG_{x+t} - LSG_{x+t}]$ but not > 1 and not <0

Where:

$FFSG_{x+t}$ = the fully funded secondary guarantee at time *t* for the insured age *x* at issue

ASG_{x+t} = the actual secondary guarantee at time *t* for the insured age *x* at issue

LSG_{x+t} = the level secondary guarantee at time *t* for the insured age *x* at issue

ii. The lapse rate for the policy for durations *t+1* and later shall be set equal to:

$L_{x+t} = R_{x+t} \bullet 0.01 + (1 - R_{x+t}) \bullet 0.005 \bullet r_{x+t}$

Where r_{x+t} is the ratio determined in Subsection 3.B.5.d.ii.

D. NPR Calculation and Cash Surrender Value Floor

1. For policies other than universal life policies, the NPR shall not be less than the greater of:

a. The cost of insurance to the next paid to date. The cost of insurance for this purpose shall be determined using the mortality tables for the policy prescribed in Subsection 3.C.

b. The policy cash surrender value, calculated as of the valuation date and in a manner that is consistent with that used in calculating the NPR on the valuation date.

2. For a universal life policy, the NPR shall not be less than the greater of:

a. The amount needed to cover the cost of insurance to the next processing date on which cost of insurance charges are deducted with respect to the policy. The cost of insurance for this purpose shall be determined using the mortality tables for the policy prescribed in Subsection 3.C.

b. The policy cash surrender value, calculated as of the valuation date and in a manner that is consistent with that used in calculating the NPR on the valuation date.

E. The policy minimum NPR is defined to be the policy NPR determined in Subsections A through Subsection D, less a credit for reinsurance ceded as defined in Section 8.

F. The minimum NPR for a product group (term, ULSG, all other) is the sum of the policy minimum NPR determined in E. for the policies in the product group.

Section 4: Deterministic Reserve

For a group of one or more policies for which a deterministic reserve is to be calculated, the company shall calculate the deterministic reserve for the group using the method described in either Subsection A or Subsection B of this section.

A. Calculate the deterministic reserve equal to the actuarial present value of benefits, expenses and related amounts less the actuarial present value of premiums and related amounts, less the positive or negative PIMR balance allocated to the group of one or more policies being modeled under Section 7.D., where:

1. Cash flows are projected in compliance with the applicable requirements in Section 7, Section 8 and Section 9 over economic scenario 12 described in Section 7.G.1, and further described in Appendix 1E.

2. Present values are calculated using the path of discount rates for the corresponding model segment determined in compliance with Section 7.H.

3. The actuarial present value of benefits, expenses and related amount equals the sum of:

   a. Present value of future benefits, but before netting the repayment of any policy loans.

   Guidance Note: Future benefits include but are not limited to death and cash surrender benefits.

   b. Present value of future expenses excluding federal income taxes and expenses paid to provide fraternal benefits in lieu of federal income taxes.

   c. Policy account value invested in the separate account at the valuation date.

   d. Policy loan balance at the valuation date with appropriate reflection of any relevant due, accrued or unearned loan interest, if policy loans are explicitly modeled under Section 7.F.3.

4. The actuarial present value of premiums and related amounts equals the sum of the present values of:

   a. Future gross premium payments and/or other applicable revenue.

   b. Future net cash flows to or from the general account, or from or to the separate account.

   c. Future net policy loan cash flows, if policy loans are explicitly modeled under Section 7.F.3.

   Guidance Note: Future net policy loan cash flows include: policy loan interest paid in cash plus repayments of policy loan principal, including repayments occurring at death or surrender (note that the future benefits in Section 4.A.3.a are before consideration of policy loans), less additional policy loan principal.

   d. Future net reinsurance cash flows determined in compliance with Section 8.

   e. The future derivative liability program net cash flows (i.e., cash received minus cash paid) that are allocated to this group of policies.

5. If a group of policies is excluded from the stochastic reserve requirements, the company may not include future transactions associated with non-hedging derivative programs in determining the deterministic reserve for those policies.

B. Calculate the deterministic reserve as a – b, where

1. a = the aggregate annual statement value of those starting assets which, when projected along with all premium and investment income, result in the liquidation of all projected future benefits and expenses by the end of the projection horizon. Under this alternative, the following considerations apply:

a. Cash flows are projected in compliance with the applicable requirements in Section 7, Section 8 and Section 9 over the single scenario described in Section 7.G.1.

b. The requirements for future benefits and premiums in Section 4.A apply as well to the calculation of the deterministic reserve under this subsection.

2. b = that portion of the PIMR amount allocated under Section 7.D.

C. If a group of policies for which a deterministic reserve is calculated includes policies from more than one product group, where product group is defined, as in Section 2, to be term insurance policies, ULSG policies or all other types of policies, a deterministic reserve shall be determined for each product group by following the process of A – C above by treating each product group as a subgroup. The NAER used for discounting each product group can be the NAER for the group of policies. If the sum of the deterministic reserve for each product group does not equal the total deterministic reserve, the total shall be allocated to each product group proportionally.

Section 5: Stochastic Reserve

For a group of one or more policies for which a stochastic reserve is to be calculated, the company shall calculate the stochastic reserve as follows:

A. Project cash flows in compliance with the applicable requirements in Section 7, Section 8 and Section 9 using the stochastically generated scenarios described in Section 7.G.2., and further described in Appendix 1E. In determining the stochastic reserve, the company shall determine the number and composition of subgroups for aggregation purposes in a manner that is consistent with how the company manages risks across the different product types, and that reflects the likelihood of any change in risk offsets that could arise from shifts between product types. If a company is managing the risks of two or more different product types as part of an integrated risk management process, then the products may be combined into the same aggregation subgroup. If policies from more than one product group are included in an aggregation subgroup, the reserve for each product group shall also be determined, as described in Section 5.G.

Guidance Note: Aggregation refers to the number and composition of subgroups of policies that are used to combine cash flows. Aggregating policies into a common subgroup allows the cash flows arising from the policies for a given stochastic scenario to be netted against each other (i.e., allows risk offsets between policies to be recognized). Note Section 5G regarding the calculation of the stochastic reserve on a stand-alone basis for each product group. Product group is defined, as in Section 2, to be term insurance policies, ULSG policies or all other types of policies.

B. Calculate the scenario reserve for each stochastically generated scenario as follows:

1. For each model segment at the model start date and end of each projection year, calculate the discounted value of the negative of the projected statement value of general account

and separate account assets using the path of discount rates for the model segment determined in compliance with Section 7.H.4 from the projection start date to the end of the respective projection year.

Guidance Note: The projected statement value of general account and separate account assets for a model segment may be negative or positive.

2. Sum the amounts calculated in Subparagraph 1 above across all model segments at the model start date and end of each projection year.

Guidance Note: The amount in Subparagraph 2 above may be negative or positive.

3. Set the scenario reserve equal to the sum of the statement value of the starting assets across all model segments and the maximum of the amounts calculated in Subparagraph 2 above.

C. Rank the scenario reserves from lowest to highest.

D. Calculate CTE 70.

E. Determine any additional amount needed to capture any material risk included in the scope of these requirements but not already reflected in the cash-flow models using an appropriate and supportable method and supporting rationale.

F. Add the CTE amount (D) plus any additional amount (E) less the positive or negative PIMR balance allocated to the group of one or more policies being modeled under Section 7.D.6.

G. The stochastic reserve equals the amount determined in Subsection 5.F. If the company includes policies from two or more product groups in a subgroup for aggregation purposes as described in Section 5.A, the company shall calculate the stochastic reserve for policies from each product group on a stand-alone basis by following the process of A through F above.

Section 6: Stochastic and Deterministic Exclusion Tests

A. Stochastic Exclusion Test

1. Requirements to pass the stochastic exclusion test:

a. Groups of policies pass the stochastic exclusion test if one of the following is met:

i. Annually and within 12 months before the valuation date the company demonstrates that the groups of policies pass the stochastic exclusion ratio test defined in Section 6.A.2.

ii. In the first year and at least once every three calendar years thereafter, the company provides a demonstration in the PBR Actuarial Report as specified in Section 6.A.3.

iii. For groups of policies other than variable life or ULSG, in the first year and at least every third calendar year thereafter the company provides a certification by a qualified actuary that the group of policies is not subject to material interest rate risk or asset return volatility risk (i.e., the risk on non-fixed-income investments having substantial volatility of returns such as common stocks and real estate investments). The

company shall provide the certification and documentation supporting the certification to the commissioner upon request.

Guidance Note: The qualified actuary should develop documentation to support the actuarial certification that presents his or her analysis clearly and in detail sufficient for another actuary to understand the analysis and reasons for the actuary's conclusion that the group of policies is not subject to material interest rate risk or asset return volatility risk. Examples of methods a qualified actuary could use to support the actuarial certification include, but are not limited to:

a) A demonstration that reserves for the group of policies calculated according to Section 5 – Section 9 of VM-05, VM-A and VM-C are at least as great as the assets required to support the group of policies using the company's cash-flow testing model under each of the 16 scenarios identified in Section 6 or alternatively each of the New York seven scenarios.

b) A demonstration that the group of policies passed the stochastic exclusion ratio test within 36 months prior to the valuation date and the company has not had a material change in its interest rate risk.

c) A qualitative risk assessment of the group of policies that concludes that the group of policies does not have material interest rate risk or asset return volatility. Such assessment would include an analysis of product guarantees, the company's NGE policy, assets backing the group of policies and the company's investment strategy.

b. A company may not exclude a group of policies for which there is one or more clearly defined hedging strategies from stochastic reserve requirements.

2. Stochastic Exclusion Ratio Test

a. In order to exclude a group of policies from the stochastic reserve requirements using the method allowed under Section 6.A.1.a, a company shall demonstrate that the ratio of (b–a)/c is less than 6.0% where:

i. a = the adjusted deterministic reserve described in Subsection 6.A.2.b.i using the baseline economic scenario described in Appendix 1.

ii. b = the largest adjusted deterministic reserve described in Subsection 6.A.2.b.i under any of the other 15 economic scenarios described in Appendix 1.

iii. c = an amount calculated from the baseline economic scenario described in Appendix 1 that represents the present value of benefits for the policies, adjusted for reinsurance by subtracting ceded benefits. For clarity, premium, ceded premium, expense, reinsurance expense allowance, modified coinsurance reserve adjustment and reinsurance experience refund cash flows shall not be considered "benefits," but items such as death benefits, surrender or withdrawal benefits and policyholder dividends shall be. For this purpose, the company shall use the benefits cash flows from the calculation of quantity "a" and calculate

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the present value of those cash flows using the same path of discount rates as used for "a."

b. In calculating the ratio in item "a" above:

i. The company shall calculate an adjusted deterministic reserve for the group of policies for each of the 16 scenarios that is equal to either (a) or (b) below:

a) The deterministic reserve defined in Section 4.A, but with the following differences:

1) Using anticipated experience assumptions with no margins.

2) Using the interest rates and equity return assumptions specific to each scenario.

3) Using NAER and discount rates defined in Section 7.H specific to each scenario to discount the cash flows.

b) The gross premium reserve developed from the cash flows from the company's asset adequacy analysis models, using the experience assumptions of the company's cash-flow analysis, but with the following differences:

1) Using the interest rates and equity return assumptions specific to each scenario.

2) Using the methodology to determine NAER and discount rates defined in Section 7.H specific to each scenario to discount the cash flows, but using the company's cash-flow testing assumptions for default costs and reinvestment earnings.

ii. The company shall use the most current available baseline economic scenario and the 15 other economic scenarios published by the NAIC. The methodology for creating these scenarios can be found in Appendix 1 of this VM-20.

iii. The company shall use assumptions within each scenario that are dynamically adjusted as appropriate for consistency with each tested scenario.

iv. The company may not group together contract types with significantly different risk profiles for purposes of calculating this ratio.

v. Mortality improvement beyond the projection start date may not be reflected in the mortality assumption for the purpose of the calculating the stochastic exclusion ratio.

c. If the ratio calculated in paragraph (a) above is less than 6% pre-yearly renewable term (YRT) reinsurance, but is greater than 6% post-YRT reinsurance, the group of policies will still pass the Stochastic Exclusion Ratio Test (SERT) if

the company can demonstrate that the sensitivity of the adjusted deterministic reserve to economic scenarios is comparable pre- and post-YRT reinsurance.

i. An example of an acceptable demonstration:

a) For convenience in notation • SERT = the ratio (b–a)/c defined in (a) above

1) The pre-YRT reinsurance results are "gross of YRT," with a subscript "gy," so denoted $SERT_{gy}$

2) The post-YRT results are "net of YRT," with subscript "ny," so denoted $SERT_{ny}$

b) If a block of business being tested is subject to one or more YRT reinsurance cessions as well as other forms of reinsurance, such as coinsurance, take "gross of YRT" to mean net of all non-YRT reinsurance but ignoring the YRT contract(s), and "net of YRT" to mean net of *all* reinsurance contracts. That is, treat YRT reinsurance as the last reinsurance in, and compute certain values below with and without that last component.

c) So, if $SERT_{gy} \leq 0.060$ but $SERT_{ny} > 0.060$, then compute the largest percent increase in reserve (LPIR) = (b–a)/a, both "gross of YRT" and "net of YRT."

$LPIR_{gy} = (b_{gy} – a_{gy})/a_{gy}$

$LPIR_{ny} = (b_{ny} – a_{ny})/a_{ny}$

Note that the scenario underlying b_{gy} could be different from the scenario underlying b_{ny}.

If $SERT_{gy} \times LPIR_{ny}/LPIR_{gy} < 0.060$, then the block of policies passes the SERT.

ii. Another more qualitative approach is to calculate the adjusted deterministic reserves for the 16 scenarios both gross and net of reinsurance to demonstrate that there is a similar pattern of sensitivity by scenario.

3. Stochastic Exclusion Demonstration Test

a. In order to exclude a group of policies from the stochastic reserve requirements using the method as allowed under Section 6.A.1.a.ii above, the company must provide a demonstration in the PBR Actuarial Report in the first year and at least once every three calendar years thereafter that complies with the following:

i. The demonstration shall provide a reasonable assurance that if the stochastic reserve was calculated on a stand-alone basis for the group of policies subject to the stochastic reserve exclusion, the minimum reserve for those groups of policies would not increase. The demonstration shall take into account whether changing conditions over the current and two subsequent calendar years would be likely to change the conclusion to exclude the group of policies from the stochastic reserve requirements.

ii. If, as of the end of any calendar year, the company determines the minimum reserve for the group of policies no longer adequately provides for all material risks, the exclusion shall be discontinued and the company fails the SERT for those policies.

iii. The demonstration may be based on analysis from a date that proceeds the initial or subsequent exclusion period.

iv. The demonstration shall provide an effective evaluation of the residual risk exposure remaining after risk mitigation techniques such as derivative programs and reinsurance.

b. The company may use one of the following or another method acceptable to the commissioner to demonstrate compliance with Subsection 6.A.3.a:

i. Demonstrate that the greater of [the quantity A and the quantity B] is greater than the stochastic reserve calculated on a stand-alone basis, where:

A = the deterministic reserve, and

B = the NPR less any associated due and deferred premium asset.

ii. Demonstrate that the greater of [the quantity A and the quantity B] is greater than the scenario reserve that results from each of a sufficient number of adverse deterministic scenarios, where:

A = the deterministic reserve, and

B = the NPR less any associated due and deferred premium asset.

iii. Demonstrate that the greater of [the quantity A and the quantity B] is greater than the stochastic reserve calculated on a stand-alone basis, but using a representative sample of policies in the stochastic reserve calculations, where:

A = the deterministic reserve, and

B = the NPR less any associated due and deferred premium asset.

iv. Demonstrate that any risk characteristics that would otherwise cause the stochastic reserve calculated on a stand-alone basis to exceed greater of the deterministic reserve and the NPR, less any associated due and deferred premium asset, are not present or have been substantially eliminated through actions such as hedging, investment strategy, reinsurance or passing the risk on to the policyholder by contract provision.

B. Deterministic Exclusion Test

1. Scope of Products

a. A group of ULSG policies that does not meet the definition of a “non-material secondary guarantee” or a group of policies that is not excluded from the stochastic reserve requirement is deemed to not pass the deterministic reserve exclusion test, and the deterministic reserve must be computed for this group of

policies.

b. The Deterministic (Reserve) Exclusion Test (DET) may not be used for term insurance policies subject to Section 3.A.1., and these policies may not be excluded from the deterministic reserve requirements of Section 4.

2. Except as provided in Subsection 6.B.1, a group of policies passes the DET if the company demonstrates that the sum of the valuation net premiums for all future years for the group of policies, determined according to paragraph 5 below, is less than the sum of the corresponding ~~anticipated~~ guaranteed gross premiums for such policies. The test shall be determined on a direct or assumed basis.

3. A company may not group together policies of different contract types with significantly different risk profiles for purposes of the calculation in Subsection 6.B.2.

4. If a group of policies being tested is no longer adding new issues, and the test has been passed for three consecutive years, the group passes until determined otherwise. For this group, the test must be computed at least once each five years going forward.

5. For purposes of determining the valuation net premiums used in the demonstration in subsection 6.B.2:

a. If pursuant to Section 2 the NPR is the minimum reserve required under Section 2.A of the Standard Valuation Law for policies issued prior to the operative date of the *Valuation Manual*, the valuation net premiums are determined according to those minimum reserve requirements;

b. If the net premium reserve is determined according to Section 3.A.1, the lapse rates assumed for all durations are 0%;

c. policies with guaranteed gross premium patterns that subject the policy to shock lapses, as defined in Section 3.C.3.b.iii, the valuation net premiums comparison to the guaranteed gross premiums indicated in paragraph 2 shall be performed considering only the initial premium period;

d. If the anticipated mortality for the group of policies exceeds the valuation mortality, then the company shall use the anticipated mortality to determine the net premium. For this purpose, mortality shall be measured as the present value of future death claims discounted at the valuation interest rate used for the net premium reserve.

e. The guaranteed gross premium is defined as:

i. For universal life policies, the guaranteed gross premium shall be the premium specified in the contract, or if no premium is specified, the level annual gross premium at issue that would keep the policy in force for the entire period coverage is to be provided based on the policy guarantees of mortality, interest and expenses; and

ii. For policies other than universal life policies, the guaranteed gross premium shall be the guaranteed premium specified in the contract.

Section 7: Cash-Flow Models

A. Model Structure

1. The company shall design and use a cash-flow model that:

   a. Complies with applicable ASOPs in developing cash-flow models and projecting cash flows.

   b. Uses model segments consistent with the company's asset segmentation plan, investment strategies or approach used to allocate investment income for statutory purposes. Assets of segments that cover policies both subject to and not subject to these requirements may be allocated as defined in Section 7.D.1.b.

   c. Assigns each policy subject to these requirements to only one model segment and shall use a separate cash-flow model for each model segment.

   d. Projects cash flows for a period that extends far enough into the future so that no obligations remain.

2. The company may use simplifications or modeling efficiency techniques to develop cash flows, if the approach is consistent with Section 2.G.

> **Guidance Note:** For example, it may be reasonable to assume 100% deaths or 100% surrenders after some appropriate period of time.

B. General Description of Cash-Flow Projections

1. For the deterministic reserve and for each scenario for the stochastic reserve, the company shall project cash flows ignoring federal income taxes and reflecting the dynamics of the expected cash flows for the entire model segment. The company shall reflect the effect of all material product features, both guaranteed and non-guaranteed. The company shall project cash flows including the following:

   a. Revenues received by the company including gross premiums received from the policyholder (including any due premiums as of the projected start date).

   > **Guidance Note:** To be consistent with quantity B defined in Section 2.A.2 and Section 2.A.3, and quantity B defined in Section 6.A.3.b., all due premiums as of the projection start date are assumed to be collected after the projection start date, but the company needs to determine an assumption as to the timing of when the due premiums will be received.

   b. All material benefits projected to be paid to policyholders, including but not limited to death claims, surrender benefits and withdrawal benefits, reflecting the impact of all material guarantees and adjusted to take account of amounts projected to be charged to account values on general account business.

   > **Guidance Note:** Amounts charged to account values on general account business are not revenue; examples include cost of insurance and expense charges.

   c. NGE cash flows as described in Section 7.C.

   d. Net cash flows between the general account and separate account for variable products.

Guidance Note: Cash flows going out from the general account to the separate account increase the reserve, and cash flows coming in to the general account from the separate account decrease the reserve. Examples include allocation of net premiums to the separate account, policyholder-initiated transfers between fixed and variable investment options, transfers of separate account values to pay death or withdrawal benefits, and amounts charged to separate account values for cost of insurance, expense, etc.

e. Insurance company expenses (including overhead expenses), commissions, fund expenses, contractual fees and charges, and taxes (excluding federal income taxes and expenses paid to provide fraternal benefits in lieu of federal income taxes), as described in Section 9.E.

f. Revenue-sharing income received by the company (net of applicable expenses) and other applicable revenue and fees associated with the policies and adjusting the revenue to reflect the uncertainty of revenue-sharing income that is not guaranteed, as described in Section 9.G.

g. Net cash flows associated with any reinsurance as described in Section 8.

h. Cash flows from derivative liability and derivative asset programs, as described in Section 7.K.

i. Cash receipts or disbursements associated with invested assets (other than policy loans) as described in Section 7.F., including investment income, realized capital gains and losses, principal repayments, asset default costs, investment expenses, asset prepayments, and asset sales.

j. If modeled explicitly, cash flows related to policy loans as described in Section 7.F.3.b., including interest income, new loan payments and principal repayments.

Guidance Note: Because the projection of cash flows reflect premium mode directly, deferred premiums are zero under this approach.

2. In determining the deterministic reserve and stochastic reserve, the company may perform the cash-flow projections for each policy in force on the date of valuation or by grouping policies using modeling efficiency techniques. If such techniques are used, the company shall develop the groups in a manner consistent with Section 2.G.

C. NGE Cash Flows

1. Except as noted in Subsection 7.C.5, the company shall include NGE in the models to project future cash flows beyond the time the company has authorized their payment or crediting.

2. The projected NGE shall reflect factors that include, but are not limited to, the following (not all of these factors will necessarily be present in all situations):

a. The nature of contractual guarantees.

b. The company's past NGE practices and established NGE policies.

c. The timing of any change in NGE relative to the date of recognition of a change in experience.

d. The benefits and risks to the company of continuing to authorize NGE.

3. Projected NGE shall be established based on projected experience consistent with how actual NGE are determined.

4. Projected levels of NGE in the cash-flow model must be consistent with the experience assumptions used in each scenario. Policyholder behavior assumptions in the model must be consistent with the NGE assumed in the model.

5. The company may exclude any portion of an NGE that:

a. Is not based on some aspect of the policy's or contract's experience.

b. Is authorized by the board of directors and documented in the board minutes, where the documentation includes the amount of the NGE that arises from other sources.

However, if the board has guaranteed a portion of the NGE into the future, the company must model that amount (unless excluded by Subsection 7.C.6). In other words, the company cannot exclude from its model any NGE that the board has guaranteed for future years, even if it could have otherwise excluded them, based on this subsection.

6. The liability for policyholder dividends declared but not yet paid that has been established according to statutory accounting principles as of the valuation date is reported separately from the statutory reserve. The policyholder dividends that give rise to this dividend liability as of the valuation date may or may not be included in the cash-flow model at the company's option.

a. If the policyholder dividends that give rise to the dividend liability are not included in the cash-flow model, then no adjustment is needed to the resulting aggregate modeled (whether deterministic or stochastic) reserve.

b. If the policyholder dividends that give rise to the dividend liability are included in the cash-flow model, then the resulting aggregate modeled (whether stochastic or deterministic) reserve should be reduced by the amount of the dividend liability.

D. Starting Assets

1. For each model segment, the company shall select starting assets such that the aggregate annual statement value of the assets at the projection start date equals the estimated value of the modeled reserve plus the PIMR balance on the projection start date, allocated to the policies in the appropriate model segment subject to the following:

a. Starting asset values shall include the relevant balance of any due, accrued or unearned investment income.

b. For an asset portfolio that supports both policies that are subject and not subject to these requirements, the company shall determine an equitable method to apportion the total amount of starting assets between the subject and non-subject policies.

2. If for all model segments combined, the aggregate annual statement value of starting assets is less than 98% or greater than the larger of NPR or 102% of the final modeled reserve, the company shall provide documentation in the PBR Actuarial Report that provides reasonable assurance that the modeled reserve is not materially understated as a result of the estimate of the amount of starting assets.

3. The company shall select starting assets for each model segment that consists of the following:

   a. All separate account assets supporting the policies.

   b. All policy loans supporting the policies that are explicitly modeled under Section 7.F.3.b.

   c. All derivative instruments held at the projection start date that are part of a derivative program and can be appropriately allocated to the model segment.

   d. An amount of other general account assets such that the aggregate value of starting assets meets the requirements in Section 7.D.1. These assets shall generally be selected on a consistent basis from one reserve valuation to the next. Any material change in the selection methodology shall be documented in the PBR Actuarial Report.

4. The aggregate value of general account starting assets is the sum of the amounts in Subsection 7.D.3.b through Subsection 7.D.3.d above.

Guidance Note: The aggregate value of general account assets in Subsection 7.D.4 may be negative. This may occur, for example, for model segments in which a substantial portion of policyholder funds are allocated to separate accounts. The assets in Subsection 7.D.3.d above may include negative assets or short-term borrowing, resulting in a projected interest expense.

5. The company shall calculate the projected values of starting assets in a manner consistent with their values at the start of the projection.

6. Under Section 4 and Section 5, any PIMR balance allocated to the group of one or more policies being modeled at the projection start date is included in the calculations of the respective reserves. The determination of the PIMR allocation is subject to the following:

   a. The amount of PIMR allocable to each model segment is the approximate statutory interest maintenance reserve liability that would have developed for the model segment assuming applicable capital gains taxes are excluded. The allocable PIMR may be either positive or negative.

   b. In performing the allocation to each model segment, the company shall use a reasonable approach to allocate any portion of the total company balance that is disallowable under statutory accounting procedures (i.e., when the total company balance is an asset rather than a liability).

   c. The company may use a simplified approach to allocate the PIMR, if the impact of the PIMR on the minimum reserve is minimal.

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E. Reinvestment Assets and Disinvestment

1. At the valuation date and each projection interval as appropriate, model the purchase of general account reinvestment assets with available cash and net asset and liability cash flows in a manner that is representative of and consistent with the company's investment policy for each model segment, subject to the following requirements:

a. The model investment strategy may incorporate a representation of the actual investment policy that ranges from relatively complex to relatively simple. In any case, the PBR Actuarial Report shall include documentation supporting the appropriateness of the representation relative to actual investment policy.

Guidance Note: A complex model representation may include, for example, illiquid or callable assets whereas a simple model representation may involve mapping of more complex assets to combinations of, for example, public non-callable corporate bonds, U.S. Treasuries and cash.

b. The final maturities and cash-flow structures of assets purchased in the model, such as the patterns of gross investment income and principal repayments or a fixed or floating rate interest basis, shall be determined by the company as part of the model representation.

c. The combination of price and structure for fixed income investments and derivative instruments associated with fixed income investments shall appropriately reflect the then-current U.S. Department of the Treasury (Treasury) curve along the relevant scenario and the requirements for gross asset spread assumptions stated below.

d. For purchases of public non-callable corporate bonds, use the gross asset spreads over Treasuries prescribed in Section 9.F. (For purposes of this subsection, "public" incorporates both registered and 144a securities.) The prescribed spreads reflect current market conditions as of the model start date and grade to long-term conditions based on historical data at the start of projection year four.

e. For transactions of derivative instruments associated with fixed income investments, reflect the prescribed assumptions in Section 9.F for interest rate swap spreads.

f. For purchases of other fixed income investments, if included in the model investment strategy, set assumed gross asset spreads over Treasuries in a manner that is consistent with, and results in reasonable relationships to, the prescribed spreads for public non-callable corporate bonds and interest rate swaps.

g. Notwithstanding the above requirements, the model investment strategy and/or any non-prescribed asset spreads shall be adjusted as necessary so that the modeled reserve is not less than would be obtained by substituting an alternative investment strategy in which all fixed income reinvestment assets are public non-callable corporate bonds with gross asset spreads, asset default costs and investment expenses by projection year that are consistent with a credit quality blend of 50% PBR credit rating 6 (A2/A) and 50% PBR credit rating 3 (Aa2/AA). The following pertain to this requirement:

Policy loans, equities and derivative instruments associated with the execution of a clearly defined hedging strategy (in compliance with Section 7.L) are not affected by this requirement.

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Guidance Note: In many cases, particularly if the model investment strategy does not involve callable assets, it is expected that the demonstration of compliance will not require running the reserve calculation twice. For example, an analysis of the weighted average net reinvestment spread on new purchases by projection year (gross spread minus prescribed default costs minus investment expenses) of the model investment strategy compared to the weighted average net reinvestment spreads by projection year of the alternative strategy may suffice. The assumed mix of asset types, asset credit quality or the levels of non-prescribed spreads for other fixed income investments may need to be adjusted to achieve compliance.

2. Model at each projection interval any disinvestment in a manner that is consistent with the company's investment policy and that reflects the company's cost of borrowing where applicable. Gross asset spreads used in computing market values of assets sold in the model shall be consistent with, but not necessarily the same as, the gross asset spreads in Section 7.E.1.d and Section 7.E.1.f above, recognizing that starting assets may have different characteristics than modeled reinvestment assets.

3. Determine the values of reinvestment assets at the valuation date and each projection interval in a manner consistent with the values of starting assets that have similar investment characteristics.

F. Cash Flows from Invested Assets

The company shall determine cash flows from invested assets, including starting and reinvestment assets, as follows:

1. Determine cash flows for each projection interval for general account fixed income assets, including derivative asset programs associated with these assets, as follows:

   a. Model gross investment income and principal repayments in accordance with the contractual provisions of each asset and in a manner consistent with each scenario. Grouping of assets is allowed if the company can demonstrate that grouping does not materially understate the modeled reserve more than would have been obtained using a seriatim approach.

   b. Reflect asset default costs as prescribed in Section 9.F and anticipated investment expenses through deductions to the gross investment income.

   c. Model the proceeds arising from modeled asset sales and determine the portion representing any realized capital gains and losses.

   Guidance Note: Examples of general account fixed income assets include public bonds, convertible bonds, preferred stocks, private placements, asset backed securities, commercial mortgage loans, residential mortgage loans, mortgage backed securities and collateralized mortgage obligations.

   d. Reflect any uncertainty in the timing and amounts of asset cash flows related to the paths of interest rates, equity returns or other economic values directly in the projection of asset cash flows. Asset defaults are not subject to this requirement since asset default assumptions must be determined by the prescribed method in Section 9.F.

2. Determine cash flows for each projection interval for general account equity assets (i.e., non-fixed income investments having substantial volatility of returns such as common stocks and real estate investments), including derivative programs associated with these assets, as follows:

   a. Determine the grouping for equity asset categories (e.g., large cap stocks, international stocks, owned real estate, etc.) and the allocation of specific assets to each category as described in Section 7.I.

   b. Project the gross investment return including realized and unrealized capital gains for each investment category in a manner that is consistent with the prescribed general account equity return described in Section 7.G.

   c. Model the timing of an asset sale in a manner that is consistent with the investment policy of the company for that type of asset. Reflect expenses through a deduction to the gross investment return using prudent estimate assumptions.

3. Determine cash flows for each projection interval for policy loan assets by modeling existing loan balances either explicitly or by substituting assets that are a proxy for policy loans (e.g., bonds, cash, etc.) subject to the following:

   a. If the company substitutes assets that are a proxy for policy loans, the company must demonstrate that such substitution:

      i. Produces reserves that are no less than those that would be produced by modeling existing loan balances explicitly.

      ii. Complies with the policyholder behavior requirements stated in Section 9.D.

   b. If the company models policy loans explicitly, the company shall:

      i. Treat policy loan activity as an aspect of policyholder behavior and subject to the requirements of Section 9.D.

      ii. For both the deterministic reserve and the stochastic reserve, assign loan balances either to exactly match each policy's utilization or to reflect average utilization over a model segment or sub-segments.

      iii. Model policy loan interest in a manner consistent with policy provisions and with the scenario. In calculating the deterministic reserve and stochastic reserve, include interest paid in cash as a positive policy loan cash flow in that projection interval, per Section 4.A.4, but do not include interest added to the loan balance as a policy loan cash flow. (The increased balance will require increased repayment cash flows in future projection intervals.)

      iv. Model policy loan principal repayments, including those that occur automatically upon death or surrender. In calculating the deterministic reserve and the stochastic reserve, include policy loan principal repayments as a positive policy loan cash flow, per Section 4.A.4.

      v. Model additional policy loan principal. In calculating the deterministic and stochastic reserve, include additional policy loan principal as a negative policy loan cash flow, per Section 4.A.4.

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vi. Model any investment expenses allocated to policy loans and include them either with policy loan cash flows or insurance expense cash flows.

4. Determine cash flows for each projection interval for all other general account assets by modeling asset cash flows on other assets that are not described in Subsection 7.F.1 through Subsection 7.F.3 using methods consistent with the methods described in Subsection 7.F.1 and Subsection 7.F.2. This includes assets that are a hybrid of fixed income and equity investments.

5. Determine cash flows or total investment returns as appropriate for each projection interval for all separate account assets as follows:

a. Determine the grouping for each variable fund and subaccount (e.g., bonds funds, large cap stocks, international stocks, owned real estate, etc.) as described in Section 7.J.

b. Project the total investment return for each variable fund and subaccount in a manner that is consistent with the prescribed returns described in Section 7.G.

G. Economic Scenarios

1. Deterministic Economic Scenarios

a. For purposes of calculating the deterministic reserve under Section 4, the company shall use:

i. Treasury interest rate curves following Scenario 12 from the set of prescribed scenarios used in the stochastic exclusion ratio test defined in Section 6.A.2; and

ii. Total investment return paths for general account equity assets and separate account fund performance consistent with the total investment returns for corresponding investment categories contained in Scenario 12 from the set of prescribed scenarios used in the stochastic exclusion ratio test defined in Section 6.A.2.

b. The company shall map each of the proxy funds defined in Section 7.I and Section 7.J to the prescribed fund returns defined in Section 7.G.1.a following the mapping process described in Section 7.G.2.b.

c. The Scenario 12 interest rate yield curves and total investment returns are based on approximately a one standard deviation shock to the economic conditions as of the projection start date, where the shock is spread uniformly over the first 20 years of the projection. The values in Scenario 12 are based on the same generator that is used for the stochastic scenarios, as described in Appendix 1.

2. Stochastic Economic Scenarios

a. For purposes of calculating the stochastic reserve under Section 4, the company shall use:

i. Treasury interest rate curves following the prescribed economic scenario generator with prescribed parameters, as described in Appendix 1; and

ii. Total investment return paths for general account equity assets and separate account fund performance generated from a prescribed economic scenario generator with prescribed parameters, as described in Appendix 1.

> **Guidance Note:** It is expected that the prescribed generator will produce prescribed returns for several different investment categories (similar to the 19 categories provided by Academy for C3P2): Treasuries at different tenors, money market/short-term investments, U.S. Intermediate Term Government Bonds, U.S. Long-Term Corporate Bonds, Diversified Fixed Income, Diversified Balanced Allocation, Diversified Large Capitalized U.S. Equity, Diversified International Equity, Intermediate Risk Equity, and Aggressive or Specialized Equity).

b. The company shall map each of the proxy funds defined in Section 7.I and Section 7.J to the prescribed fund returns defined in Section 7.G.2.a. This mapping process may involve blending the accumulation factors from two or more of the prescribed fixed income and/or equity returns to create the projected returns for each proxy fund. If a proxy fund cannot be appropriately mapped to some combination of the prescribed returns, the company shall determine an appropriate return and disclose the rationale for determining such return.

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Guidance Note: Mapping of the returns on the proxy funds to the prescribed funds returns is left to the judgment of the qualified actuary to whom responsibility for this group of policies is assigned, but the returns so generated must be consistent with the prescribed returns. This does not imply a strict functional relationship between the model parameters for various markets/funds, but it would generally be inappropriate to assume that a market or fund consistently "outperforms" (lower risk, higher expected return relative to the efficient frontier) over the long term.

When parameters are fit to historic data without consideration of the economic setting in which the historic data emerged, the market price of risk may not be consistent with a reasonable long-term model of market equilibrium. One possibility for establishing "consistent" parameters (or scenarios) across all funds would be to assume that the market price of risk is constant (or nearly constant) and governed by some functional (e.g., linear) relationship. That is, higher expected returns can be garnered only by assuming greater risk. (For example, the standard deviation of log returns is often used as a measure of risk.)

Specifically, two return distributions X and Y would satisfy the following relationship:

$$\text{Market Price of Risk} = \left(\frac{E[R_X]-r}{\sigma_X}\right) = \left(\frac{E[R_Y]-r}{\sigma_Y}\right)$$

Where $E[R]$ and σ are, respectively, the (unconditional) expected returns and volatilities, and r is the expected risk-free rate over a suitably long holding period commensurate with the projection horizon. One approach to establish consistent scenarios would set the model parameters to maintain a near-constant market price of risk.

A closely related method would assume some form of "mean-variance" efficiency to establish consistent model parameters. Using the historic data, the mean-variance (alternatively, "drift-volatility") frontier could be constructed from a plot of (mean, variance) pairs from a collection of world market indices. The frontier could be assumed to follow some functional form (quadratic polynomials and logarithmic functions tend to work well) with the coefficients determined by standard curve fitting or regression techniques. Recognizing the uncertainty in the data, a "corridor" could be established for the frontier. Model parameters then would be adjusted to move the proxy market (fund) inside the corridor.

Clearly, there are many other techniques that could be used to establish consistency between the return on the proxy funds and the prescribed returns. While appealing, the above approaches do have drawbacks, and the actuary should not be overly optimistic in determining the fund returns.

c. Use of fewer scenarios rather than a higher number of scenarios is permissible as a model efficiency technique provided that:

i. The smaller set of scenarios is generated using the prescribed scenario generator.

ii. The use of the technique is consistent with Section 2.G.

d. The number of scenarios required to comply with Section 2.G will depend on the specific nature of the company's assets and liabilities and may change from time to time. Compliance with Section 2.G would ordinarily be tested by comparing scenario reserves of a simpler model or a representative subset of policies, run using the reduced scenario set, with the scenario reserves of the same subset or simpler model run using the larger scenario set.

e. Companies also shall perform a periodic analysis of the impact of using a different number of scenarios on the stochastic reserve, noting the difference in results as the number of scenarios is increased. Again, an appropriate subset of the entire in-force block can be used for this analysis.

H. Determination of NAER and Discount Rates

1. In calculating the deterministic reserve, under Section 4A, the company shall determine a path of NAER for each model segment that reflects the net general account portfolio rate in each projection interval (i.e., monthly, quarterly, annually) in compliance with Section 7, which will depend primarily on:

   a. Projected net investment earnings from the portfolio of starting assets.

   b. Pattern of projected asset cash flows from the starting assets and subsequent reinvestment assets.

   c. Pattern of net liability cash flows.

   d. Projected net investment earnings from reinvestment assets.

2. The company shall calculate the NAER as the ratio of net investment earnings divided by invested assets subject to the requirements in a through e below. All items reflected in the ratio are consistent with statutory asset valuation and accrual accounting, including reflection of due, accrued or unearned investment income where appropriate.

   a. The impact of separate accounts and policy loans is excluded.

   b. The NAER for each projection interval is calculated in a manner that is consistent with the timing of cash flows and length of the projection interval of the related cash-flow model.

   c. Net investment earnings include:

      i. Gross investment income plus capital gains and losses, minus prescribed default costs as defined in Section 9.F, and minus investment expenses.

      ii. Income from derivative asset programs.

   d. Invested assets are determined in a manner that is consistent with the timing of cash flows within the cash-flow model and the length of the projection interval of the cash-flow model.

   e. The annual statement value of derivative instruments or a reasonable approximation thereof is in invested assets.

      All items reflected in the ratio are consistent with statutory asset valuation and accrual accounting, including reflection of due, accrued or unearned investment income where appropriate.

Guidance Note: Section 7.A.2 permits the use of modeling efficiency techniques to calculate the deterministic reserve and stochastic reserve. This availability for simplification includes ways to determine appropriate NAER. Small to intermediate size companies, or any size company with smaller blocks of business, have options to create NAER with modeling efficiency techniques if the results are consistent with Section 2.G.

3. The company shall use the path of NAER as the discount rates for each model segment in the deterministic reserve calculations in Section 4A.

4. The company shall use the path of one-year Treasury interest rates in effect at the beginning of each projection year multiplied by 1.05 for each model segment within each scenario as the discount rates in the stochastic reserve calculations in Section 5.

Guidance Note: The use of different discount rate paths for the deterministic and scenario reserves is driven by differences in methodology. The deterministic reserve is based on a present value of all liability cash flows, with the discount rates reflecting the investment returns of the assets backing the liabilities. The scenario reserve is based on a starting estimate of the reserve and assets that support that estimate, plus the greatest present value of accumulated deficiencies. Here, the discount rates are a standard estimate of the investment returns of only the marginal assets needed to eliminate either a positive or negative deficiency.

I. Grouping of Equity Investments in the General Account

1. The company may group the portion of the general account starting assets that are equity investments (e.g., common stocks, real estate investments) for modeling using an approach that establishes various equity investment categories with each investment category defined to reflect the different types of equity investments in the portfolio.

2. The company shall design a proxy for each equity investment category in order to develop the investment return paths and map each investment category to an appropriately crafted proxy investment category normally expressed as a linear combination of recognized market indices (or sub-indices). The company shall include an analysis in the proxy construction process that establishes a firm relationship between the investment return on the proxy and the specific equity investment category.

J. Grouping of Variable Funds and Subaccounts for Separate Accounts

1. Similar to the approach used for general account equity investments, the company may group the portion of the starting asset amount held in the separate account represented by the variable funds and the corresponding account values for modeling using an approach that recognizes the investment guidelines and objectives of the funds.

2. Similar to the approach used for general account equity investments, the company shall design an appropriate proxy for each variable subaccount in order to develop the investment return paths and map each variable account to an appropriately crafted proxy fund normally expressed as a linear combination of recognized market indices (or sub-indices). The company shall include an analysis in the proxy construction process that establishes a firm relationship between the investment return on the proxy and the specific variable funds.

K. Modeling of Derivative Programs

1. When determining the deterministic reserve and the stochastic reserve, the company shall include in the projections the appropriate costs and benefits of derivative instruments that are currently held by the company in support of the policies subject to these requirements. The company shall also include the appropriate costs and benefits of anticipated future derivative instrument transactions associated with the execution of a clearly defined hedging strategy, as well as the appropriate costs and benefits of anticipated future derivative instrument transactions associated with non-hedging derivative programs (e.g., replication, income generation) undertaken as part of the investment strategy supporting the policies, provided they are normally modeled as part of the company's risk assessment and evaluation processes.

Guidance Note: The prohibition in these modeled reserve requirements against projecting future hedging transactions other than those associated with a clearly defined hedging strategy is intended to address initial concerns expressed by various parties that reserves could be unduly reduced by reflection of programs whose future execution and performance may have greater uncertainty. The prohibition appears, however, to be in conflict with Principle 2 listed in the *Valuation Manual*. Companies may actually execute and reflect in their risk assessment and evaluation processes hedging strategies similar in many ways to clearly defined hedging strategies but lack sufficient clarity in one or more of the qualification criteria. By excluding the associated derivative instruments, the investment strategy that is modeled may also not reflect the investment strategy the company actually uses. Further, because the future hedging transactions may be a net cost to the company in some scenarios and a net benefit in other scenarios, the exclusion of such transactions can result in a modeled reserve that is either lower or higher than it would have been if the transactions were not excluded. The direction of such impact on the reserves could also change from period to period as the actual and projected paths of economic conditions change. A more graded approach to recognition of non-qualifying hedging strategies may be more theoretically consistent with Principle 2. The requirements stated here for handling hedging strategies are essentially consistent with those included in the CTE methodology of VM-21. It is recommended that as greater experience is gained by actuaries and regulators with the principle-based approach and as industry hedging programs mature, the various requirements of this section be reviewed.

2. For each derivative program that is modeled, the company shall reflect the company's established investment policy and procedures for that program; project expected program performance along each scenario; and recognize all benefits, residual risks and associated frictional costs. The residual risks include, but are not limited to: basis, gap, price, parameter estimation and variation in assumptions (mortality, persistency, withdrawal, etc.). Frictional costs include, but are not limited to: transaction, margin (opportunity costs associated with margin requirements) and administration. For clearly defined hedging strategies, the company may not assume that residual risks and frictional costs have a value of zero, unless the company demonstrates in the PBR Actuarial Report that "zero" is an appropriate expectation.

3. In circumstances where one or more material risk factors related to a derivative program are not fully captured within the cash-flow model used to calculate CTE 70, the company shall reflect such risk factors by increasing the stochastic reserve as described in Section 5.E.

Guidance Note: The previous two paragraphs address a variety of possible situations. Some hedging programs may truly have zero or minimal residual risk exposure, such as when the hedge program exactly replicates the liability being hedged. With dynamic hedging strategies, residual risks are typically expected; however, in some cases the cash-flow model supporting the CTE calculation may be able to adequately reflect such risks through margins in program assumptions, adjustments to costs and benefits, etc. In other cases, reference to additional external models or analyses may be necessary where such results cannot be readily expressed in a format directly amenable to a CTE calculation. In such cases, the company will need to combine the results of such models by some method that is consistent with the objectives of these requirements. Emerging actuarial practice will be relied on to provide approaches for a range of situations that may be encountered.

Guidance Note: Statutes, laws or regulations of any state or jurisdiction related to the use of derivative instruments for hedging purposes supersede these provisions. Therefore, these provisions should not be used to determine whether a company is permitted to use such instruments in any state or jurisdiction.

L. Clearly Defined Hedging Strategy

1. A clearly defined hedging strategy must identify:

   a. The specific risks being hedged (e.g., cash flow, policy interest credits, delta, rho, vega, etc.).

   b. The hedge objectives.

   c. The risks that are not hedged (e.g., variation from expected mortality, withdrawal, and other utilization or decrement rates assumed in the hedging strategy, etc.).

   d. The financial instruments used to hedge the risks.

   e. The hedge trading rules, including the permitted tolerances from hedging objectives.

   f. The metrics for measuring hedging effectiveness.

   g. The criteria used to measure effectiveness.

   h. The frequency of measuring hedging effectiveness.

   i. The conditions under which hedging will not take place.

   j. The person or persons responsible for implementing the hedging strategy.

   k. Areas where basis, gap or assumption risk related to the hedging strategy have been identified.

   l. The circumstances under which hedging strategy will not be effective in hedging the risks.

2. A clearly defined hedging strategy may be dynamic, static, or a combination of dynamic and static.

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3. Hedging strategies involving the offsetting of the risks associated with other products outside of the scope of these requirements is not a clearly defined hedging strategy.

Guidance Note: For purposes of the above criteria, "effectiveness" need not be measured in a manner as defined in *SSAP No. 86—Derivatives* in the AP&P Manual.

Section 8: Reinsurance

A. General Considerations

1. In this section, reinsurance includes retrocession and assuming company includes retrocessionaire.

Guidance Note: In determining reserves, one party to a reinsurance transaction may make use of reserve calculations of the other party. In this situation, if the company chooses assumptions that differ from those used by the other party, the company must either rerun the reserve calculation or be prepared to demonstrate that appropriate adjustments to the other party's calculations have been made.

2. The company shall assume that the laws and regulations in place as of the valuation date regarding credit for reinsurance remain in effect throughout the projection period.

3. A company shall include a reinsurance agreement or amendment in calculating the minimum reserve if, under the terms of the AP&P Manual, the agreement or amendment qualifies for credit for reinsurance.

4. If a reinsurance agreement or amendment does not qualify for credit for reinsurance, but treating the reinsurance agreement or amendment as if it did so qualify would result in a reduction to the company's surplus, then the company shall increase the minimum reserve by the absolute value of such reductions in surplus.

Guidance Note: Section 8.A.3 provides that, in general, if a treaty does not meet the requirements for credit for reinsurance, it should not be allowed to reduce the reserve. Thus, it should not be allowed a reinsurance credit to the NPR, and its cash flows should not be included in the cash-flow models used to calculate the deterministic or stochastic reserve. Section 8.A.4 introduces the exception that if allowing a net premium credit and including the treaty cash flows in the cash-flow models would produce a more conservative result, then that more conservative result should prevail.

B. Determination of a Credit to the NPR to Reflect Reinsurance Ceded

1. Determination of the credit to the net premium reserve to reflect reinsurance shall be done in accordance with *SSAP No. 61R—Life, Deposit-Type and Accident and Health Reinsurance* in the AP&P Manual.

Guidance Note: The credit taken under a coinsurance arrangement shall be calculated using the same methodology and assumptions used in determining its NPR, but only for the percentage of the risk that was reinsured. If the reinsurance is on a YRT basis, the credit shall be calculated using the assumptions used in determining the NPR, but for the net amount at risk.

2. If a company cedes a portion of a policy under more than one reinsurance agreement, then the company shall calculate a credit separately for each such agreement. The credit for reinsurance ceded for the policy shall be the sum of the credits for all such agreements.

3. The credit for reinsurance ceded applied to a group of policies shall be the sum of the credit for reinsurance ceded for each of the policies of the group.

C. Reflection of Reinsurance Cash Flows in the Deterministic Reserve or Stochastic Reserve

In calculations of the deterministic reserve or stochastic reserve pursuant to Section 4 and Section 5:

1. The company shall use assumptions and margins that are appropriate for each company pursuant to a reinsurance agreement. In such instance, the ceding and assuming companies are not required to use the same assumptions and margins for the reinsured policies.

2. To the extent that a single deterministic valuation assumption for risk factors associated with certain provisions of reinsurance agreements will not adequately capture the risk, the company shall do one of the following:

   a. Stochastically model the risk factors directly in the cash-flow model when calculating the stochastic reserve.

   b. Perform a separate stochastic analysis outside the cash-flow model to quantify the impact on reinsurance cash flows to and from the company. The company shall use the results of this analysis to adjust prudent estimate assumptions or to determine an amount to adjust the stochastic reserve to adequately make provision for the risks of the reinsurance features.

   Guidance Note: An example of reinsurance provisions where a single deterministic valuation assumption will not adequately capture the risk is stop-loss reinsurance.

3. The company shall determine cash flows for reinsurance ceded subject to the following:

   a. The company shall include the effect of projected cash flows received from or paid to assuming companies under the terms of ceded reinsurance agreements in the cash flows used in calculating the deterministic reserve in Section 4 and stochastic reserves in Section 5.

   b. If cash flows received from or paid to assuming companies under the terms of any reinsurance agreement are dependent upon cash flows received from or paid to assuming companies under other reinsurance agreements, the company shall first determine reinsurance cash flows for reinsurance agreements with no such dependency and then use the reinsurance cash flows from these independent agreements to determine reinsurance cash flows for the remaining dependent agreements.

   c. The company shall use assumptions to project cash flows to and from assuming companies that are consistent with other assumptions used by the company in calculating the deterministic or stochastic reserve for the reinsured policies and that reflect the terms of the reinsurance agreements.

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4. The company shall determine cash flows for reinsurance assumed subject to the following:

   a. The company shall include the effect of cash flows projected to be received from and paid to ceding companies under the terms of assumed reinsurance agreements in the cash flows used in calculating the deterministic reserve in Section 4 and the stochastic reserve in Section 5.

   b. If cash flows received from or paid to ceding companies under the terms of any reinsurance agreement are dependent upon cash flows received from or paid to ceding companies under other reinsurance agreements, the company shall first determine reinsurance cash flows for reinsurance agreements with no such dependency and then use the reinsurance cash flows from these independent agreements to determine reinsurance cash flows for the remaining dependent agreements.

5. If a company assumes a policy under more than one reinsurance agreement, then the company may treat each agreement separately for the purposes of calculating the reserve.

6. An assuming company shall use assumptions to project cash flows to and from ceding companies that reflect the assuming company's experience for the business segment to which the reinsured policies belong, and reflect the terms of the reinsurance agreement.

7. The company shall assume that the counterparties to a reinsurance agreement are knowledgeable about the contingencies involved in the agreement and likely to exercise the terms of the agreement to their respective advantage, taking into account the context of the agreement in the entire economic relationship between the parties. In setting assumptions for the NGE in reinsurance cash flows, the company shall include, but not be limited to, the following:

   a. The usual and customary practices associated with such agreements.

   b. Past practices by the parties concerning the changing of terms, in an economic environment similar to that projected.

   c. Any limits placed upon either party's ability to exercise contractual options in the reinsurance agreement.

   d. The ability of the direct-writing company to modify the terms of its policies in response to changes in reinsurance terms.

   e. Actions that might be taken by a party if the counterparty is in financial difficulty.

8. The company shall account for any actions that the ceding company and, if different, the direct-writing company have taken or are likely to take that could affect the expected cash flows of the reinsured business in determining assumptions for the modeled reserve.

Guidance Note: Examples of actions the direct-writing company could take include: 1) instituting internal replacement programs or special underwriting programs, both of which could change expected mortality rates; or 2) changing NGE in the reinsured policies, which could affect mortality, policyholder behavior, and possibly expense and investment assumptions. Examples of actions the ceding company could take include: 1) the exercise of contractual options in a reinsurance agreement to influence the setting of NGEs in the reinsured policies; or 2) the ability to participate in claim decisions.

9. For actions taken by the ceding company, and, if different, the direct-writing company, set assumptions in a manner consistent with Section 9.D. Note that these assumptions are in addition to, rather than in lieu of, assumptions as to the behavior of the underlying policyholders.

10. The company shall use assumptions in determining the modeled reserve that account for any actions that the assuming company has taken or is likely to take that could affect the expected cash flows of the reinsured business.

Guidance Note: Examples of such actions include, but are not limited to, changes to the current scale of reinsurance premiums and changes to expense allowances.

11. The company shall consider all elements of a reinsurance agreement that the assuming company can change, and assumptions for those elements are subject to the requirements in Section 7.C. Appropriate assumptions for these elements may depend on the scenario being tested. The company shall take into account all likely consequences of the assuming company changing an element of the reinsurance agreement, including any potential impact on the probability of recapture by the ceding company.

Guidance Note: The ability of an assuming company to change elements of a reinsurance agreement, such as reinsurance premiums or expense allowances, may be thought of as comparable to the ability of a direct-writing company to change NGE on policies.

12. The company shall set assumptions in a manner consistent with Subsection 8.C.8, taking into account any ceding company option to recapture reinsured business. Appropriate assumptions may depend on the scenario being tested (analogous to interest-sensitive lapses).

Guidance Note: The right of a ceding company to recapture is comparable to policyholder surrender options for a direct-writing company. Cash flows associated with recapture include recapture fees or other termination settlements.

13. The company shall set assumptions in a manner consistent with Subsection 8.C.10, taking into account an assuming company's right to terminate in-force reinsurance business. In the case in which the assuming company's right to terminate is limited to cases of non-payment of amounts due by the ceding company or other specific, limited circumstances, the company may assume that the termination option would be expected to have insignificant value to either party and, therefore, may exclude recognition of this right to terminate in the cash-flow projections. However, if a reinsurance agreement contains other termination provisions with material impact, the company shall set appropriate assumptions for these provisions consistent with the particular scenario being tested.

14. If under the terms of the reinsurance agreement, some of the assets supporting the reserve are held by the counterparty or by another party, the company shall:

a. Consider the following in order to determine whether to model such assets for purposes of projecting cash flows:

i. The degree of linkage between the portfolio performance and the calculation of the reinsurance cash flows.

ii. The sensitivity of the valuation result to the asset portfolio performance.

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

c. If the company determines that modeling is necessary, comply with the requirements in Section 7.E and Section 9.F, taking into account:

i. The investment strategy of the company holding the assets, as codified in the reinsurance agreement or otherwise based on current documentation provided by that company.

ii. Actions that may be taken by either party that would affect the net reinsurance cash flows (e.g., a conscious decision to alter the investment strategy within the guidelines).

Guidance Note: In some situations, it may not be necessary to model the assets held by the other party. An example would be modeling by an assuming company of a reinsurance agreement containing provisions, such as experience refund provisions, under which the cash flows and effective investment return to the assuming company are the same under all scenarios.

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

15. If a ceding company has knowledge that an assuming company is financially impaired, the ceding company shall establish a margin for the risk of default by the assuming company. In the absence of knowledge that the assuming company is financially impaired, the ceding company is not required to establish a margin for the risk of default by the assuming company.

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16. If an assuming company has knowledge that a ceding company is financially impaired, the assuming company shall establish a margin for the risk of default by the ceding company. Such margin may be reduced or eliminated if the assuming company has a right to terminate the reinsurance upon non-payment by the ceding company. In the absence of knowledge that a ceding company is financially impaired, the assuming company is not required to establish a margin for the risk of default by the ceding company.

17. In setting any margins required by Subsection 8.C.15 and Subsection 8.C.16 to reflect potential uncertainty regarding the receipt of cash flows from a counterparty, the company shall take into account the ratings, RBC ratio or other available information related to the probability of the risk of default by the counterparty, as well as any security or other factor limiting the impact on cash flows.

D. Determination of a Pre-Reinsurance-Ceded Minimum Reserve

1. The minimum reserve pursuant to Section 2 is a post-reinsurance-ceded minimum reserve. The company also shall calculate a pre-reinsurance-ceded reserve as specified in D.2 below, for financial statement purposes where such a pre-reinsurance-ceded amount is required. Similarly, where a reserve credit for reinsurance may be required, the credit for reinsurance ceded shall be the excess, if any, of the pre-reinsurance-ceded minimum reserve over the post-reinsurance-ceded minimum reserve. Note that due allowance for reasonable approximations may be used where appropriate.

2. The pre-reinsurance-ceded minimum reserve shall be calculated pursuant to the requirements of this *Valuation Manual* VM-20, using methods and assumptions consistent with those used in calculating the minimum reserve, but excluding the effect of ceded reinsurance.

a. If, when ceded reinsurance is excluded, a group of policies is not able to pass the exclusion tests pursuant to Section 6, then the required deterministic or stochastic reserves shall be calculated in determining the pre-reinsurance-ceded minimum reserve, even if not required for the minimum reserve.

b. The company shall use assumptions that represent company experience in the absence of reinsurance—for example, assuming that the business was managed in a manner consistent with the manner that retained business is managed—when computing such reserves.

c. The requirement in Section 7.D.2 regarding the 98% to 102% collar does apply when determining the amount of starting assets excluding the effect of ceded reinsurance.

Section 9: Assumptions

A. General Assumption Requirements

1. The company shall use prudent estimate assumptions in compliance with this section for each risk factor that is not prescribed or is not stochastically modeled by applying a margin to the anticipated experience assumption for the risk factor.

2. The company shall establish the prudent estimate assumption for each risk factor in compliance with the requirements in Section 12 of the Standard Valuation Law and must periodically review and update the assumptions as appropriate in accordance with these requirements.

3. The company shall model the following risk factors stochastically unless the company elects the stochastic modeling exclusion defined in Section 6:

   a. Interest rate movements (i.e., Treasury interest rate curves).

   b. Equity performance (e.g., Standard & Poor's 500 index [S&P 500] returns and returns of other equity investments).

4. If the company elects to stochastically model risk factors in addition to those listed in A.3 above, the requirements in this section for determining prudent estimate assumptions for these risk factors do not apply.

5. In determining the stochastic reserve, the company shall use prudent estimate assumptions that are consistent with those prudent estimate assumptions used for determining the deterministic reserve, modified as appropriate to reflect the effects of each scenario.

6. The company shall use its own experience, if relevant and credible, to establish an anticipated experience assumption for any risk factor. To the extent that company experience is not available or credible, the company may use industry experience or other data to establish the anticipated experience assumption, making modifications as needed to reflect the circumstances of the company.

   a. For risk factors (such as mortality) to which statistical credibility theory may be appropriately applied, the company shall establish anticipated experience assumptions for the risk factor by combining relevant company experience with industry experience data, tables or other applicable data in a manner that is consistent with credibility theory and accepted actuarial practice.

   b. For risk factors (such as premium patterns on flexible premium contracts) that do not lend themselves to the use of statistical credibility theory, and for risk factors (such as the current situation with some lapse assumptions) to which statistical credibility theory can be appropriately applied but cannot currently be applied due to lack of industry data, the company shall establish anticipated experience assumptions in a manner that is consistent with accepted actuarial practice and that reflects any available relevant company experience, any available relevant industry experience, or any other experience data that are available and relevant. Such techniques include:

      i. Adopting standard assumptions published by professional, industry or regulatory organizations to the extent they reflect any available relevant company experience or reasonable expectations.

      ii. Applying factors to relevant industry experience tables or other relevant data to reflect any available relevant company experience and differences in expected experience from that underlying the base tables or data due to differences between the risk characteristics of the company experience and the risk characteristics of the experience underlying the base tables or data.

      iii. Blending any available relevant company experience with any available relevant industry experience and/or other applicable data using weightings established in a manner that is consistent with accepted actuarial practice and that reflects the risk characteristics of the underlying policies and/or company practices.

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c. For risk factors that have limited or no experience or other applicable data to draw upon, the assumptions shall be established using sound actuarial judgment and the most relevant data available, if such data exists.

d. For any assumption that is set in accordance with the requirements of Section 9.A.6.c, the qualified actuary to whom responsibility for this group of policies is assigned, shall use sensitivity testing and disclose the analysis performed to ensure that the assumption is set at the conservative end of the plausible range.

The qualified actuary, to whom responsibility for this group of policies is assigned, shall annually review relevant emerging experience for the purpose of assessing the appropriateness of the anticipated experience assumption. If the results of statistical or other testing indicate that previously anticipated experience for a given factor is inadequate, then the qualified actuary shall set a new, adequate, anticipated experience assumption for the factor.

7. The company shall examine the results of sensitivity testing to understand the materiality of prudent estimate assumptions on the modeled reserve. The company shall update the sensitivity tests periodically as appropriate, considering the materiality of the results of the tests. The company may update the tests less frequently when the tests show less sensitivity of the modeled reserve to changes in the assumptions being tested or the experience is not changing rapidly. Providing there is no material impact on the results of the sensitivity testing, the company may perform sensitivity testing:

a. Using samples of the policies in force rather than performing the entire valuation for each alternative assumption set.

b. Using data from prior periods.

8. The company shall vary the prudent estimate assumptions from scenario to scenario within the stochastic reserve calculation in an appropriate manner to reflect the scenario-dependent risks.

B. Assumption Margins

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

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

If not stochastically modeled or prescribed, assumptions that are generally considered material include, but are not limited to, mortality, morbidity, interest, equity returns, expenses, lapses, partial withdrawals, loans and option elections.

2. The greater the uncertainty in the anticipated experience assumption, the larger the required margin, with the margin added or subtracted as needed to produce a larger modeled reserve than would otherwise result. For example, the company shall use a larger margin when:

   a. The experience data have less relevance or lower credibility.

   b. The experience data are of lower quality, such as incomplete, internally inconsistent, or not current.

   c. There is doubt about the reliability of the anticipated experience assumption, such as, but not limited to, recent changes in circumstances or changes in company policies.

   d. There are constraints in the modeling that limit an effective reflection of the risk factor.

3. In complying with the sensitivity testing requirements in Subsection A.7 above, greater analysis and more detailed justification are needed to determine the level of uncertainty when establishing margins for risk factors that produce greater sensitivity on the modeled reserve.

4. A margin is not required for assumptions when variations in the assumptions do not have a material impact on the modeled reserve.

5. A margin should reflect the magnitude of fluctuations in historical experience of the company for the risk factor, as appropriate.

6. The company shall apply the method used to determine the margin consistently on each valuation date, but is permitted to change the method from the prior year if the rationale for the change and the impact on modeled reserve is disclosed.

C. Mortality Assumptions

1. Procedure for Setting Prudent Estimate Mortality Assumptions

   a. The company shall determine mortality segments for the purpose of determining separate prudent estimate mortality assumptions for groups of policies that the company expects will have different mortality experience than other groups of policies (such as male vs. female, smoker vs. non-smoker, preferred vs. super-preferred vs. residual, etc.).

   b. For each mortality segment, the company shall establish prudent estimate mortality assumptions using the following procedure:

      i. Determine the company experience mortality rates as provided in Subsection 9.C.2. If company experience data is limited or not available, the company can use an applicable industry basic table in lieu of company experience as provided in Subsection 9.C.3.

      ii. If the company determines company experience mortality rates as provided in Subsection 9.C.2, then use the procedure described in Subsection 9.C.3 to determine the applicable industry table for each mortality segment to grade company experience to the industry table.

iii. Determine the level of credibility of the underlying company experience as provided in Subsection 9.C.4.

iv. Determine the prescribed mortality margins as provided in Subsection 9.C.5. Separate mortality margins are determined for company experience mortality rates and for the applicable industry basic tables.

v. Use the procedure described in Subsection 9.C.6 to determine the prudent estimate assumptions.

2. Determination of Company Experience Mortality Rates

a. For each mortality segment, the company shall determine company experience mortality rates derived from company experience data. If company experience data is not available or limited, the company can choose to use an applicable industry basic table in lieu of its own company experience, as provided in Subsection 9.C.3.

b. Company experience data shall be based on experience from the following sources:

i. Actual company experience for books of business within the mortality segment.

ii. Experience from other books of business within the company with similar underwriting.

iii. Experience data from other sources, if available and appropriate, such as actual experience data of one or more mortality pools in which the policies participate under the term of a reinsurance agreement. Data from other sources is appropriate if the source has underwriting and expected mortality experience characteristics that are similar to policies in the mortality segment.

c. The company experience mortality rates shall not be lower than the mortality rates the company expects to emerge, which the company can justify and which are disclosed in the PBR Actuarial Report.

d. When determining the company experience mortality rates for each mortality segment, the company can base the mortality on more aggregate experience and use other techniques to further subdivide the aggregate class into various subclasses or mortality segments (e.g., start with aggregate non-smoker then use the conservation of total deaths principle, normalization or other approach to divide the aggregate mortality into super preferred, preferred and residual standard non-smoker class assumptions). In doing so, the company must ensure that when the mortality segments are weighted together, the total number of expected claims is not less than the company experience data for the aggregate class.

e. The company shall review, and update as needed, the company experience data described in Subsection 9.C.2.b, whether based on actual experience or data from other sources, at least every three years. If updated experience becomes available prior to the end of three years since the last review or update, which alters the company's expected mortality for the mortality segments in a significant manner

and such impact is expected to continue into the future, the company shall reflect the changes implied by the updated data in the current year.

i. The company experience data for each mortality segment shall include the most recent experience study and shall include the in force and claim data pertaining to the study period for all policies currently in the mortality segment or that would have been in the mortality segment at any time during the period over which experience is being evaluated.

ii. The period of time used for the experience study should be at least three exposure years and should not exceed 10 exposure years.

f. The company may remove from the company experience data any policies for which the experience is reflected through adjustments to the prudent estimate assumptions as provided under Subsection 9.C.6.e below, including policies insuring impaired lives and those for which there is a reasonable expectation, due to conditions such as changes in premiums or other policy provisions, that policyholder behavior will lead to mortality results that vary significantly from those that would otherwise be expected.

The company may adjust the company experience rates for each mortality segment to reflect the expected incremental change due to the adoption of risk selection and underwriting practices different from those underlying the company experience data identified above, provided that:

i. The adjustments are supported by published medical or clinical studies or other published studies that correlate a specific risk selection criteria to mortality or longevity experience (for example, criterion and correlations determined through predictive analytics).

ii. The rationale and support for the use of the study and for the adjustments are disclosed in the PBR Actuarial Report.

Guidance Note: It is anticipated that the adjustment described in Subsection 9.C.2.f to experience will rarely be made. Since these adjustments are expected to be rare, and since it is difficult to anticipate the nature of these adjustments, the commissioner may wish to determine the level of documentation or analysis that is required to allow such adjustments. The NAIC may want to consider whether approval by a centralized examination office would be an acceptable alternative to approval by the commissioner.

g. Mortality improvement shall not be incorporated beyond the valuation date. However, historical mortality improvement from the central point of the underlying company experience data to the valuation date may be incorporated.

3. Determination of Applicable Industry Basic Tables

a. The industry basic table shall be based on the most recent VBT listed in VM-M Section 2, including the Primary, Limited Underwriting and RR Table forms, if available. The industry basic table used should be based on the table form that most appropriately reflects the risk characteristics of the respective mortality segment.

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b. A modified industry basic table is permitted in a limited number of situations where an industry basic table does not appropriately reflect the expected mortality experience, such as joint life mortality, simplified underwriting, or substandard or rated lives. In cases other than modification of the table to reflect joint life mortality, the modification must not result in mortality rates lower than those in the industry basic table without approval by the commissioner.

c. The company may apply the underwriting criteria scoring procedure described in Subparagraph d below to determine:

i. The industry basic table that can serve as the industry experience rates when company experience data is limited or not available.

ii. The applicable industry basic table for grading company experience mortality to industry experience mortality using the grading method described in Subsection 9.C.6.b.iii.

d. The underwriting criteria scoring procedure is the algorithm embedded in the Underwriting Criteria Score Calculator, adopted by the Life Actuarial (A) Task Force and maintained on the Society of Actuaries (SOA) website, (*www.soa.org/Research/Experience-Study/Ind-Life/Valuation/relativerisktool.aspx*), which is used to score every risk class in a preferred risk class structure. The scoring is based on the specific underwriting criteria used by a company.

i. In using the underwriting criteria scoring procedure to determine the appropriate industry basic table for a particular mortality segment, the company shall take into account factors that are not recognized in the underwriting scoring algorithm but are applicable to policies issued in that mortality segment.

> **Guidance Note:** Examples of such factors include the number of underwriting exceptions that are made, the quality and experience level of the underwriters, and characteristics of the distribution system. For example, if a company deviates from its preferred criteria on a regular basis, then it needs to take that into consideration since the underwriting criteria scoring procedure is not designed to quantify that risk.

ii. In using the underwriting criteria scoring procedure to determine the appropriate industry basic table for policies that are issued subject to simplified underwriting and policies that are issued without underwriting, the company shall take into account factors not recognized in the underwriting scoring algorithm but are applicable to such policies.

iii. In taking into account factors that are not recognized in the underwriting scoring algorithm, a company may, to the extent it can justify, adjust the industry basic tables up or down two tables from that determined by application of the underwriting criteria scoring procedures. Further adjustments to reflect risk characteristics not captured within the Underwriting Criteria Scoring (UCS) Tool may be allowed upon approval by the commissioner.

e. As an alternative to the UCS Tool, the company may use other actuarially sound methods to determine the applicable basic tables related to subdivisions of mortality segments. The company shall document the analysis performed to

demonstrate the applicability of the chosen method and resulting choice in tables and reasons why the results using the UCS Tool may not be suitable.

Guidance Note: For example, the company may determine a more all-inclusive basic table as a table appropriate for the whole mortality segment (appropriately modified by the removal of classified lives, term conversions or any other legitimately excludable class) and then subdivide that segment using actuarially sound methods including, but not limited to, the UCS.

f. If no industry basic table appropriately reflects the risk characteristics of the mortality segment, the company may use any well-established industry table that is based on the experience of policies having the appropriate risk characteristics in lieu of an industry basic table.

Guidance Note: Subsection 9.C.3.f above is intended to provide flexibility needed to handle products based on group-type mortality, etc., for which there might not be an industry basic table.

g. Mortality improvement shall not be incorporated beyond the valuation date. However, historical mortality improvement from the date of the industry basic table (e.g., 2015 for the 2015 VBT) to the valuation date may be incorporated using the improvement factors for the applicable industry basic table as determined by the SOA and published on the SOA website: *www.soa.org/Research/Experience-Study/Ind-Life/Valuation/research-mortality-improvement-2016.aspx*.

Guidance Note: The improvement factors for the industry basic table will be determined by the SOA. YYYY is the calendar year of valuation.

Guidance Note: The start date for the improvement factors to be applied to the industry basic tables differs from that used for determining company experience mortality rates as described in Subsection 9.C.2.g, as the industry basic tables have already been improved from the mid-point of the exposure period of the data underlying the table to the start date of the table—e.g., the 2015 VBT has already been improved from the mid-point of the underlying data supporting the table to 2015.

4. Credibility of Company Experience

a. For valuations in which the industry basic mortality table is the 2008 VBT, determine an aggregate level of credibility over the entire exposure period using a methodology to determine the level of credibility that follows common actuarial practice as published in actuarial literature (for example, but not limited to, the Limited Fluctuation Method or Bühlmann Empirical Bayesian Method).

For valuations in which the industry basic mortality table is the 2015 VBT, determine an aggregate level of credibility following either the Limited Fluctuation Method by amount, such that the minimum probability is at least 95% with an error margin of no more than 5% or Bühlmann Empirical Bayesian Method by amount. Once chosen, the credibility method must be applied to all business subject to VM-20 and requiring credibility percentages. A company seeking to change credibility methods must request and subsequently receive the approval of the commissioner. The request must include the justification for the change and a demonstration of the rationale supporting the change.

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The formula to determine the credibility level by amount under the Limited Fluctuation Method is as follows:

Limited Fluctuation $Z = \min\{1, rm/z\sigma\}$

Where,

r = error margin ≤ 5%

z = normal distribution quantile ≥ 95%

m = mortality ratio, i.e. actual to expected (A/E) ratio by amount

σ = standard deviation of the mortality ratio

The following formula can be used in conjunction with the 2015 VBT industry table to directly approximate the credibility based on the Buhlmann Empirical Bayesian Method:

$$\text{Bühlmann } Z = \frac{A}{A + \frac{(109\% * B) - (120.4\% * C)}{(0.019604 * A)}}$$

Where,

A = Sum of expected deaths by amount = Σ (amount insured) x (exposure) x (mortality)

B = Σ(amount insured)^2 x (exposure) x (mortality)

C = Σ(amount insured)^2 x (exposure)^2 x (mortality)^2

b. Credibility may be determined at either the mortality segment level or at a more aggregate level if the mortality for the sub-classes (mortality segments) was determined using an aggregate level of mortality experience.

A single level of credibility shall be determined over the entire exposure period, rather than for each duration, within the exposure period. This overall level of credibility will be used to:

ii. Determine the prescribed margin for company experience mortality rates.

iii. Determine the grading period (shown in column (1) in the table in Subsection 9.C.6.b.iii) for grading company experience mortality rates into the applicable industry basic table.

5. Prescribed Mortality Margins

a. Separate prescribed margins will be added to company experience mortality rates and to the applicable industry basic tables. The mortality margin shall be in the form of a prescribed percentage increase applied to each mortality rate.

b. The prescribed margin percentages for the company experience mortality rates will vary by attained age (att age), by the level of credibility of the underlying company experience, based on the level of credibility and the method used to

determine the credibility in Subsection 9.C.4. The percentages are given in the following tables. To determine the margin percentage for each table, round the credibility level amount to the nearest whole integer.

i. For valuations in which the industry mortality table is the 2008 VBT limited underwriting table:

Credibility Level

Att Age	0%–19%	20%–39%	40%–59%	60%–79%	80%–100%
<45	21.0%	13.7%	8.4%	6.3%	5.3%
46–47	20.0%	13.0%	8.0%	6.0%	5.0%
48–49	19.0%	12.4%	7.6%	5.7%	4.8%
50–51	18.0%	11.7%	7.2%	5.4%	4.5%
52–53	17.0%	11.1%	6.8%	5.1%	4.3%
54–55	16.0%	10.4%	6.4%	4.8%	4.0%
56–57	15.0%	9.8%	6.0%	4.5%	3.8%
58–59	14.0%	9.1%	5.6%	4.2%	3.5%
60–61	13.0%	8.5%	5.2%	3.9%	3.3%
62–63	12.0%	7.8%	4.8%	3.6%	3.0%
64–68	11.0%	7.2%	4.4%	3.3%	2.8%
69–76	10.0%	6.5%	4.0%	3.0%	2.5%
77+	9.0%	5.9%	3.6%	2.7%	2.3%

ii. For valuations in which the industry mortality table is the 2015 VBT and where the credibility is determined using the Bühlmann Empirical Bayesian Method by amount method:

Bühlmann Margins												
	Credibility Level											
Att Age	0%–7%	8%–12%	13%–17%	18%–22%	23%–27%	28%–32%	33%–37%	38%–42%	43%–47%	48%–52%	53%–57%	58%–62%
<47	20.4%	20.4%	20.4%	20.4%	20.0%	19.3%	18.6%	17.9%	17.1%	16.3%	15.5%	14.6%
46– 47	20.2%	20.2%	20.2%	20.2%	20.0%	19.3%	18.6%	17.9%	17.1%	16.3%	15.5%	14.6%
48– 49	20.0%	20.0%	20.0%	20.0%	19.7%	19.1%	18.4%	17.6%	16.9%	16.1%	15.3%	14.4%
50– 51	19.8%	19.8%	19.8%	19.8%	19.4%	18.8%	18.1%	17.4%	16.7%	15.9%	15.1%	14.2%
52– 53	19.6%	19.6%	19.6%	19.6%	19.1%	18.5%	17.8%	17.1%	16.4%	15.6%	14.8%	14.0%
54– 55	19.2%	19.2%	19.2%	19.2%	18.8%	18.2%	17.5%	16.8%	16.1%	15.4%	14.6%	13.7%
56– 57	18.9%	18.9%	18.9%	18.9%	18.5%	17.9%	17.2%	16.5%	15.8%	15.1%	14.3%	13.5%
58– 59	18.5%	18.5%	18.5%	18.5%	18.1%	17.5%	16.9%	16.2%	15.5%	14.8%	14.1%	13.2%
60– 61	18.2%	18.2%	18.2%	18.2%	17.8%	17.2%	16.5%	15.9%	15.2%	14.5%	13.8%	13.0%
62– 63	17.8%	17.8%	17.8%	17.8%	17.4%	16.8%	16.2%	15.6%	14.9%	14.2%	13.5%	12.7%
64– 65	17.4%	17.4%	17.4%	17.4%	17.0%	16.4%	15.8%	15.2%	14.6%	13.9%	13.2%	12.4%
66– 67	16.9%	16.9%	16.9%	16.9%	16.6%	16.0%	15.4%	14.8%	14.2%	13.5%	12.8%	12.1%
68– 69	16.5%	16.5%	16.5%	16.5%	16.2%	15.6%	15.0%	14.5%	13.8%	13.2%	12.5%	11.8%
70– 71	16.1%	16.1%	16.1%	16.1%	15.7%	15.2%	14.6%	14.1%	13.5%	12.8%	12.2%	11.5%
72– 73	15.6%	15.6%	15.6%	15.6%	15.3%	14.7%	14.2%	13.7%	13.1%	12.5%	11.8%	11.1%
74–75	15.1%	15.1%	15.1%	15.1%	14.8%	14.3%	13.8%	13.2%	12.7%	12.1%	11.5%	10.8%
76– 77	14.6%	14.6%	14.6%	14.6%	14.3%	13.8%	13.3%	12.8%	12.2%	11.7%	11.1%	10.4%
78– 79	14.1%	14.1%	14.1%	14.1%	13.8%	13.3%	12.8%	12.3%	11.8%	11.3%	10.7%	10.1%
80– 81	13.6%	13.6%	13.6%	13.6%	13.3%	12.8%	12.4%	11.9%	11.4%	10.8%	10.3%	9.7%
82– 83	13.0%	13.0%	13.0%	13.0%	12.7%	12.3%	11.9%	11.4%	10.9%	10.4%	9.9%	9.3%
84–85	12.5%	12.5%	12.5%	12.5%	12.2%	11.8%	11.4%	10.9%	10.4%	10.0%	9.4%	8.9%
86– 87	11.9%	11.9%	11.9%	11.9%	11.6%	11.2%	10.8%	10.4%	10.0%	9.5%	9.0%	8.5%
88–89	11.3%	11.3%	11.3%	11.3%	11.1%	10.7%	10.3%	9.9%	9.5%	9.0%	8.6%	8.1%
90– 91	10.7%	10.7%	10.7%	10.7%	10.5%	10.1%	9.7%	9.4%	9.0%	8.5%	8.1%	7.6%
92– 93	10.1%	10.1%	10.1%	10.1%	9.8%	9.5%	9.2%	8.8%	8.4%	8.0%	7.6%	7.2%
94– 95	9.4%	9.4%	9.4%	9.4%	9.2%	8.9%	8.6%	8.3%	7.9%	7.5%	7.1%	6.7%
96– 97	8.8%	8.8%	8.8%	8.8%	8.6%	8.3%	8.0%	7.7%	7.4%	7.0%	6.6%	6.3%
98–99	8.1%	8.1%	8.1%	8.1%	7.9%	7.7%	7.4%	7.1%	6.8%	6.5%	6.1%	5.8%
100–101	7.4%	7.4%	7.4%	7.4%	7.3%	7.0%	6.8%	6.5%	6.2%	5.9%	5.6%	5.3%
102–103	6.7%	6.7%	6.7%	6.7%	6.6%	6.3%	6.1%	5.9%	5.6%	5.4%	5.1%	4.8%
104–105	6.0%	6.0%	6.0%	6.0%	5.9%	5.7%	5.5%	5.2%	5.0%	4.8%	4.5%	4.3%
106 and over 107	5.3%	5.3%	5.3%	5.3%	5.1%	5.0%	4.8%	4.6%	4.4%	4.2%	4.0%	3.8%

Bühlmann Margins												
	Credibility Level											
Att Age	63%–67%	68%–72%	73%–77%	78%–82%	83%–87%	88%–89%	90%–91%	92%–93%	94%–95%	96%–97%	98%	99%+
<47	13.7%	12.7%	11.6%	10.3%	8.9%	8.0%	7.3%	6.5%	5.7%	4.6%	3.3%	2.3%
46–47	13.7%	12.7%	11.6%	10.3%	8.9%	8.0%	7.3%	6.5%	5.7%	4.6%	3.3%	2.3%
48–49	13.5%	12.5%	11.4%	10.2%	8.8%	7.9%	7.2%	6.4%	5.6%	4.6%	3.2%	2.3%
50–51	13.3%	12.3%	11.2%	10.0%	8.7%	7.8%	7.1%	6.4%	5.5%	4.5%	3.2%	2.2%
52–53	13.1%	12.1%	11.1%	9.9%	8.6%	7.7%	7.0%	6.3%	5.4%	4.4%	3.1%	2.2%
54–55	12.9%	11.9%	10.9%	9.7%	8.4%	7.5%	6.9%	6.1%	5.3%	4.3%	3.1%	2.2%
56–57	12.6%	11.7%	10.7%	9.5%	8.3%	7.4%	6.8%	6.0%	5.2%	4.3%	3.0%	2.1%
58–59	12.4%	11.5%	10.5%	9.4%	8.1%	7.3%	6.6%	5.9%	5.1%	4.2%	3.0%	2.1%
60–61	12.1%	11.2%	10.3%	9.2%	7.9%	7.1%	6.5%	5.8%	5.0%	4.1%	2.9%	2.1%
62–63	11.9%	11.0%	10.0%	9.0%	7.8%	7.0%	6.4%	5.7%	4.9%	4.0%	2.8%	2.0%
64–65	11.6%	10.8%	9.8%	8.8%	7.6%	6.8%	6.2%	5.6%	4.8%	3.9%	2.8%	2.0%
66–67	11.3%	10.5%	9.6%	8.6%	7.4%	6.6%	6.1%	5.4%	4.7%	3.8%	2.7%	1.9%
68–69	11.0%	10.2%	9.3%	8.3%	7.2%	6.5%	5.9%	5.3%	4.6%	3.7%	2.6%	1.9%
70–71	10.7%	9.9%	9.1%	8.1%	7.0%	6.3%	5.7%	5.1%	4.4%	3.6%	2.6%	1.8%
72–73	10.4%	9.7%	8.8%	7.9%	6.8%	6.1%	5.6%	5.0%	4.3%	3.5%	2.5%	1.8%
74–75	10.1%	9.4%	8.5%	7.6%	6.6%	5.9%	5.4%	4.8%	4.2%	3.4%	2.4%	1.7%
76–77	9.8%	9.0%	8.3%	7.4%	6.4%	5.7%	5.2%	4.7%	4.0%	3.3%	2.3%	1.7%
78–79	9.4%	8.7%	8.0%	7.1%	6.2%	5.5%	5.0%	4.5%	3.9%	3.2%	2.3%	1.6%
80–81	9.1%	8.4%	7.7%	6.9%	5.9%	5.3%	4.9%	4.3%	3.8%	3.1%	2.2%	1.5%
82–83	8.7%	8.1%	7.4%	6.6%	5.7%	5.1%	4.7%	4.2%	3.6%	2.9%	2.1%	1.5%
84–85	8.3%	7.7%	7.0%	6.3%	5.5%	4.9%	4.5%	4.0%	3.5%	2.8%	2.0%	1.4%
86–87	7.9%	7.4%	6.7%	6.0%	5.2%	4.7%	4.2%	3.8%	3.3%	2.7%	1.9%	1.3%
88–89	7.6%	7.0%	6.4%	5.7%	4.9%	4.4%	4.0%	3.6%	3.1%	2.6%	1.8%	1.3%
90–91	7.1%	6.6%	6.0%	5.4%	4.7%	4.2%	3.8%	3.4%	3.0%	2.4%	1.7%	1.2%
92–93	6.7%	6.2%	5.7%	5.1%	4.4%	3.9%	3.6%	3.2%	2.8%	2.3%	1.6%	1.1%
94–95	6.3%	5.8%	5.3%	4.8%	4.1%	3.7%	3.4%	3.0%	2.6%	2.1%	1.5%	1.1%
96–97	5.9%	5.4%	5.0%	4.4%	3.8%	3.4%	3.1%	2.8%	2.4%	2.0%	1.4%	1.0%
98–99	5.4%	5.0%	4.6%	4.1%	3.5%	3.2%	2.9%	2.6%	2.2%	1.8%	1.3%	0.9%
100–101	5.0%	4.6%	4.2%	3.7%	3.2%	2.9%	2.6%	2.4%	2.1%	1.7%	1.2%	0.8%
102–103	4.5%	4.2%	3.8%	3.4%	2.9%	2.6%	2.4%	2.1%	1.9%	1.5%	1.1%	0.8%
104–105	4.0%	3.7%	3.4%	3.0%	2.6%	2.3%	2.1%	1.9%	1.7%	1.4%	1.0%	0.7%
106 and over 107	3.5%	3.3%	3.0%	2.7%	2.3%	2.1%	1.9%	1.7%	1.5%	1.2%	0.8%	0.6%

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iii. For valuations in which the industry mortality table is the 2015 VBT and where the credibility is determined using the Limited Fluctuation Method:

Proposed Limited Fluctuation Margins										
	Credibility Level									
Att Age	0%–7%	8%–12%	13%–17%	18%–22%	23%–27%	28%–32%	33%–37%	38%–42%	43%–47%	48%–52%
<45	20.4%	20.4%	17.4%	15.9%	14.5%	13.2%	12.1%	11.0%	10.0%	9.1%
46–47	20.2%	20.2%	17.4%	15.9%	14.5%	13.2%	12.1%	11.0%	10.0%	9.1%
48–49	20.0%	20.0%	17.2%	15.7%	14.3%	13.0%	11.9%	10.8%	9.9%	9.0%
50–51	19.8%	19.8%	17.0%	15.5%	14.1%	12.9%	11.7%	10.7%	9.7%	8.9%
52–53	19.6%	19.6%	16.7%	15.2%	13.9%	12.7%	11.5%	10.5%	9.6%	8.7%
54–55	19.2%	19.2%	16.4%	15.0%	13.6%	12.4%	11.3%	10.3%	9.4%	8.6%
56–57	18.9%	18.9%	16.1%	14.7%	13.4%	12.2%	11.1%	10.2%	9.3%	8.5%
58–59	18.5%	18.5%	15.8%	14.4%	13.1%	12.0%	10.9%	10.0%	9.1%	8.3%
60–61	18.2%	18.2%	15.5%	14.1%	12.9%	11.7%	10.7%	9.8%	8.9%	8.1%
62–63	17.8%	17.8%	15.2%	13.8%	12.6%	11.5%	10.5%	9.6%	8.7%	8.0%
64–65	17.4%	17.4%	14.8%	13.5%	12.3%	11.2%	10.2%	9.3%	8.5%	7.8%
66–67	16.9%	16.9%	14.5%	13.2%	12.0%	11.0%	10.0%	9.1%	8.3%	7.6%
68–69	16.5%	16.5%	14.1%	12.8%	11.7%	10.7%	9.7%	8.9%	8.1%	7.4%
70–71	16.1%	16.1%	13.7%	12.5%	11.4%	10.4%	9.5%	8.6%	7.9%	7.2%
72–73	15.6%	15.6%	13.3%	12.1%	11.1%	10.1%	9.2%	8.4%	7.7%	7.0%
74–75	15.1%	15.1%	12.9%	11.8%	10.7%	9.8%	8.9%	8.1%	7.4%	6.8%
76–77	14.6%	14.6%	12.5%	11.4%	10.4%	9.5%	8.6%	7.9%	7.2%	6.5%
78–79	14.1%	14.1%	12.0%	11.0%	10.0%	9.1%	8.3%	7.6%	6.9%	6.3%
80–81	13.6%	13.6%	11.6%	10.6%	9.6%	8.8%	8.0%	7.3%	6.7%	6.1%
82–83	13.0%	13.0%	11.1%	10.1%	9.2%	8.4%	7.7%	7.0%	6.4%	5.8%
84–85	12.5%	12.5%	10.6%	9.7%	8.8%	8.1%	7.4%	6.7%	6.1%	5.6%
86–87	11.9%	11.9%	10.1%	9.2%	8.4%	7.7%	7.0%	6.4%	5.8%	5.3%
88–89	11.3%	11.3%	9.6%	8.8%	8.0%	7.3%	6.7%	6.1%	5.5%	5.1%
90–91	10.7%	10.7%	9.1%	8.3%	7.6%	6.9%	6.3%	5.7%	5.2%	4.8%
92–93	10.1%	10.1%	8.6%	7.8%	7.1%	6.5%	5.9%	5.4%	4.9%	4.5%
94–95	9.4%	9.4%	8.0%	7.3%	6.7%	6.1%	5.6%	5.1%	4.6%	4.2%
96–97	8.8%	8.8%	7.5%	6.8%	6.2%	5.7%	5.2%	4.7%	4.3%	3.9%
98–99	8.1%	8.1%	6.9%	6.3%	5.7%	5.2%	4.8%	4.4%	4.0%	3.6%
100–101	7.4%	7.4%	6.3%	5.8%	5.3%	4.8%	4.4%	4.0%	3.6%	3.3%
102–103	6.7%	6.7%	5.7%	5.2%	4.8%	4.3%	4.0%	3.6%	3.3%	3.0%
104–105	6.0%	6.0%	5.1%	4.7%	4.3%	3.9%	3.5%	3.2%	2.9%	2.7%
106 and over 107	5.3%	5.3%	4.5%	4.1%	3.7%	3.4%	3.1%	2.8%	2.6%	2.4%

Proposed Limited Fluctuation Margins									
	Credibility Level								
Att Age	53%–57%	58%–62%	63%–67%	68%–72%	73%–77%	78%–82%	83%–87%	88%–92%	93%–100%
<45	8.3%	7.6%	6.9%	6.3%	5.8%	5.3%	4.8%	4.4%	4.0%
46–47	8.3%	7.6%	6.9%	6.3%	5.8%	5.3%	4.8%	4.4%	4.0%
48–49	8.2%	7.5%	6.8%	6.2%	5.7%	5.2%	4.7%	4.3%	3.9%
50–51	8.1%	7.4%	6.7%	6.1%	5.6%	5.1%	4.7%	4.2%	3.9%
52–53	8.0%	7.3%	6.6%	6.0%	5.5%	5.0%	4.6%	4.2%	3.8%
54–55	7.8%	7.2%	6.5%	5.9%	5.4%	4.9%	4.5%	4.1%	3.8%
56–57	7.7%	7.0%	6.4%	5.8%	5.3%	4.9%	4.4%	4.0%	3.7%
58–59	7.6%	6.9%	6.3%	5.7%	5.2%	4.8%	4.3%	4.0%	3.6%
60–61	7.4%	6.8%	6.2%	5.6%	5.1%	4.7%	4.3%	3.9%	3.5%
62–63	7.2%	6.6%	6.0%	5.5%	5.0%	4.6%	4.2%	3.8%	3.5%
64–65	7.1%	6.5%	5.9%	5.4%	4.9%	4.5%	4.1%	3.7%	3.4%
66–67	6.9%	6.3%	5.7%	5.2%	4.8%	4.4%	4.0%	3.6%	3.3%
68–69	6.7%	6.1%	5.6%	5.1%	4.7%	4.2%	3.9%	3.5%	3.2%
70–71	6.6%	6.0%	5.4%	5.0%	4.5%	4.1%	3.8%	3.4%	3.1%
72–73	6.4%	5.8%	5.3%	4.8%	4.4%	4.0%	3.7%	3.3%	3.0%
74–75	6.2%	5.6%	5.1%	4.7%	4.3%	3.9%	3.5%	3.2%	2.9%
76–77	6.0%	5.4%	5.0%	4.5%	4.1%	3.8%	3.4%	3.1%	2.9%
78–79	5.8%	5.2%	4.8%	4.4%	4.0%	3.6%	3.3%	3.0%	2.8%
80–81	5.5%	5.0%	4.6%	4.2%	3.8%	3.5%	3.2%	2.9%	2.6%
82–83	5.3%	4.8%	4.4%	4.0%	3.7%	3.4%	3.1%	2.8%	2.5%
84–85	5.1%	4.6%	4.2%	3.9%	3.5%	3.2%	2.9%	2.7%	2.4%
86–87	4.8%	4.4%	4.0%	3.7%	3.4%	3.1%	2.8%	2.5%	2.3%
88–89	4.6%	4.2%	3.8%	3.5%	3.2%	2.9%	2.6%	2.4%	2.2%
90–91	4.4%	4.0%	3.6%	3.3%	3.0%	2.7%	2.5%	2.3%	2.1%
92–93	4.1%	3.7%	3.4%	3.1%	2.8%	2.6%	2.4%	2.2%	2.0%
94–95	3.8%	3.5%	3.2%	2.9%	2.7%	2.4%	2.2%	2.0%	1.8%
96–97	3.6%	3.3%	3.0%	2.7%	2.5%	2.3%	2.1%	1.9%	1.7%
98–99	3.3%	3.0%	2.7%	2.5%	2.3%	2.1%	1.9%	1.7%	1.6%
100–101	3.0%	2.8%	2.5%	2.3%	2.1%	1.9%	1.7%	1.6%	1.4%
102–103	2.7%	2.5%	2.3%	2.1%	1.9%	1.7%	1.6%	1.4%	1.3%
104–105	2.4%	2.2%	2.0%	1.9%	1.7%	1.5%	1.4%	1.3%	1.2%
106 and over 107	2.1%	2.0%	1.8%	1.6%	1.5%	1.4%	1.2%	1.1%	1.0%

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c. The prescribed margin percentages for the applicable industry basic tables will vary by attained age and are as follows:

i. For valuations in which the industry mortality table is the 2008 VBT limited underwriting table:

Mortality Margin Table

Attained Age	Load	Attained Age	Load
< 40	21%	65	11%
40	21%	66	11%
41	21%	67	11%
42	21%	68	11%
43	21%	69	10%
44	21%	70	10%
45	21%	71	10%
46	20%	72	10%
47	20%	73	10%
48	19%	74	10%
49	19%	75	10%
50	18%	76	10%
51	18%	77	9%
52	17%	78	9%
53	17%	79	9%
54	16%	80	9%
55	16%	81	9%
56	15%	82	9%
57	15%	83	9%
58	14%	84	9%
59	14%	85	9%
60	13%	86	9%
61	13%	87	9%
62	12%	88	9%
63	12%	89	9%
64	11%	90	9%

ii. For valuations in which the industry table is the 2015 VBT:

Mortality Margin (Loading) for Industry Table			
Attained Age	**Load**	**Attained Age**	**Load**
0–45	20.4%	76–77	14.6%
46–47	20.2%	78–79	14.1%
48–49	20.0%	80–81	13.6%
50–51	19.8%	82–83	13.0%
52–53	19.6%	84–85	12.5%
54–55	19.2%	86–87	11.9%
56–57	18.9%	88–89	11.3%
58–59	18.5%	90–91	10.7%
60–61	18.2%	92–93	10.1%
62–63	17.8%	94–95	9.4%
64–65	17.4%	96–97	8.8%
66–67	16.9%	98–99	8.1%
68–69	16.5%	100–101	7.4%
70–71	16.1%	102–103	6.7%
72–73	15.6%	104–105	6.0%
74–75	15.1%	106 and over	5.3%

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d. The prescribed margin percentages shall be increased, as appropriate, to reflect the level of uncertainty related to situations, including, but not limited to, the following:

i. The reliability of the company's experience studies is low due to imprecise methodology, length of time since the data was updated or other reasons.

ii. The length of time since the experience data was updated.

iii. The underwriting or risk selection risk criteria associated with the mortality segment have changed since the experience on which the company experience mortality rates are based was collected.

iv. The data underlying the company experience mortality rates lack homogeneity.

v. Unfavorable environmental or health developments are unfolding and are expected to have a material and sustained impact on the insured population.

vi. Changes to the company's marketing or administrative practices or market forces expose the policies to the risk of anti-selection.

Guidance Note: For example, the secondary market for life insurance policies.

vii. Underwriting is less effective than expected.

6. Process to Determine Prudent Estimate Assumptions

a. If applicable industry basic tables are used in lieu of company experience, the prudent estimate assumptions for each mortality segment shall equal the respective mortality rates in the applicable industry basic tables as provided in Subsection 9.C.3, plus the prescribed margin as provided in Subsection 9.C.5.c.

b. If the company determines company experience mortality rates, the prudent estimate assumptions will be determined as follows:

i. For each mortality segment, use the company experience mortality rates (as defined in Subsection 9.C.2) for policy durations in which there exists sufficient company experience data (as defined below in paragraph ii), plus the prescribed margin as provided in Subsection 9.C.5.b.

ii. The company shall determine the sufficient data period by identifying the last policy duration at which sufficient company experience data exists (using all the sources defined in Subsection 9.C.2.b). This period ends at the last policy duration that has 50 or more claims (i.e., no duration beyond this point has 50 claims or more). The sufficient data period may be determined at a more aggregate level than the mortality segment if the company based its mortality on aggregate experience and then used a methodology to subdivide the aggregate class into various sub-classes or mortality segments.

Guidance Note: The objective is to use the last duration at which there are 50 or more claims—not the first duration in which there are less than 50 claims.

iii. Beginning in the policy duration at which sufficient company experience data no longer exists, use the guidelines in the applicable table below to linearly grade from the company experience mortality rates with margins to 100% of the applicable industry basic table with margins. (The determination of the applicable industry basic table is described in Section 9.C.3.) Grading must begin and end no later than the policy durations shown in the applicable table below, based on the level of credibility of the data as provided in Subsection 9.C.4. For valuations on or after Jan. 1, 2015, if the credibility level is less than 20%, the company is not allowed to use its company experience and must use 100% of the applicable industry table.

a) The number of years for data to be considered sufficient is equal to the length of the sufficient data period (defined in paragraph ii above) but no greater than the number of years in column (2).

b) Grading must begin no later than the number of years in column (3) after the duration when sufficient data no longer exists (as defined in paragraph (A) above).

c) Grading to 100% of the industry table must be completed no later than the number of years in column (4) after the duration when sufficient data no longer exists (as defined in paragraph (A) above).

Table effective for valuations Dec. 31, 2016, and prior:

Credibility of company data (as defined in Section 9.C.4 above)	Maximum # of years for data to be considered sufficient	Maximum # of years in which to begin grading after sufficient data no longer exists	Maximum # of years in which the assumption must grade to 100% to an applicable industry table (from the duration where sufficient data no longer exists)
(1)	(2)	(3)	(4)
10%–19%	10	2	10
20%–39%	20	4	15
40%–59%	30	6	18
60%–79%	40	8	20
80%–100%	50	10	25

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Table effective for valuations on and after Jan. 1, 2017:

Credibility of company data (as defined in Section 9.C.4 above) (1)	Maximum # of years for data to be considered sufficient (2)	Maximum # of years in which to begin grading after sufficient data no longer exists (3)	Maximum # of years in which the assumption must grade to 100% to an applicable industry table (from the duration where sufficient data no longer exists)* (4)
20%–39%	10	2	8*
40%–59%	20	4	12*
60%–79%	35	7	17*
80%–100%	50	10	25*

* Additional standards for valuations on and after Jan. 1, 2017:

* The maximum # of years in which the assumption must grade to 100% of an applicable industry table shall be the lesser of (a) the appropriate number of years stated in the chart above or (b) the number of years of sufficient data + 15 times the credibility percentage applicable to column (1) in the chart above. This maximum # of years figure shall be rounded to the nearest whole number.

For example, if the number of years of sufficient data was 9 and the credibility percentage over the sufficient data period was 80%, (b) would equal 9 + 15 * (80%) = 21. The maximum # of years in which the assumption must grade to 100% of an applicable industry table (from the duration where sufficient data no longer exists) would, therefore, be 21.

iv. Notwithstanding the guidelines in paragraph b.iii above, the company must grade into 100% of the applicable industry table mortality with margins by the later of attained age 100 or 15 years after policy underwriting.

c. Smoothing may be used within each mortality segment to ensure that an appropriate relationship exists by attained age within each mortality segment.

d. The company may adjust the resulting mortality rates within each mortality segment to ensure the resulting prudent estimate produces a reasonable relationship with assumptions in other mortality segments that reflects the underwriting class or risk class of each mortality segment. Such adjustments must be done in a manner that does not result in a material change in total expected claims for all mortality segments in the aggregate.

e. Adjust the prudent estimate mortality assumptions to reflect differences associated with impaired lives, and differences due to policyholder behavior if there is a reasonable expectation that due to conditions such as changes in premiums or other policy provisions, policyholder behavior will lead to mortality results that vary from the mortality results that would otherwise be expected.

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i. The adjustment for impaired lives shall follow established actuarial practice, including the use of mortality adjustments determined from clinical and other data.

ii. The adjustment for policyholder behavior shall follow common actuarial practice, including the use of dynamic adjustments to base mortality.

7. Anticipated Experience Assumptions

a. Anticipated experience assumptions shall be the company experience mortality rates described in Section C.2 (which excludes prescribed margins). If the company elects to use an applicable industry basic table in lieu of its own company experience, as described in Section C.2.a., then the anticipated experience assumptions shall be the applicable industry basic table (which excludes prescribed margins).

b. The resulting anticipated experience assumptions must be no lower than the mortality rates that are actually expected to emerge and that the company can justify. The company must disclose this conclusion in the PBR Actuarial Report.

D. Policyholder Behavior Assumptions

1. General Prudent Estimate Policyholder Behavior Assumption Requirements

The company shall determine prudent estimate policyholder behavior assumptions such that the assumptions:

a. Reflect expectations regarding variations in anticipated policyholder behavior relative to characteristics that have a material impact on the modeled reserve, which may include gender, attained age, issue age, policy duration, time to maturity, tax status, level of account and cash value, surrender charges, transaction fees or other policy charges, distribution channel, product features, and whether the policyholder and insured are the same person.

b. Are appropriate for the block of business being valued, giving due consideration to other assumptions used in conjunction with the cash-flow model and to the scenarios whose results are likely to contribute to the modeled reserve.

c. Are based on actual experience data directly applicable to the block of business being valued (i.e., direct data) when available. In the absence of directly applicable data, the company should next use available data from any other block of business that is similar to the block of business being valued, whether or not that block of business is directly written by the company. If data from a similar block of business are used, the company shall adjust the anticipated experience assumption to reflect material differences between the business being valued and the similar block of business.

d. Reflect the outcomes and events exhibited by historical experience only to the extent such experience is relevant to the risk being modeled.

e. Reflect the likelihood that policyholder behavior will be affected by any significant increase in the value of a product option, such as term conversion privileges or policy loans.

f. Are assigned to policies in a manner that provides an appropriate level of granularity.

Guidance Note: Anticipated experience policyholder behavior assumptions for policyholder behavior risk factors include, but are not limited to, assumptions for premium payment patterns, premium persistency, surrenders, withdrawals, allocations between available investment and crediting options, benefit utilization, and other option elections. For fixed premium products, many of the premium payment patterns, premium persistency and partial withdrawal behavior assumptions may not apply and do not need to be considered.

2. Dynamic Modeling

a. The company shall use a dynamic model or other scenario-dependent formulation to determine anticipated policyholder behavior unless the behavior can be appropriately represented by static assumptions.

b. For risk factors that are modeled dynamically, the company shall use a reasonable range of future expected behavior that is consistent with the economic scenarios and other variables in the model.

c. The company is not required to model extreme or "catastrophic" forms of behavior in the absence of evidence to the contrary.

3. Margins for Prudent Estimate Policyholder Behavior Assumptions

The company shall establish margins for policyholder behavior assumptions in compliance with Subsection 9.B subject to the following:

a. To the extent that there is an absence of relevant and fully credible data, the company shall determine the margin such that the policyholder behavior assumption is shifted toward the conservative end of the plausible range of behavior, which is the end of the range that serves to increase the modeled reserve.

b. The company must assume that policyholders' efficiency will increase over time unless the company has relevant and credible experience or clear evidence to the contrary.

c. The company must reflect the data uncertainty associated with using data from a similar but not identical block of business to determine the anticipated experience assumption.

d. The company shall establish a higher margin for partial withdrawal and surrender assumptions in the case where the company's marketing or administrative practices encourages anti-selection.

4. Additional Sensitivity Testing for Policyholder Behavior Assumptions

The company shall examine the sensitivity of assumptions on the modeled reserve as required under Subsection A.7 of this section and shall at a minimum sensitivity test:

a. Premium payment patterns, premium persistency, surrenders, partial withdrawals, allocations between available investment and crediting options, benefit utilization, and other option elections if relevant to the risks in the product.

b. For policies that give policyholders flexibility in the timing and amount of premium payments:

i. Minimum premium scenario.

ii. No further premium payment scenario.

iii. Pre-payment of premiums – Single premium scenario.

iv. Pre-payment of premiums – Level premium scenario.

5. For a universal life policy that guarantees coverage to remain in force as long as the secondary guarantee requirement is met and during projection periods in which the cash value is zero or minimal, industry experience, for purposes of complying with Section 9.A.6, shall be the *Lapse Experience Under Term-to-100 Insurance Policies* published by the Canadian Institute of Actuaries in October 2007. During projection periods in which the cash value is zero or minimal, the assumption shall grade from credible company experience to the rates in the *Lapse Experience Under Term-to-100 Insurance Policies* published by the Canadian Institute of Actuaries in October 2007 in five projection years from the last duration where substantially credible experience is available.

Guidance Note: The term "minimal cash value" means that the cash value is of such small value that its presence would not significantly affect a policyholder's decision to lapse the policy in comparison to a situation with zero cash value.

6. For a term life policy that guarantees level or near level premiums until a specified duration followed by a material premium increase, or for a policy for which level or near level premiums are expected for a period, followed by a material premium increase, for the period following that premium increase the lapse and mortality assumptions shall be adjusted, or margins added, such that the present value of cash inflows in excess of cash outflows assumed shall be limited to reflect the relevance and credibility of the experience, approaching zero for periods where the underlying data has low or no credibility or relevance.

For the calculation of the deterministic reserve, for a term life policy issued Jan. 1, 2017, and later that guarantees level or near level premiums for more than five years until a specified duration followed by a material premium increase, or for a policy for which level or near level premiums are expected for more than five years, followed by a material premium increase, for the period following that premium increase the cash inflows or outflows shall be adjusted such that the present value of cash inflows does not exceed the present value of cash outflows.

E. Expense Assumptions

1. General Prudent Estimate Expense Assumption Requirements

In determining prudent estimate expense assumptions, the company:

a. Shall use expense assumptions for the deterministic and stochastic scenarios that are the same except for differences arising from application of inflation rates.

b. May spread certain information technology development costs and other capital expenditures over a reasonable number of years in accordance with accepted statutory accounting principles as defined in the Statements of Statutory Accounting Principles.

Guidance Note: Care should be taken with regard to the potential interaction with the considerations above.

c. Shall assume that the company is a going concern.

d. Shall choose an appropriate expense basis that properly aligns the actual expense to the assumption. If values are not significant, they may be aggregated into a different base assumption.

Guidance Note: For example, death benefit expenses should be modeled with an expense assumption that is per death incurred.

e. Shall reflect the impact of inflation.

f. May not assume future expense improvements.

g. Shall not include assumptions for federal income taxes (and expenses paid to provide fraternal benefits in lieu of federal income taxes) and foreign income taxes.

h. Shall use assumptions that are consistent with other related assumptions.

i. Use fully allocated expenses.

Guidance Note: 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 allocated to the modeled policies.

j. Shall allocate expenses using an allocation method that is consistent across company lines of business. Such allocation must be determined in a manner that is within the range of actuarial practice and methodology and consistent with applicable ASOP. Allocations may not be done for the purpose of decreasing the modeled reserve.

k. Shall reflect expense efficiencies that are derived and realized from the combination of blocks of business due to a business acquisition or merger in the expense assumption only when any future costs associated with achieving the efficiencies are also recognized.

Guidance Note: 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.

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l. Shall 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), including expenses categorized in the annual statement as "taxes, licenses and fees" (Exhibit 3 of the annual statement) in the expense assumption.

m. Shall include acquisition expenses associated with business in force as of the valuation date and significant non-recurring expenses expected to be incurred after the valuation date in the expense assumption.

n. For policies sold under a new policy form or due to entry into a new product line, the company shall use expense factors that are consistent with the expense factors used to determine anticipated experience assumptions for policies from an existing block of mature policies taking into account:

i. Any differences in the expected long-term expense levels between the block of new policies and the block of mature policies.

ii. That all expenses must be fully allocated as required under Subparagraph b above.

2. Margins for Prudent Estimate Expense Assumptions

The company shall determine margins for expense assumptions according to the requirements given in Subsection 9.B.

F. Asset Assumptions

Guidance Note: This subsection includes requirements for prescribed asset default costs, certain prescribed asset spreads, and handling of uncertainty of timing and amounts of cash flows due to embedded options in the assets.

1. Procedure for Setting Annual Default Cost Factors by Projection Year for Starting Fixed Income Assets with an NAIC Designation

The company shall determine a set of total annual default cost factors, by projection year, for each starting fixed income asset that has an NAIC designation, expressed as percentages of the statement value in each projection year. In making such determination for each asset, the company shall use certain inputs from company records according to 9.F.2, assign a PBR credit rating according to the procedure in 9.F.3, and use prescribed tables or other sources as indicated in this subsection and contained or referenced in Appendix 2. The total annual default cost factor in each year shall be the sum of three prescribed components (a) + (b) + (c) as follows:

a. The "baseline annual default cost factor" in all projection years shall be taken from the most current available baseline default cost table published by the NAIC using the PBR credit rating and weighted average life (WAL) of the asset on the valuation date. The methodology for creating this table can be found in Appendix 2 of this section VM-20. Table A of Appendix 2 shall be the initial NAIC table for this purpose.

b. The "spread related factor" shall grade linearly in yearly steps from the prescribed amount in year one to zero in years four and after. The prescribed amount in year one may be positive or negative and shall be calculated as follows:

i. Multiply 25% by the result of (ii) minus (iii).

ii. The current market benchmark spread published by the NAIC consistent with the PBR credit rating and WAL of the asset on the valuation date.

iii. The most current available long-term benchmark spread published by the NAIC.

iv. The resulting amount shall not be less than the negative of the baseline annual default cost in year one and shall not be greater than two times the baseline annual default cost in year one.

c. The "maximum net spread adjustment factor" shall be the same amount for each starting fixed income asset within a model segment and shall grade linearly in yearly steps from the prescribed amount in year one to zero in years four and after. The prescribed amount in year one shall be calculated as follows:

i. For each asset included in the model segment and subject to this Subsection 9.F.1, calculate a preliminary year one net spread equal to the option adjusted spread of the asset on the valuation date less the sum of the amounts from 9.F.1.a and 9.F.1.b for the asset and less the investment expense for the asset.

ii. Calculate a weighted average preliminary year one net spread for the model segment using a weight applied to the amount in 9.F.1.c.i for each asset equal to that asset's statement value on the valuation date multiplied by the lesser of three years and the asset's WAL on the valuation date.

iii. Calculate the amount in 9.F.1.c.i above for a hypothetical asset with the following assumed characteristics (the regulatory threshold asset):

a) A PBR credit rating of 9.

b) A WAL equal to the average WAL on the valuation date for the assets in the model segment and subject to this Subsection 9.F.1.

c) An option adjusted spread equal to the current market benchmark spread published by the NAIC for the assumed PBR credit rating and WAL. The methodology for determining this published spread can be found in Appendix 2.

d) Investment expense of 0.10%.

iv. The prescribed amount in year one is the excess, if any, of the result in 9.F.1.c.ii over the result in 9.F.1.c.iii.

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Guidance Note: A broader explanation for this factor: For each model segment, a comparison is to be made of two spread amounts, both being net of the default costs calculated thus far and net of investment expenses. In each case, the gross option adjusted spread is based on current market prices at the valuation date. The first result represents the weighted average net spread for all the assets in the model segment (and subject to this subparagraph), as if all the assets were purchased at their current market spreads. The second result represents the net spread for a portfolio of index Baa bonds (NAIC 2, PBR credit rating of 9) as if the index Baa portfolio were purchased at the current average market spread. If the first result is higher than the second, additional default costs must be added to each asset until the two results are equal for the first projection year. This additional amount of default cost on each asset then grades off linearly in the model until it reaches zero in year four and after. This process is repeated each actual valuation date. A company that invests in an asset mix earning an average gross spread greater than Baa bonds initially or an asset mix whose average market spread could widen significantly relative to market spreads for Baa bonds are examples of situations likely to trigger additional assumed default costs either initially or in the future.

2. Company-Determined Inputs for Each Asset

The company shall determine certain items for each asset that are necessary to calculate the total annual default cost factors:

a. "Investment expense" for each asset shall mean the company's anticipated experience assumption for assets of the same type, expressed as an annual percentage of statement value.

b. "Option adjusted spread (OAS)" for each asset shall mean the average spread over zero coupon Treasury bonds that equates a bond's market price as of the valuation date with its modeled cash flows across an arbitrage free set of stochastic interest rate scenarios. For floating rate bonds, the OAS shall be calculated as the equivalent spread over Treasuries if the bonds were swapped to a fixed rate. Market conventions and other approximations are acceptable for the purposes of this subsection.

c. "Weighted average life (WAL)" for each asset shall mean the weighted average number of years until 100% of the outstanding principal is expected to be repaid, rounded to the nearest whole number but not less than 1. For bonds or preferred stocks that are perpetual or mature after 30 years, the WAL shall be 30. Market conventions and other approximations are acceptable for the purposes of this subsection.

Guidance Note: OAS is a metric used for callable corporate bonds and other bonds with optionality such as residential mortgage-backed securities (RMBS). Any excess of the nominal spread of an asset over its OAS represents additional return for taking on the risk of embedded options. This additional return is not considered when using OAS to make adjustments to annual default cost factors because the additional return is assumed to be related to the cost of embedded options that must be modeled directly by the company along each scenario in the cash-flow model. (See 9.F.8.) OAS is dependent on market prices, which may be gathered by companies in a variety of ways for financial reporting purposes. For instance, prices and OAS may be developed internally for assets with less relative liquidity such as private placements. The general sources of market prices used to determine OAS, as well as the method or source for the OAS calculation, should be documented in the PBR Actuarial Report. In some cases, OAS may not be available due to unavailability of market prices. When such is the case, the asset may be excluded from the particular calculation.

3. Determination of PBR Credit Rating

a. Table K of Appendix 2 converts the ratings of NAIC approved ratings organizations (AROs) and NAIC designations to a numeric rating system from 1 through 20 that is to be used in the steps below. A rating of 21 applies for any ratings of lower quality than those shown in the table.

b. For an asset with an NAIC designation that is derived solely by reference to underlying ARO ratings without adjustment, the company shall determine the PBR credit rating as the average of the numeric ratings corresponding to each available ARO rating, rounded to the nearest whole number.

c. For an asset that is not a commercial mortgage and that has an NAIC designation that is not derived solely by reference to underlying ARO ratings without adjustment, the company shall determine the PBR credit rating as the second least favorable numeric rating associated with that NAIC designation.

d. For a commercial or agricultural mortgage loan, the company shall determine the PBR credit rating as the Table K lookup of the numeric rating corresponding to the loan's NAIC commercial mortgages (CM) category, where the latter is assigned by the company in accordance with NAIC life RBC instructions.

Guidance Note: The 1 through 21 PBR credit rating system attempts to provide a more granular assessment of credit risk than has been used for establishing NAIC designations for RBC and asset valuation reserve (AVR) purposes. The reason is that unlike for RBC and AVR, the VM-20 reserve cash-flow models start with the gross yield of each asset and make deductions for asset default costs. The portion of the yield represented by the purchase spread over Treasuries is often commensurate with the more granular rating assigned, such as A+ or A-. Thus, use of the PBR credit rating system may provide a better match of risk and return for an overall portfolio in the calculation of VM-20 reserves. However, for assets that have an NAIC designation that does not rely directly on ARO ratings, a more granular assessment consistent with the designation approach is not currently available.

Guidance Note: The *Purposes and Procedures Manual of the NAIC Investment Analysis Office* (P&P Manual), which establishes the rules for setting NAIC designations, underwent significant change during 2009–2010, particularly in the area of assessing the credit risk of structured securities. The NAIC Valuation of Securities (E) Task Force implemented an interim solution in 2009 to set designations for non-agency RMBS based on modeling by a third-party firm. The Task Force is developing a long-term solution for these and other structured securities, such as commercial mortgage-backed securities (CMBS), that may involve a combination of modeling and other methods such as "notching up" or "notching down" the result derived by reference to ARO ratings. In all such cases where the ARO rating basis is either not used at all or is adjusted in some way, the intent is that paragraph (c) be used to determine the PBR credit rating. Another common example where (c) is to be used would be securities that are not Securities Valuations Office (SVO) filing exempt (FE), such as many private placement bonds. For example, a private placement that was not FE and was rated by the SVO as NAIC 1 would be assigned a PBR credit rating of 6 (second least favorable), equivalent to A2.

4. Special Situations

For an asset handled under 9.F.3.c and for which the NAIC designation varies depending on the company's carrying value of the asset, the company must avoid overstatement of the net return of the asset when projecting future payments of principal and interest together with the prescribed annual default costs.

Guidance Note: For example, if a non-agency RMBS is rated NAIC 2 if held at a particular company's carrying value but NAIC 4 if held at par, and that company's cash-flow model first projects the full recovery of scheduled principal and interest, it would be more appropriate to then deduct annual default costs consistent with NAIC 4 rather than NAIC 2. If the company's cash-flow model has already incorporated a reduced return of principal and interest consistent with the company's carrying value, then it would be more appropriate to deduct annual default costs consistent with NAIC 2. Modeling of assets with impairments is an emerging topic, and methods for handling in vendor and company projection models vary.

5. Annual Default Cost Factors for Starting Fixed Income Assets without an NAIC Designation

For starting assets that do not have an NAIC designation, the default assumption shall be established such that the net yield shall be capped at 104% of the applicable corresponding historical Treasury yield rate most closely coinciding with the dates of purchase and maturity structure of supporting assets plus 25 basis points (bps).

6. Annual Default Cost Factors for Reinvestment Fixed Income Assets

The sets of annual default cost factors for reinvestment fixed income assets are determined following the same process as for starting fixed income assets except that Subsection 9.F.1.c does not apply to reinvestment assets.

7. Amount of Assumed Default Costs

The assumed default costs in the cash-flow model for a projection interval shall be the sum over all fixed income assets of the result of the total annual default cost factor for

each asset, adjusted appropriately for the length of the projection interval, multiplied by the appropriate credit exposure for each asset.

8. Procedure for Setting Prescribed Gross Asset Spreads by Projection Year for Certain Asset Transactions and Operations in the Cash-Flow Model

a. Gross asset spreads over Treasuries for public non-callable corporate bonds purchased in projection year one shall be the current market benchmark spreads published by the NAIC consistent with the PBR credit rating and WAL of assets purchased.

b. Gross asset spreads over Treasuries for public non-callable corporate bonds purchased in projection years four and after shall be the most current available long-term benchmark spreads published by the NAIC consistent with the PBR credit rating and WAL of assets purchased.

c. The prescribed gross asset spreads for these asset types shall grade linearly between year one and year four in yearly steps.

d. Interest rate swap spreads over Treasuries shall be prescribed by the NAIC for use throughout the cash-flow model wherever appropriate for transactions and operations including, but not limited to, purchase, sale, settlement, and cash flows of derivative positions, and reset of floating rate investments. A current and long-term swap spread curve shall be prescribed for year one and years four and after, respectively, with yearly grading in between. The three-month and six-month points on the swap spread curves represent the corresponding London Interbank Offered Rate (LIBOR) spreads over Treasuries.

9. Basis of NAIC Long-Term Benchmark Spreads

The prescribed long-term benchmark spread table established by the NAIC shall to the extent practicable:

a. Reflect recent historical market data based on actual daily trading activity.

b. Reflect an expanding observation period that uses the most recent reported data, with a minimum observation period of seven years expanding to a maximum observation period of 15 years.

c. Be based on an “85% conditional mean” of the periodic market data. This measure is defined as the mean obtained after excluding from the observation period the trading days involving the 7.5% highest and 7.5% lowest observed spreads for “A” rated 7- to 10-year maturities or other most similar asset category available from the source data. For other asset categories, the mean shall be obtained after excluding the same trading days that were excluded for the primary asset category.

d. Provide a table of bond spreads by PBR credit rating and WAL and swap spreads by maturity. If needed, interpolation and/or smoothing techniques should be applied to the source data to provide sufficient granularity and logical relationships by credit quality.

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Guidance Note: Long-term prescribed spreads are targeted at the historical mean because any biased measure could either add or subtract conservatism depending on whether assets are predominantly being purchased or being sold in the cash-flow model. The conditional mean concept is intended to limit the volatility of the long-term prescribed spreads from one valuation date to the next by excluding a limited number of observations in both tails within the averaging period. Empirical analysis during the 2000–2009 time period showed little change in volatility or the level of prescribed spreads from excluding more than the highest and lowest 7.5% observations.

10. Modeling of Embedded Options in Assets

Reflect any uncertainty in the timing and amounts of asset cash flows related to the paths of interest rates, equity returns or other economic values contained in the various scenarios directly in the projection of asset cash flows under the various scenarios within the stochastic reserve calculation model and under the deterministic scenario within the deterministic reserve calculation model.

Guidance Note: For example, model the impact on cash flows of embedded prepayment, extension, and call and put options in a manner consistent with current asset adequacy analysis practice.

G. Revenue-Sharing Assumptions

1. The company may include income from projected future revenue sharing (as defined in these requirements equals gross revenue-sharing income (GRSI)) net of applicable projected expenses (net revenue-sharing income) in cash-flow projections, if:

   a. The GRSI is received by the company.

   b. A signed contractual agreement or agreements are in place as of the valuation date and support the current payment of the GRSI.

   c. The GRSI is not already accounted for directly or indirectly as a company asset.

2. For purposes of this section, GRSI is considered to be received by the company if it is paid directly to the company through a contractual agreement with either the entity providing the GRSI or an affiliated company that receives the GRSI. The GRSI also would be considered to be received if it is paid to a subsidiary that is owned by the company and if 100% of the statutory income from that subsidiary is reported as statutory income of the company. In this case, the company shall assess the likelihood that future GRSI is reduced due to the reported statutory income of the subsidiary being less than future GRSI received.

3. If the requirements in Section 9.G.1 are not met, and the GRSI is not included in cash-flow projections, applicable projected expenses also are not included.

4. In determining the anticipated experience assumption for the GRSI, the company shall reflect factors that include, but are not limited to, the following (not all of these factors will necessarily be present in all situations):

   a. The terms and limitations of the agreement(s), including anticipated revenue, associated expenses and any contingent payments incurred or made by either the company or the entity providing the GRSI as part of the agreement(s).

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b. The relationship between the company and the entity providing the GRSI that might affect the likelihood of payment and the level of expenses.

c. The benefits and risks to both the company and the entity paying the GRSI of continuing the arrangement.

d. The likelihood that the company will collect the GRSI during the term(s) of the agreement(s) and the likelihood of continuing to receive future revenue after the agreement(s) has ended.

e. The ability of the company to replace the services provided to it by the entity providing the GRSI or to provide the services itself, along with the likelihood that the replaced or provided services will cost more to provide.

f. The ability of the entity providing the GRSI to replace the services provided to it by the company or to provide the services itself, along with the likelihood that the replaced or provided services will cost more to provide.

5. The company shall include all expenses required or assumed to be incurred by the company in conjunction with the arrangement providing the GRSI, as well as any assumed expenses incurred by the company in conjunction with the assumed replacement of the services provided to it in the projections as a company expense. In addition, the company shall include expenses incurred by either the entity providing the net revenue-sharing income or an affiliate of the company in the applicable expenses that reduce the GRSI.

6. In determining the prudent estimate of projected GRSI, the company shall reflect a margin (which decreases the assumed GRSI) related to the uncertainty of the revenue. Such uncertainty is driven by many factors, including, but not limited to, the potential for changes in industry trends. Contractually guaranteed GRSI shall not reflect a margin, although company expenses related to contractually guaranteed GRSI shall reflect a margin.

7. The qualified actuary to whom responsibility for this group of policies is assigned is responsible for reviewing the revenue-sharing agreements that apply to that group of policies, verifying compliance with these requirements and documenting the rationale for any source of the GRSI used in the projections for that group of policies.

8. The amount of net revenue-sharing income assumed in a given scenario shall not exceed the sum of (a) and (b), where:

a. Is the contractually guaranteed GRSI, net of applicable expenses, projected under the scenario.

b. Is the company's estimate of non-contractually guaranteed net revenue-sharing income multiplied by the following factors:

i. 1.0 in the first projection year.

ii. 0.9 in the second projection year.

iii. 0.8 in the third projection year.

iv. 0.7 in the fourth projection year.

v. 0.6 in the fifth projection year.

vi. 0.5 in the sixth and all subsequent projection years. The resulting amount of non-contractually guaranteed net revenue-sharing income after application of this factor shall not exceed 0.25% per year on separate account assets in the sixth and all subsequent projection years.

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

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

Appendix 1: Additional Description of Economic Scenarios

The prescribed economic scenario generator can be found on the SOA's website at *http://soa.org/research/software-tools/research-scenario.aspx*.

A. Generating Interest Rates

The prescribed economic scenario generator uses three random numbers per period. These are:

1. A random shock to the 20-year Treasury rate.

2. A random shock to the spread between 1-year and 20-year Treasury rates.

3. A random shock to the volatility.

In generating the scenarios for the test, zero shocks to volatility are used.

When generating scenarios for the test, upward shocks to the 20-year Treasury are associated with downward shocks to the spread, making the yield curve less steep (or potentially inverted).

The prescribed mean reversion parameter described in Section D shall be used in calculating the scenarios based on the prescribed scenario generator.

The prescribed economic scenario generator can be found on the SOA's website at *http://soa.org/research/software-tools/research-scenario.aspx.*

B. Generating Equity Returns

The equity returns scenarios can be generated using the prescribed economic scenario generator, located on the SOA's website at *http://soa.org/research/software-tools/research-scenario.aspx.*

C. Source of U.S. Treasury Interest Rates

Treasury interest rates can be found at the website: *www.treas.gov/offices/domestic-finance/debt-management/interest-rate/yield_historical_main.shtml.*

D. Prescribed Mean Reversion Parameter

The mean reversion point for the 20-year Treasury bond rate is dynamic, based on historical interest rates as they emerge.

The formula for the dynamic mean reversion point is:

20% of the median 20-year Treasury bond rate over the last 600 months.

+ 30% of the average 20-year Treasury bond rate over the last 120 months.

+ 50% of the average 20-year Treasury bond rate over the last 36 months.

The result is then rounded to the nearest 0.25%.

The mean reversion point for use in the generator changes once per year, in January, and is based on historical rates through the end of the prior year. While the mean reversion point is dynamic depending on the date from which a scenario starts, it remains constant (rather than dynamic) across all time periods after the scenario start date, for purposes of generating the scenario.

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The historical 20-year Treasury bond rate for each month is the rate reported for the last business day of the month.

E. This section describes the set of 16 scenarios for the SERT in VM-20. Starting with yield curve on the valuation date, the scenarios are created using the Academy's stochastic scenario generator using predefined sets of random numbers, where each random number is a sample from a normal distribution with mean zero and variance 1.

The rationale for this approach is twofold. First, the scenarios should be realistic in that they could be produced by the generator. Second, in some way the likelihood of any scenario occurring can be measured.

One way to measure the likelihood of a scenario occurring is to measure the likelihood of its series of random shocks—that is, the random numbers used in the generator. Given any sequence of random numbers, their sum can be compared with a mean of zero and a standard error equal to the square root of the number of deviates in the sequence. With the mean and standard error, we can determine, in a crude way, where the sum of deviates in our sequence lies in the distribution of the sum of all such sequences.

For example, if we want a sequence that is always one standard error above average, we start with a value of 1.0 as the first deviate. The value of the n^{th} deviate is the excess of the square root of n over the square root of n-1. So, the second value is $1.414 – 1 = 0.414$, and the third value is $1.732 – 1.414 = 0.318$.

Scenario 1 – Pop up, high equity

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

Scenario 2 – Pop up, low equity

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

Scenario 3 – Pop down, high equity

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

Scenario 4 – Pop down, low equity

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

Scenario 5 – Up/down, high equity

Interest rate shocks are selected that, for each five-year period, are consistently in the same direction. The cumulative shock for each five-year period is at the 90% level during "up" periods and at the 10% level during "down" periods.

Equity returns are selected to maintain the cumulative equity return at the 90% level.

Scenario 6 – Up/down, low equity

Interest rate shocks are selected that, for each five-year period, are consistently in the same direction. The cumulative shock for each five-year period is at the 90% level during "up" periods and at the 10% level during "down" periods.

Equity returns are selected to maintain the cumulative equity return at the 10% level.

Scenario 7 – Down/up, high equity

Interest rate shocks are selected that, for each five-year period, are consistently in the same direction. The cumulative shock for each five-year period is at the 90% level during "up" periods and at the 10% level during "down" periods.

Equity returns are selected to maintain the cumulative equity return at the 90% level.

Scenario 8 – Down/up, low equity

Interest rate shocks are selected that, for each five-year period, are consistently in the same direction. The cumulative shock for each five-year period is at the 90% level during "up" periods and at the 10% level during "down" periods.

Equity returns are selected to maintain the cumulative equity return at the 10% level.

Scenario 9 – Baseline scenario

All shocks are zero.

Scenario 10 – Inverted yield curves

There are no shocks to long-term rates and equities.

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

Scenario 11 – Volatile equity returns

There are no shocks to interest rates. There are shocks to equity returns that are consistently in the same direction for each two-year period and then switch directions.

Scenario 12 – Deterministic scenario for valuation

There are uniform downward shocks each month for 20 years, sufficient to get down to the one standard deviation point (84%) on the distribution of 20-year shocks. After 20 years, shocks are zero.

Scenario 13 – Delayed pop up, high equity

There are interest rate shocks that are zero for the first 10 years, followed by 10 years of shocks—each 1.414 (square root of 2) times those in the first 10 years of Scenario 1. This gives the same 20-year cumulative shock as scenario 1, but all the shock is concentrated in the second 10 years. After 20 years, the shock is the same as scenario 1.

Equity returns are selected to maintain the cumulative equity return at the 90% level.

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Scenario 14 – Delayed pop up, low equity

There are interest rate shocks that are zero for the first 10 years, followed by 10 years of shocks—each 1.414 (square root of 2) times those in the first 10 years of Scenario 2. This gives the same 20-year cumulative shock as scenario 2, but all the shock is concentrated in the second 10 years. After 20 years, the shock is the same as scenario 1.

Equity returns are selected to maintain the cumulative equity return at the 10% level.

Scenario 15 – Delayed pop down, high equity

There are interest rate shocks that are zero for the first 10 years, followed by 10 years of shocks—each 1.414 (square root of 2) times those in the first 10 years of Scenario 3. This gives the same 20-year cumulative shock as scenario 3, but all the shock is concentrated in the second 10 years. After 20 years, the shock is the same as scenario 3.

Equity returns are selected to maintain the cumulative equity return at the 90% level.

Scenario 16 – Delayed pop down, low equity

There are interest rate shocks that are zero for the first 10 years, followed by 10 years of shocks—each 1.414 (square root of 2) times those in the first 10 years of Scenario 4. This gives the same 20-year cumulative shock as scenario 4, but all the shock is concentrated in the second 10 years. After 20 years, the shock is the same as scenario 4.

Equity returns are selected to maintain the cumulative equity return at the 10% level.

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Appendix 2: Tables for Calculating Asset Default Costs and Asset Spreads, Including Basis of Tables

This appendix describes the basis for certain prescribed asset default cost and asset spread tables to be updated and published periodically by the NAIC via website. These tables are needed for insurers to comply with the requirements of Subsection 9.F for asset default costs and asset spreads in VM-20. In some cases, as specified in 9.F, tables published in this appendix will serve as the NAIC published table until a different table is published. The development of the various tables is described in Subsection A through Subsection E of this appendix. The actual tables are shown in Subsection F of this appendix. Certain tables were developed based on various source material referenced herein. Other tables are simply compilations or presentations of data from such sources.

It is important to note up front that the development of prescribed default costs is based entirely on analysis of corporate bonds. Default costs for other fixed income securities and commercial and agricultural mortgages are assumed to follow those of corporate bonds with similar NAIC designations through a mapping tool called "PBR credit rating." Examples of other fixed income securities are structured securities, private placements and preferred stocks. Discussions at the NAIC during 2009–2010, particularly at the Valuation of Securities (E) Task Force, focused on the observation that similarly rated assets of different types may have similar likelihood of default or loss of principal but may have a significantly different distribution of the severity of that loss. Discussions have particularly focused on the different drivers of severity between structured securities and corporate bonds. As a result, the Valuation of Securities (E) Task Force has been developing updated methods to assign NAIC designations for C-1 RBC purposes for structured securities in order to better take into account these differences. The VM-20 procedure to assign a PBR credit rating has been structured so that in the cases where the Task Force decides to go away from directly using the ratings of approved ratings organizations, the PBR credit rating will be based on the NAIC designation rather than underlying ratings. Where the Task Force continues to authorize use of underlying ratings, the PBR credit rating also will be based on those ratings. However, VM-20 uses the underlying ratings to assign the PBR credit rating in a somewhat different manner.

Subsection 9.F.3 describes the process the company must follow to assign a PBR credit rating for any fixed income asset with an NAIC designation.

A. Baseline Annual Default Cost Factors

The general process followed to determine the baseline annual default cost factors shown in Table A (see Subsection F) was as follows:

1. Determine from historical corporate bond data a matrix of cumulative default rates, for maturities of one to 10 years and for 20 ratings classes (Aaa, Aa1, Aa2, Aa3 … Caa2, Caa3, Ca).

2. Determine also from historical corporate bond data a set of recovery rates that varies only by rating class.

3. Determine a matrix of baseline annual default cost factors (in bps), where for a given rating the baseline annual default cost factor for a bond with maturity or weighted average life of t = 10,000* (1- Recovery Rate) * (1-[1-Cumulative Default Rate (t)]^[1/t]).

4. Item 1 and Item 2 above were determined from Moody's reports that were published in February 2008. In February 2009 and February 2010, Moody's published updated versions of these reports, but there is no commitment from Moody's to continue updating these reports in the future. It was not explored whether another source for one or both elements might be preferable. If the NAIC decides to use Moody's as the source going

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forward, then the matrix of baseline annual default cost factors could be updated after Moody's publishes any updated research.

Details of step 1 and step 2 above are contained in Subsection B and Subsection C below. Essentially, step 1 involved gathering from Moody's historical data the cumulative default rates for key maturities over many cohort years, ranking those rates, and applying a CTE 70 metric. For example, for the period 1970–2007, representing 37 years, there were 37 one-year cohorts, 33 five-year cohorts and 28 10-year cohorts. A CTE 70 for 10-year maturities involved averaging the eight cohorts with the highest 10-year cumulative default rates. Step 2 involved gathering from Moody's historical data the annual recovery rates for various bond categories from 1982–2007, ranking those rates, and calculating sample mean and CTE 70 statistics. The final recovery rate table uses the mean for higher quality investment grade rating classes, uses the CTE 70 for lower quality below investment grade rating classes and grades in between.

In Subsection F below:

a. Table A shows baseline default costs using Moody's data as of February 2008.

b. Table B shows the baseline default cost margin as of February 2008 (Table A rates minus the historical mean rates).

B. Cumulative Default Rates Used in Baseline Annual Default Cost Factors

The current process to determine cumulative default rates is as follows:

1. Obtain the most recent Moody's report on default rates (e.g., Moody's 2008-02-11 Special Comment – Corporate Default & Recovery Rates 1920–2007).

2. Extract one-year, five-year and 10-year average cumulative default rate data by whole letter rating (e.g., Aaa, Aa,…CCC) from the report (e.g., Exhibit 27 – Average Cumulative Issuer-Weighted Global Default Rates, 1970-2007*).

3. Extract one-year, five-year and 10-year cumulative default rate cohort data by whole letter rating from the report (e.g., Exhibit 36 – Cumulative Issuer-Weighted Default Rates by Annual Cohort, 1970-2007). Calculate the mean of these one-year, five-year and 10-year cumulative default rates, which should be close to the result in item 2 for each whole letter rating.

4. Sort the data in item 3 to calculate preliminary CTE 70 one-year, five-year and 10-year cumulative default rates at each whole letter rating.

5. Adjust the result in item 4 to reflect any differences between 2 and 3. 5 = 4 + (2 - 3).

6. Use linear interpolation to determine cumulative default rates for maturities 2 to 4 and 6 to 9.

7. Transform the data into a matrix that varies by rating notch (e.g., Aaa, Aa1, Aa2, Aa3, A1… Caa2, Caa3, Ca) using an algorithm to ensure that in the new matrix, the rows are monotonic by maturity, the columns are monotonic by rating, and to the extent possible the new matrix has a shape comparable to another Moody's cumulative default rate table that varies by notch (e.g., Moody's Idealized Cumulative Default Rates).

8. For maturities greater than 10 years, define baseline annual default cost factors as equal to those for 10-year maturities.

In Subsection F below:

a. Table C shows empirical CTE 70 default rates from Moody's data as of February 2008.

b. Table D shows prescribed cumulative default rates derived from Moody's data as of February 2008.

C. Recovery Rate Used in Baseline Annual Default Cost Factors

The current process to determine the recovery rate is as follows:

1. Obtain the most recent Moody's report on recovery rates (e.g., Moody's 2008-02-11 Special Comment – Corporate Default & Recovery Rates 1920–2007).

2. Extract historical annual data on recovery rates (e.g., the All Bonds column from Exhibit 22 – Annual Average Defaulted Bond and Loan Recovery Rates, 1982–2007).

3. Determine the mean and CTE 70 of the annual sample observations for each of the different lien position categories, as well as for the All Bonds category.

In Subsection F below:

a. Table E1 shows a sorted version of "Exhibit 22 – Annual Average Defaulted Bond and Loan Recovery Rates, 1982–2007," and develops the CTE 70 recovery rates and the implied margin.

Table E1 develops mean and CTE 70 recovery rates for all bonds, as well as for senior bank loans and five bond lien position categories that make up the All Bonds statistics. Implementation will be facilitated if VM-20 uses one recovery rate based on All Bonds rather than using all six lien position categories. Using the more detailed data would require either companies or the SVO to assign each asset to one of the categories.

Table E1 also illustrates that bonds that are more senior in the issuer's capital structure tend to have higher recovery rates than bonds that are subordinated.

b. Table E2 shows the final recovery rates that vary by PBR credit rating. This table was determined by assuming CTE 70 applies for Ba3/BB- and below, mean applies for Baa1/BBB+ and above, and interpolated recovery rates apply for ratings that are between Ba3/BB- and Baa1/BBB+. This approach recognizes that investment-grade bonds are more likely to be senior in the issuer's capital structure, and below-investment-grade bonds are more likely to be subordinated. Differentiating by actual seniority position of each bond was not considered practical. In addition, because recovery rates and default rates are not 100% correlated, and the cumulative default rates were set at CTE 70, use of the mean recovery rate, at least for the higher-quality bonds, helps to avoid overly conservative prescribed default costs for those bonds.

D. Illustrative Current Market Benchmark Spreads

Current market benchmark spreads published by the NAIC are intended to represent average market spreads at the valuation date for public non-callable corporate bonds and interest rate swaps. They are used to establish the initial spread environment in the cash-flow model for purposes of modeling reinvestment assets and disinvestment and for modeling prescribed default

costs. Section 9.F calls for both spreads and default costs to grade from initial to long-term conditions by the start of projection year four. Ultimately, the NAIC will need to publish current market benchmark spreads on a website on a quarterly basis. The current process to determine current market benchmark spreads is as follows:

1. Extract valuation date Investment Grade bond index spread data by ratings category and maturity bucket (e.g., download JPMorgan US Liquid Index (JULI) Interpolated Spread over Treasury data for All Industries).

2. Extract valuation date Below Investment Grade bond index spread data by ratings category (e.g., download JPMorgan Domestic High Yield Index Spread to Worst data by Rating Tier), and assume that the Below Investment Grade spread curve is flat across maturities.

3. Transform the data into a matrix that varies by rating notch (e.g., Aaa, Aa1, Aa2, Aa3, A1… Caa2, Caa3, Ca) and maturity (1, 2 … 30) using an algorithm to ensure that in the new matrix: (a) the rows are monotonic by rating; (b) the investment grade columns are monotonic by maturity; and (c) the columns on the borderline between investment grade and below investment grade (Baa3/BBB-) is interpolated between Baa2/BBB and Ba1/BB+.

   In Subsection F below,

   a. Table F shows Current Market Benchmark Spreads as of Sept. 30, 2009, for Investment Grade bonds.

   b. Table G shows Current Market Benchmark Spreads as of Sept. 30, 2009, for Below Investment Grade bonds.

E. Long-Term Benchmark Spreads

Long-term benchmark spreads published by the NAIC are the assumed long-term average spreads for non-callable public bonds and interest rate swaps. They are used to establish the long-term spread environment in the cash-flow model for purposes of modeling reinvestment assets and disinvestment. They are also used as the normative spreads when calculating the spread related factor in the asset default cost methodology. Ultimately, the NAIC will need to publish these spreads on a website. The current process to determine mean benchmark spreads is as follows:

1. Extract daily Investment Grade bond index spread data for the prescribed observation period by ratings category and maturity bucket (e.g., download JULI Interpolated Spread over Treasury data for All Industries).

2. Extract daily Below Investment Grade bond index spread data for the prescribed observation period by ratings category (e.g., download JPMorgan Domestic High Yield Index Spread to Worst data by Rating Tier), and assume that the Below Investment Grade spread curve is flat across maturities.

3. For the whole letter “A” rated 7- to 10-year maturity bucket, or nearest similar category, calculate the “85% conditional mean average” by first excluding the 7.5% highest and 7.5% lowest daily observations over the prescribed observation period and then computing the mean of the remaining daily observations.

4. Calculate for each other ratings category and maturity bucket the mean over the prescribed observation period after excluding the observations from the same trading

days excluded in step 3. In developing Table H and Table I, a 9.25-year averaging period was used, specifically July 1, 2000, through Sept. 30, 2009.

5. Transform the data into a matrix that varies by rating notch (e.g., Aaa, Aa1, Aa2, Aa3, A1…,Caa2, Caa3, Ca) and maturity (1, 2 … 30) using an algorithm to ensure that in the new matrix: (a) the rows are monotonic by rating; (b) the investment grade columns are monotonic by maturity; and (c) the columns on the borderline between investment grade and below investment grade (Baa3/BBB-) are interpolated between Baa2/BBB and Ba1/BB+.

   In Subsection F below,

   a. Table H shows Long-Term Mean Benchmark Spreads as of Sept. 30, 2009, for Investment Grade bonds.

   b. Table I shows Long-Term Mean Benchmark Spreads as of Sept. 30, 2009, for Below Investment Grade bonds.

   c. Table J shows Long-Term Benchmark Swap Spreads.

F. Tables

Table A. Prescribed Baseline Annual Default Costs (in bps) using Moody's Data as of February 2008

PBR Credit Rating	Moody's\ WAL	1	2	3	4	5	6	7	8	9	10
1	Aaa	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
2	Aa1	0.0	0.1	0.3	0.5	0.5	0.6	0.7	0.8	0.8	0.9
3	Aa2	0.1	0.4	0.8	1.0	1.2	1.3	1.4	1.5	1.7	1.8
4	Aa3	0.2	0.9	1.7	2.2	2.4	2.7	2.9	3.1	3.3	3.7
5	A1	0.4	1.7	3.4	4.1	4.5	4.9	5.2	5.5	5.9	6.4
6	A2	0.8	3.3	6.5	7.5	8.1	8.6	9.2	9.5	10.1	11.1
7	A3	2.8	7.0	10.6	11.8	12.6	13.5	14.4	14.9	15.6	16.7
8	Baa1	6.4	13.0	16.5	18.1	19.1	20.4	21.7	22.7	23.5	24.3
9	Baa2	16.3	26.3	32.5	36.9	39.8	40.3	42.4	44.0	44.7	45.2
10	Baa3	42.0	61.4	70.0	76.8	81.0	80.0	80.6	81.4	81.9	81.8
11	Ba1	90.5	123.4	134.7	143.1	148.8	143.9	140.4	138.4	137.2	135.7
12	Ba2	173.5	226.2	243.5	257.9	267.6	253.8	241.0	232.5	228.0	224.1
13	Ba3	262.0	295.0	311.3	328.6	349.6	334.4	321.0	313.1	308.2	305.9
14	B1	436.4	453.8	468.5	480.1	495.0	464.0	441.5	425.5	415.2	409.4
15	B2	621.8	573.8	565.2	560.8	567.4	525.7	492.9	467.1	449.6	436.4
16	B3	1,009.1	832.5	789.8	779.3	788.6	726.3	689.6	663.7	641.2	626.1
17	Caa1	1,440.9	1,095.2	1,004.3	983.8	999.3	922.7	879.6	855.0	840.7	839.5
18	Caa2	2,026.5	1,427.1	1,253.0	1,191.4	1,191.9	1,089.4	1,023.7	982.5	960.8	952.3
19	Caa3	3,974.3	2,806.9	2,385.2	2,269.9	2,316.1	2,090.5	1,942.9	1,850.2	1,809.0	1,815.6
20	Ca	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1

Table A. Baseline Annual Default Costs (in bps) using Moody's Data as of December 2014

PBR Credit Rating	Moody's\ WAL	1	2	3	4	5	6	7	8	9	10
1	Aaa	0.02	0.02	0.05	0.08	0.11	0.12	0.13	0.15	0.16	0.17
2	Aa1	0.13	0.36	0.66	0.99	1.14	1.29	1.40	1.51	1.62	1.74
3	Aa2	0.31	0.96	1.72	2.22	2.49	2.72	2.88	3.04	3.24	3.48
4	Aa3	0.67	2.28	3.91	4.77	5.21	5.61	5.89	6.13	6.48	6.97
5	A1	1.30	4.44	7.76	8.94	9.59	10.14	10.56	10.86	11.40	12.25
6	A2	2.44	8.41	14.74	16.34	17.20	17.97	18.55	18.84	19.65	21.14
7	A3	4.89	11.03	17.12	19.44	21.11	21.83	22.94	23.62	24.65	26.31
8	Baa1	11.31	20.61	26.68	29.95	31.92	33.03	34.72	36.06	37.13	38.36
9	Baa2	22.25	36.07	41.27	45.26	47.99	49.78	52.61	54.87	55.82	55.97
10	Baa3	57.17	84.10	89.06	94.40	97.80	99.06	100.45	102.01	102.62	101.71
11	Ba1	102.06	138.44	146.15	153.95	159.48	156.91	154.86	154.15	153.50	151.93
12	Ba2	161.20	210.26	226.16	239.13	247.83	237.96	228.20	221.98	219.20	216.67
13	Ba3	226.34	265.80	284.74	302.71	323.26	310.19	298.46	291.66	287.48	285.62
14	B1	376.96	408.50	427.77	441.27	456.39	429.01	409.14	394.94	385.77	380.68
15	B2	470.72	468.91	479.56	485.65	498.49	466.35	441.29	421.79	409.08	399.85
16	B3	763.94	677.89	666.64	670.29	687.02	638.71	611.56	593.13	577.21	567.42
17	Caa1	984.17	810.67	782.19	788.37	817.60	766.71	741.56	730.63	727.58	735.32
18	Caa2	1127.78	864.95	819.53	813.84	844.70	801.62	780.85	776.11	785.17	806.41
19	Caa3	2211.76	1608.35	1441.08	1394.89	1424.35	1332.79	1283.03	1264.73	1276.08	1321.70
20	Ca	6993.14	6993.14	6993.14	6993.14	6993.14	6993.14	6993.14	6993.14	6993.14	6993.14

Table B. Default Cost Margin (in bps) included in Table A 2008

PBR Credit Rating	Moody's\ WAL	1	2	3	4	5	6	7	8	9	10
1	Aaa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	Aa1	0.0	0.1	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4
3	Aa2	0.1	0.3	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9
4	Aa3	0.1	0.6	1.1	1.3	1.4	1.4	1.5	1.6	1.7	1.8
5	A1	0.3	1.2	2.2	2.4	2.5	2.6	2.7	2.8	2.9	3.1
6	A2	0.5	2.3	4.2	4.5	4.5	4.6	4.8	4.9	5.0	5.4
7	A3	1.9	4.9	6.9	7.0	7.0	7.3	7.5	7.6	7.8	8.1
8	Baa1	4.3	9.2	10.7	10.8	10.6	11.0	11.4	11.7	11.8	11.8
9	Baa2	12.4	19.8	23.8	26.2	27.6	26.7	27.4	28.0	28.0	17.6
10	Baa3	24.5	34.2	35.4	36.2	37.4	34.2	32.9	32.1	31.3	34.2
11	Ba1	54.4	71.1	70.9	71.0	72.7	65.6	61.4	58.9	56.8	61.0
12	Ba2	108.7	136.0	137.3	139.8	144.6	129.0	118.7	112.2	108.1	103.7
13	Ba3	154.9	148.9	146.3	153.0	166.2	147.3	134.3	127.9	124.8	124.9
14	B1	258.0	230.2	222.5	227.1	240.0	209.2	189.6	178.9	173.5	173.0
15	B2	348.8	260.2	230.1	222.7	231.4	193.1	165.4	148.4	138.3	133.1
16	B3	587.1	409.8	368.9	371.0	392.0	344.0	320.9	307.4	297.3	294.4
17	Caa1	818.3	513.1	439.6	441.5	475.9	423.6	403.1	393.9	389.7	395.2
18	Caa2	1,095.1	595.6	453.7	416.2	435.6	361.6	317.1	282.1	250.6	224.8
19	Caa3	2,164.5	1,290.9	1,017.4	999.6	1,131.9	987.6	918.2	870.1	841.8	843.8
20	Ca	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1	7,090.1

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Table B. Default Cost Margin (in bps) included in Table A as of December 2014

PBR Credit Rating	Moody's \ WAL	1	2	3	4	5	6	7	8	9	10
1	Aaa	0.02	0.01	0.03	0.05	0.06	0.07	0.07	0.07	0.08	0.08
2	Aa1	0.09	0.21	0.38	0.56	0.63	0.68	0.72	0.75	0.79	0.83
3	Aa2	0.22	0.57	0.99	1.25	1.39	1.45	1.48	1.52	1.59	1.67
4	Aa3	0.46	1.35	2.24	2.69	2.91	2.98	3.02	3.06	3.17	3.35
5	A1	0.90	2.63	4.44	5.04	5.36	5.40	5.43	5.43	5.59	5.91
6	A2	1.69	4.98	8.44	9.23	9.63	9.58	9.55	9.45	9.66	10.23
7	A3	3.12	6.01	8.95	9.97	10.72	10.39	10.38	10.26	10.35	10.75
8	Baa1	7.21	11.23	13.96	15.39	16.24	15.77	15.76	15.72	15.67	15.76
9	Baa2	14.50	20.31	22.40	24.16	25.41	24.87	25.13	25.29	24.99	24.46
10	Baa3	38.02	48.84	50.05	52.33	53.90	51.82	50.49	49.71	48.79	47.36
11	Ba1	66.78	79.32	80.92	84.26	86.95	80.86	76.35	73.39	70.96	68.43
12	Ba2	103.74	119.01	124.51	130.62	135.26	122.20	111.52	104.16	99.48	95.62
13	Ba3	125.36	138.85	146.55	155.36	166.50	151.02	138.31	129.46	122.82	118.01
14	B1	208.79	214.28	222.03	229.28	238.81	212.68	193.56	179.35	169.00	161.66
15	B2	254.35	241.40	243.63	246.21	253.83	225.67	204.06	187.21	175.08	165.61
16	B3	412.79	351.22	342.58	345.66	358.03	317.58	292.20	273.71	258.16	247.01
17	Caa1	520.13	412.97	394.37	398.52	418.19	376.72	352.30	337.44	328.17	325.76
18	Caa2	596.29	441.30	409.43	402.92	419.36	387.91	369.66	360.96	360.57	367.76
19	Caa3	1169.43	841.65	750.80	732.22	763.92	704.72	671.85	659.72	668.42	703.30
20	Ca	1199.83	1199.83	1199.83	1199.83	1199.83	1199.83	1199.83	1199.83	1199.83	1199.83

Table C. Empirical CTE 70 Default Rates (%) from Moody's Data as of February 2008

Rating\WAL	1	2	3	4	5	6	7	8	9	10
Aaa	0.0000	0.0942	0.1884	0.2825	0.3767	0.6800	0.9833	1.2866	1.5899	1.8932
Aa	0.0492	0.2182	0.3873	0.5563	0.7253	0.8800	1.0347	1.1895	1.3442	1.4989
A	0.0583	0.3600	0.6617	0.9634	1.2651	1.6266	1.9881	2.3496	2.7111	3.0726
Baa	0.5481	1.2977	2.0474	2.7971	3.5467	4.1928	4.8389	5.4850	6.1311	6.7771
Ba	2.6013	6.6703	10.7393	14.8082	18.8772	21.0961	23.3149	25.5337	27.7526	29.9714
B	9.9611	16.9257	23.8903	30.8549	37.8196	41.2080	44.5965	47.9850	51.3735	54.7619
Caa	34.5818	41.8637	49.1457	56.4277	63.7096	66.1152	68.5208	70.9263	73.3319	75.7375

Table C. Empirical CTE 70 Default Rates (%) from Moody's Data as of December 2014

Rating\WAL	1	2	3	4	5	6	7	8	9	10
Aaa	0.0000	0.0800	0.1599	0.2399	0.3198	0.5786	0.8373	1.0961	1.3548	1.6136
Aa	0.0929	0.3479	0.6030	0.8581	1.1131	1.2897	1.4662	1.6428	1.8194	1.9959
A	0.1523	0.6283	1.1043	1.5803	2.0563	2.6066	3.1569	3.7073	4.2576	4.8080
Baa	0.5181	1.2453	1.9725	2.6997	3.4268	4.0769	4.7269	5.3769	6.0270	6.6770
Ba	2.4446	6.2608	10.0770	13.8932	17.7095	20.0528	22.3961	24.7394	27.0827	29.4260
B	8.5472	15.3498	22.1524	28.9550	35.7576	38.9637	42.1698	45.3759	48.5820	51.7880
Caa-C	36.5179	44.6644	52.8108	60.9572	69.1037	72.3822	75.6607	78.9392	82.2178	85.4963

Table D. Cumulative Default Rates at CTE 70 derived from Moody's Data as of February 2008

Rating\ Term	1	2	3	4	5	6	7	8	9	10
Aaa	0.0001%	0.0003%	0.0011%	0.0027%	0.0043%	0.0061%	0.0080%	0.0103%	0.0129%	0.0157%
Aa1	0.0007%	0.0048%	0.0151%	0.0313%	0.0458%	0.0639%	0.0834%	0.1046%	0.1288%	0.1571%
Aa2	0.0017%	0.0128%	0.0393%	0.0701%	0.1004%	0.1354%	0.1715%	0.2107%	0.2576%	0.3142%
Aa3	0.0037%	0.0303%	0.0892%	0.1506%	0.2097%	0.2784%	0.3506%	0.4245%	0.5137%	0.6284%
A1	0.0071%	0.0590%	0.1770%	0.2818%	0.3855%	0.5020%	0.6271%	0.7492%	0.9001%	1.0997%
A2	0.0132%	0.1116%	0.3358%	0.5143%	0.6897%	0.8869%	1.0967%	1.2939%	1.5426%	1.8851%
A3	0.0473%	0.2391%	0.5445%	0.8051%	1.0781%	1.3844%	1.7146%	2.0290%	2.3877%	2.8277%
Baa1	0.1096%	0.4463%	0.8470%	1.2374%	1.6245%	2.0842%	2.5796%	3.0748%	3.5658%	4.0844%
Baa2	0.2684%	0.8635%	1.5933%	2.4024%	3.2287%	3.9116%	4.7777%	5.6428%	6.4307%	7.1958%
Baa3	0.6631%	1.9290%	3.2827%	4.7647%	6.2327%	7.3466%	8.5839%	9.8402%	11.0552%	12.1929%
Ba1	1.3735%	3.7110%	6.0086%	8.4083%	10.7897%	12.4098%	13.9960%	15.6215%	17.2477%	18.7890%
Ba2	2.5368%	6.5040%	10.3058%	14.2473%	18.0898%	20.2970%	22.2031%	24.1689%	26.2970%	28.3259%
Ba3	3.6955%	8.1474%	12.6022%	17.2882%	22.3370%	25.1659%	27.6984%	30.3257%	32.9668%	35.6626%
B1	6.1549%	12.3912%	18.5430%	24.4577%	30.3603%	33.3742%	36.2428%	39.0509%	41.9040%	44.8307%
B2	8.7700%	15.5309%	22.0600%	28.0790%	34.1026%	37.0125%	39.6120%	42.0311%	44.5486%	47.0164%
B3	14.2329%	22.1052%	29.8341%	37.2322%	44.5424%	47.7158%	51.1441%	54.4483%	57.3933%	60.3261%
Caa1	20.3231%	28.5079%	36.7603%	44.9831%	53.2154%	56.6807%	60.4333%	64.2277%	67.8897%	71.6386%
Caa2	28.5824%	36.2037%	44.2010%	52.0905%	60.1578%	63.2458%	66.4304%	69.6787%	73.0350%	76.3641%
Caa3	56.0548%	63.5055%	70.7783%	78.6366%	86.1597%	87.7061%	89.3719%	91.1008%	92.9422%	94.8089%
Ca	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%

Table D. Cumulative Default Rates at CTE 70 derived from Moody's Data as of December 2014

PBR Credit Rating	Moody's \ WAL	1	2	3	4	5	6	7	8	9	10
1	Aaa	0.0004	0.0008	0.0024	0.0059	0.0092	0.0127	0.0163	0.0205	0.0251	0.0299
2	Aa1	0.0023	0.0124	0.0343	0.0684	0.0979	0.1330	0.1688	0.2079	0.2515	0.2991
3	Aa2	0.0054	0.0331	0.0892	0.1531	0.2148	0.2819	0.3470	0.4189	0.5030	0.5983
4	Aa3	0.0116	0.0787	0.2023	0.3289	0.4486	0.5796	0.7097	0.8439	1.0029	1.1966
5	A1	0.0224	0.1533	0.4012	0.6155	0.8245	1.0451	1.2694	1.4893	1.7574	2.0940
6	A2	0.0420	0.2900	0.7613	1.1235	1.4753	1.8464	2.2198	2.5722	3.0118	3.5898
7	A3	0.0844	0.3805	0.8840	1.3352	1.8085	2.2401	2.7390	3.2152	3.7647	4.4499
8	Baa1	0.1953	0.7102	1.3751	2.0523	2.7251	3.3724	4.1208	4.8723	5.6223	6.4276
9	Baa2	0.3688	1.1922	2.0381	2.9671	3.9142	4.8494	5.9467	7.0488	8.0248	8.8997
10	Baa3	0.9113	2.6634	4.1989	5.8848	7.5559	9.1079	10.6844	12.2921	13.7957	15.0801
11	Ba1	1.5669	4.2058	6.5817	9.1248	11.6575	13.6119	15.5018	17.4373	19.3168	21.0237
12	Ba2	2.3870	6.1300	9.7142	13.4291	17.0506	19.3646	21.3869	23.4624	25.6933	27.8265
13	Ba3	3.2365	7.4574	11.7245	16.2226	21.0722	23.8314	26.3111	28.8810	31.4630	34.0982
14	B1	5.3904	11.3417	17.2515	22.9503	28.6411	31.6045	34.4276	37.1904	39.9925	42.8641
15	B2	6.7312	12.9610	19.1944	25.0165	30.9095	33.9058	36.6362	39.2060	41.8711	44.4988
16	B3	10.9241	18.4475	25.9587	33.1713	40.3719	43.7108	47.3021	50.7886	53.9438	57.0959
17	Caa1	14.0734	21.8410	29.9421	38.0252	46.2950	50.1804	54.3728	58.6373	62.7962	67.0761
18	Caa2	16.1270	23.2074	31.1980	39.0367	47.4633	51.8329	56.3429	60.9803	65.7630	70.6311
19	Caa3	31.6276	40.7085	49.9568	58.9305	67.9784	71.8793	75.8006	79.7282	83.6881	87.6913
20	Ca	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000

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Table El. Development of Prescribed Recovery Rates from Moody's Data as of February 2008

Moody's 2008-02-11 Special Comment Corporate Default & Recovery Rates 1920–2007

Sorted Version of Exhibit 22–Annual Average Defaulted Bond and Loan Recovery Rates, 1982–2007*

Summary Statistics

Sr. Secured Bank Loans	Sr. Secured Bonds	Sr. U1 Secured Bonds	Sr. Subordinated Bonds	Subordinated Bonds	Jr. Subordinated Bonds	All Bonds
51.40	33.81	21.45	19.82	12.31	7.79	22.21
53.40	37.98	23.81	20.75	15.94	10.70	25.18
58.80	39.23	29.69	23.21	18.19	13.50	25.50
61.13	40.00	35.79	25.64	19.09	15.50	30.18
66.16	43.00	36.66	26.06	22.60	16.85	32.31
67.59	46.54	37.01	28.01	24.42	30.58	34.33
67.74	47.58	37.13	29.61	24.51	36.50	35.53
68.32	48.14	38.04	30.88	26.36	47.00	35.57
73.43	48.37	41.63	33.41	29.99	48.50	38.98
74.67	48.39	41.87	34.30	31.86	62.00	39.65
75.25	55.40	43.81	34.57	33.77	NA	40.69
75.44	59.22	45.24	37.27	35.64	NA	41.54
75.82	62.02	47.60	41.41	35.96	NA	43.08
76.02	62.05	49.19	41.82	38.04	NA	43.28
78.75	63.46	49.41	43.50	38.23	NA	43.64
82.07	69.25	51.02	43.75	39.42	NA	43.66
87.74	71.00	52.60	44.73	40.54	NA	45.49
88.23	71.93	52.72	44.81	41.54	NA	45.57
NA	72.50	53.73	44.99	42.58	NA	45.89
NA	73.25	54.25	46.54	44.15	NA	48.38
NA	74.63	54.88	48.09	44.26	NA	49.39
NA	75.50	55.02	49.40	46.89	NA	50.48
NA	80.54	56.10	50.16	51.25	NA	53.53
NA	83.63	60.16	51.91	56.11	NA	55.02
NA	NA	62.73	54.47	94.00	NA	55.97
NA	NA	62.75	67.88	NA	NA	59.12

**Issuer-weighted, based on 30-day post-default market prices. Discounted debt excluded.*
***Loan recoveries in 2007 are based on five 1oans from two issuers. One of the five 1oans is 2nd lien debt.*

# Observations	18	24	26	26	25	10	26
1-70 CTE	30%	30%	30%	30%	30%	30%	30%
# Obs for 70 CTE	5.4	7.2	7.8	7.8	7.5	3.0	7.8
Low 70 CTE Est	59.7%	40.1%	30.7%	23.9%	18.8%	10.7%	28.3%
High 70 CTE Est	60.9%	41.2%	31.6%	24.7%	19.6%	11.9%	29.3%
70 CTE	60.2%	40.3%	31.5%	24.6%	19.2%	10.7%	29.1%
Mean	71.2%	58.6%	45.9%	39.1%	36.3%	28.9%	41.7%
Margin	11.0%	18.3%	14.5%	14.5%	17.1%	18.2%	12.6%

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Table El. Development of Prescribed Recovery Rates from Moody's Data as of December 2014

Sorted Version of Exhibit 22–Annual Average Defaulted Bond and Loan Recovery Rates, 1982–2014*

Summary Statistics

Sr. Secured Bank Loans	Sr. Secured Bonds	Sr. U1 Secured Bonds	Sr. Subordinated Bonds	Subordinated Bonds	Jr. Subordinated Bonds	All Bonds
53.4%	31.7%	21.2%	19.8%	12.3%	7.0%	21.58%
53.6%	33.8%	24.2%	20.7%	15.9%	7.8%	25.14%
56.7%	36.0%	29.5%	20.8%	18.2%	10.7%	25.57%
58.4%	37.5%	33.2%	21.4%	18.9%	13.5%	29.67%
60.6%	38.6%	35.8%	22.7%	22.6%	16.9%	32.32%
61.7%	40.0%	36.7%	23.3%	23.4%	30.6%	33.83%
64.9%	46.5%	36.9%	25.5%	23.6%	36.5%	33.85%
66.4%	46.8%	37.1%	26.9%	24.4%	40.0%	33.93%
67.6%	47.6%	38.0%	29.6%	26.4%	47.0%	35.32%
67.9%	48.4%	38.2%	29.6%	26.8%	48.5%	35.51%
68.6%	50.6%	39.5%	32.8%	30.0%	62.0%	38.3%
68.8%	51.2%	41.3%	33.4%	31.9%	NA	38.8%
70.9%	54.9%	41.9%	33.7%	33.1%	NA	41.4%
70.9%	55.4%	43.0%	34.3%	33.7%	NA	41.5%
72.0%	59.2%	43.3%	35.3%	33.8%	NA	43.1%
73.4%	59.5%	43.6%	36.7%	35.4%	NA	43.3%
73.5%	59.8%	43.8%	37.5%	35.6%	NA	43.6%
75.1%	62.0%	45.2%	37.8%	37.3%	NA	44.5%
75.4%	62.1%	47.6%	41.4%	38.0%	NA	44.7%
78.4%	62.5%	49.2%	41.8%	38.0%	NA	45.5%
78.8%	63.3%	49.4%	42.3%	38.8%	NA	45.6%
83.6%	69.2%	51.1%	43.5%	39.7%	NA	45.9%
83.8%	69.3%	51.5%	43.8%	41.1%	NA	46.3%
85.5%	71.0%	52.1%	44.7%	41.4%	NA	46.8%
87.7%	71.9%	52.7%	45.0%	41.5%	NA	47.4%
NA	72.5%	53.7%	46.5%	44.1%	NA	47.8%
NA	73.3%	53.7%	46.8%	44.3%	NA	48.8%
NA	74.6%	54.9%	46.9%	45.3%	NA	51.3%
NA	75.5%	55.0%	48.1%	46.9%	NA	51.8%
NA	80.6%	56.1%	49.4%	51.3%	NA	55.0%
NA	83.6%	60.2%	51.9%	56.1%	NA	55.1%
NA	NA	62.8%	56.2%	94.0%	NA	56.5%
NA	NA	63.8%	67.9%	NA	NA	58.5%

**Issuer-weighted, based on 30-day post-default market prices. Discounted debt excluded.*

# Observations	25	31	33	33	32	11	33
1-70 CTE	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
# Obs for 70CTE	7.5	9.3	9.9	9.9	9.6	3.3	9.9
Low 70 CTE Est	57.4%	38.9%	31.8%	22.6%	19.9%	7.4%	29.5%
High 70 CTE Est	58.5%	39.9%	32.5%	23.4%	20.6%	8.5%	30.1%
70 CTE	57.9%	39.2%	32.4%	23.3%	20.4%	7.7%	30.1%
Mean	70.3%	57.7%	45.0%	37.5%	35.7%	29.1%	42.1%
Margin	12.4%	18.5%	12.6%	14.2%	15.4%	21.4%	12.0%

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Table E2. Prescribed Recovery Rates from Moody's Data as of February 2008

PBR Credit Rating	Moody's Rating	Recovery Rate
1	Aaa	41.7%
2	Aa1	41.7%
3	Aa2	41.7%
4	Aa3	41.7%
5	A1	41.7%
6	A2	41.7%
7	A3	41.7%
8	Baa1	41.7%
9	Baa2	39.2%
10	Baa3	36.7%
11	Ba1	34.1%
12	Ba2	31.6%
13	Ba3	29.1%
14	B1	29.1%
15	B2	29.1%
16	B3	29.1%
17	Caa1	29.1%
18	Caa2	29.1%
19	Caa3	29.1%
20	Ca	29.1%

Table E2. Prescribed Recovery Rates from Moody's as of December 2014

PBR Credit Rating	Moody's Rating	Recovery Rate
1	Aaa	42.07
2	Aa1	42.07
3	Aa2	42.07
4	Aa3	42.07
5	A1	42.07
6	A2	42.07
7	A3	42.07
8	Baa1	42.07
9	Baa2	39.67
10	Baa3	37.27
11	Ba1	34.87
12	Ba2	32.47
13	Ba3	30.07
14	B1	30.07
15	B2	30.07
16	B3	30.07
17	Caa1	30.07
18	Caa2	30.07
19	Caa3	30.07
20	Ca	30.07

Table F. Illustrative Current Market Benchmark Spreads as of Sept. 30, 2009, for Investment Grade Bonds

WAL	Investment Grade PBR Credit Rating and Moody's/S&P Ratings									
	1	2	3	4	5	6	7	8	9	10
	Aaa/ AAA	Aa1/ AA+	Aa2/AA	Aa3/ AA-	A1/A+	A2/A	A3/A-	Baa1/ BBB+	Baa2/ BBB	Baa3/ BBB-
1	108.9	114.6	120.3	128.6	136.9	145.2	176.6	208.1	239.5	338.7
2	116.4	122.1	127.8	136.1	144.4	152.7	182.8	212.9	243.0	340.4
3	123.9	129.6	135.3	143.6	151.9	160.2	189.0	217.7	246.5	342.2
4	131.3	137.0	142.7	151.0	159.3	167.6	195.0	222.5	249.9	343.9
5	138.8	144.5	150.2	158.5	166.8	175.1	201.2	227.2	253.3	345.6
6	146.2	151.9	157.6	165.9	174.2	182.5	207.2	232.0	256.7	347.3
7	153.7	159.4	165.1	173.4	181.7	190.0	213.4	236.8	260.2	349.0
8	156.6	162.3	168.0	176.3	184.6	192.9	215.8	238.6	261.5	349.7
9	159.5	165.2	170.9	179.2	187.5	195.8	218.2	240.5	262.9	350.4
10	162.4	168.1	173.8	182.1	190.4	198.7	220.5	242.4	264.2	351.0
11	163.3	169.0	174.7	183.0	191.3	199.6	221.3	242.9	264.6	351.2
12	164.1	169.8	175.5	183.8	192.1	200.4	221.9	243.5	265.0	351.4
13	165.0	170.7	176.4	184.7	193.0	201.3	222.7	244.0	265.4	351.6
14	165.8	171.5	177.2	185.5	193.8	202.1	223.3	244.6	265.8	351.8
15	166.7	172.4	178.1	186.4	194.7	203.0	224.1	245.1	266.2	352.0
16	167.5	173.2	178.9	187.2	195.5	203.8	224.7	245.6	266.5	352.2
17	168.4	174.1	179.8	188.1	196.4	204.7	225.4	246.2	266.9	352.4
18	169.2	174.9	180.6	188.9	197.2	205.5	226.1	246.7	267.3	352.6
19	170.1	175.8	181.5	189.8	198.1	206.4	226.8	247.3	267.7	352.8
20	170.9	176.6	182.3	190.6	198.9	207.2	227.5	247.8	268.1	353.0
21	171.8	177.5	183.2	191.5	199.8	208.1	228.2	248.4	268.5	353.2
22	172.6	178.3	184.0	192.3	200.6	208.9	228.9	248.9	268.9	353.4
23	173.5	179.2	184.9	193.2	201.5	209.8	229.6	249.5	269.3	353.6
24	174.3	180.0	185.7	194.0	202.3	210.6	230.3	250.0	269.7	353.8
25	175.2	180.9	186.6	194.9	203.2	211.5	231.0	250.6	270.1	354.0
26	176.0	181.7	187.4	195.7	204.0	212.3	231.7	251.0	270.4	354.1
27	176.9	182.6	188.3	196.6	204.9	213.2	232.4	251.6	270.8	354.3
28	177.7	183.4	189.1	197.4	205.7	214.0	233.1	252.1	271.2	354.5
29	178.6	184.3	190.0	198.3	206.6	214.9	233.8	252.7	271.6	354.7
30	179.4	185.1	190.8	199.1	207.4	215.7	234.5	253.2	272.0	354.9

Table F. Illustrative Current Market Benchmark Spreads as of Sept. 30, 2015, for Investment Grade Bonds

WAL	Investment Grade PBR Credit Rating and Moody's/S&P Ratings									
	1	2	3	4	5	6	7	8	9	10
	Aaa/ AAA	Aa1/ AA+	Aa2/A A	Aa3/ AA-	A1/A+	A2/A	A3/A-	Baa1/ BBB+	Baa2/ BBB	Baa3/ BBB-
1	27.11	38.26	49.41	58.12	66.84	75.55	91.10	106.65	122.20	225.83
2	34.97	47.02	59.06	67.20	75.34	83.48	101.59	119.69	137.80	233.63
3	42.84	55.77	68.71	76.28	83.84	91.41	112.07	132.74	153.40	241.43
4	50.70	64.53	78.36	85.35	92.35	99.34	122.56	145.78	169.00	249.23
5	57.92	72.35	86.79	93.96	101.13	108.30	133.99	159.68	185.38	257.42
6	65.13	80.18	95.22	102.57	109.91	117.26	145.42	173.59	201.75	265.61
7	72.36	89.78	107.19	112.83	118.46	124.10	151.88	179.67	207.45	268.46
8	79.60	99.38	119.16	123.08	127.01	130.93	158.34	185.75	213.16	271.31
9	86.83	104.37	121.90	127.19	132.48	137.77	164.80	191.83	218.86	274.16
10	89.47	107.06	124.64	129.93	135.23	140.52	167.79	195.06	222.33	275.90
11	92.11	109.75	127.38	132.68	137.97	143.27	170.78	198.29	225.80	277.63
12	94.76	112.44	130.12	135.42	140.72	146.02	173.77	201.52	229.27	279.37
13	97.40	115.13	132.86	138.16	143.46	148.76	176.75	204.74	232.73	281.10
14	100.04	117.82	135.60	140.91	146.21	151.51	179.74	207.97	236.20	282.84
15	102.68	120.51	138.34	143.65	148.96	154.26	182.73	211.20	239.67	284.57
16	105.33	123.21	141.08	146.39	151.70	157.01	185.72	214.43	243.14	286.30
17	107.97	125.90	143.83	149.14	154.45	159.76	188.71	217.66	246.61	288.04
18	110.61	128.59	146.57	151.88	157.19	162.51	191.70	220.89	250.08	289.77
19	113.25	131.28	149.31	154.62	159.94	165.26	194.69	224.12	253.55	291.51
20	115.89	133.97	152.05	157.37	162.69	168.01	197.68	227.35	257.02	293.24
21	118.54	136.66	154.79	160.11	165.43	170.75	200.66	230.57	260.48	294.98
22	121.18	139.35	157.53	162.85	168.18	173.50	203.65	233.80	263.95	296.71
23	123.82	142.04	160.27	165.60	170.92	176.25	206.64	237.03	267.42	298.44
24	126.46	144.74	163.01	168.34	173.67	179.00	209.63	240.26	270.89	300.18
25	129.11	147.43	165.75	171.08	176.42	181.75	212.62	243.49	274.36	301.91
26	131.75	150.12	168.49	173.83	179.16	184.50	215.61	246.72	277.83	303.65
27	134.39	152.81	171.23	176.57	181.91	187.25	218.60	249.95	281.30	305.38
28	137.03	155.50	173.97	179.31	184.65	189.99	221.58	253.17	284.76	307.12
29	139.67	158.19	176.71	182.06	187.40	192.74	224.57	256.40	288.23	308.85
30	142.32	160.88	179.45	184.80	190.15	195.49	227.56	259.63	291.70	310.58

Table G. Illustrative Current Market Benchmark Spreads as of Sept. 30, 2009, for Below Investment Grade Bonds

WAL	Below Investment Grade PBR Credit Rating and Moody's/S&P Ratings									
	11	12	13	14	15	16	17	18	19	20
	Ba1/BB+	Ba2/BB	Ba3/BB-	B1/B+	B2/B	B3/B-	Caa1/ CCC+	Caa2/ CCC	Caa3/ CCC-	Ca/CC
1	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
2	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
3	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
4	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
5	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
6	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
7	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
8	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
9	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
10	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
11	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
12	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
13	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
14	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
15	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
16	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
17	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
18	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
19	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
20	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
21	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
22	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
23	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
24	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
25	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
26	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
27	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
28	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
29	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9
30	437.8	529.8	596.8	663.9	730.9	876.8	1,022.8	1,168.7	1,314.7	1,478.9

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Table G. Illustrative Current Market Benchmark Spreads as of Sept. 30, 2015, for Below Investment Grade Bonds

WAL	Below Investment Grade PBR Credit Rating and Moody's/S&P Ratings									
	11	12	13	14	15	16	17	18	19	20
	Ba1/BB+	Ba2/BB	Ba3/BB-	B1/B+	B2/B	B3/B-	Caa1/ CCC+	Caa2/ CCC	Caa3/ CCC-	Ca/CC
1	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
2	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
3	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
4	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
5	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
6	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
7	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
8	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
9	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
10	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
11	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
12	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
13	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
14	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
15	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
16	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
17	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
18	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
19	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
20	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
21	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
22	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
23	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
24	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
25	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
26	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
27	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
28	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
29	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72
30	329.47	392.96	456.45	519.95	583.44	761.50	939.55	1117.61	1295.67	1473.72

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Table H. Long-Term Benchmark Spreads as of Sept. 30, 2009, for Investment Grade Bonds

WAL	Investment Grade PBR Credit Rating and Moody's/S&P Ratings									
	1	2	3	4	5	6	7	8	9	10
	Aaa/ AAA	Aa1/AA+	Aa2/AA	Aa3/AA-	A1/A+	A2/A	A3/A-	Baa1/ BBB+	Baa2/ BBB	Baa3/ BBB-
1	60.3	68.3	76.3	83.4	90.5	97.6	125.0	152.5	179.9	242.2
2	66.0	74.0	82.0	89.3	96.6	103.9	130.3	156.6	183.0	243.8
3	71.7	79.7	87.7	95.2	102.7	110.2	135.5	160.8	186.1	245.3
4	77.4	85.4	93.4	101.1	108.7	116.4	140.7	164.9	189.2	246.9
5	83.1	91.1	99.1	107.0	114.8	122.7	145.9	169.1	192.3	248.4
6	88.8	96.8	104.8	112.8	120.9	128.9	151.0	173.2	195.3	249.9
7	94.5	102.5	110.5	118.7	127.0	135.2	156.3	177.3	198.4	251.5
8	96.7	104.7	112.7	121.0	129.4	137.7	158.3	179.0	199.6	252.1
9	99.0	107.0	115.0	123.4	131.7	140.1	160.3	180.6	200.8	252.7
10	101.2	109.2	117.2	125.7	134.1	142.6	162.4	182.2	202.0	253.3
11	101.9	109.9	117.9	126.4	134.8	143.3	163.0	182.7	202.4	253.5
12	102.5	110.5	118.5	127.0	135.5	144.0	163.6	183.1	202.7	253.6
13	103.2	111.2	119.2	127.7	136.2	144.7	164.2	183.6	203.1	253.8
14	103.8	111.8	119.8	128.4	136.9	145.5	164.8	184.1	203.4	254.0
15	104.5	112.5	120.5	129.1	137.6	146.2	165.4	184.6	203.8	254.2
16	105.1	113.1	121.1	129.7	138.3	146.9	166.0	185.0	204.1	254.3
17	105.8	113.8	121.8	130.4	139.0	147.6	166.6	185.5	204.5	254.5
18	106.4	114.4	122.4	131.0	139.7	148.3	167.1	186.0	204.8	254.7
19	107.1	115.1	123.1	131.7	140.4	149.0	167.7	186.5	205.2	254.9
20	107.7	115.7	123.7	132.4	141.1	149.8	168.4	187.0	205.6	255.1
21	108.4	116.4	124.4	133.1	141.8	150.5	169.0	187.4	205.9	255.2
22	109.0	117.0	125.0	133.7	142.5	151.2	169.6	187.9	206.3	255.4
23	109.7	117.7	125.7	134.4	143.2	151.9	170.1	188.4	206.6	255.6
24	110.3	118.3	126.3	135.1	143.8	152.6	170.7	188.9	207.0	255.8
25	111.0	119.0	127.0	135.8	144.5	153.3	171.3	189.3	207.3	255.9
26	111.6	119.6	127.6	136.4	145.2	154.0	171.9	189.8	207.7	256.1
27	112.3	120.3	128.3	137.1	146.0	154.8	172.5	190.3	208.0	256.3
28	112.9	120.9	128.9	137.8	146.6	155.5	173.1	190.8	208.4	256.5
29	113.6	121.6	129.6	138.5	147.3	156.2	173.7	191.2	208.7	256.6
30	114.2	122.2	130.2	139.1	148.0	156.9	174.3	191.7	209.1	256.8

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Table H. Long-Term Benchmark Spreads as of Sept. 30, 2015, for Investment Grade Bonds

WAL	Investment Grade PBR Credit Rating and Moody's/S&P Ratings									
	1	2	3	4	5	6	7	8	9	10
	Aaa/ AAA	Aa1/AA+	Aa2/AA	Aa3/AA-	A1/A+	A2/A	A3/A-	Baa1/ BBB+	Baa2/ BBB	Baa3/ BBB-
1	44.26	50.93	57.61	68.24	78.86	89.49	114.53	139.58	164.63	244.90
2	51.12	59.66	68.20	78.56	88.92	99.28	123.43	147.58	171.73	248.45
3	57.99	68.39	78.79	88.89	98.98	109.08	132.33	155.58	178.84	252.00
4	64.85	77.12	89.38	99.21	109.04	118.87	141.23	163.58	185.94	255.56
5	71.07	83.73	96.40	106.71	117.02	127.34	150.04	172.75	195.45	260.31
6	77.28	90.35	103.41	114.21	125.00	135.80	158.85	181.91	204.96	265.07
7	78.99	93.05	107.11	117.13	127.15	137.17	160.06	182.94	205.83	265.50
8	80.71	95.76	110.81	120.06	129.30	138.55	161.26	183.98	206.69	265.93
9	82.42	98.47	114.51	122.98	131.45	139.92	162.47	185.01	207.56	266.36
10	83.92	99.87	115.81	124.19	132.57	140.95	163.44	185.93	208.42	266.80
11	85.42	101.27	117.12	125.41	133.70	141.99	164.42	186.85	209.29	267.23
12	86.93	102.67	118.42	126.62	134.82	143.02	165.40	187.77	210.15	267.66
13	88.43	104.08	119.72	127.84	135.95	144.06	166.38	188.70	211.02	268.09
14	89.93	105.48	121.03	129.05	137.07	145.09	167.36	189.62	211.88	268.53
15	91.43	106.88	122.33	130.26	138.20	146.13	168.33	190.54	212.75	268.96
16	92.93	108.28	123.63	131.48	139.32	147.16	169.31	191.46	213.61	269.39
17	94.43	109.69	124.94	132.69	140.44	148.20	170.29	192.38	214.48	269.82
18	95.94	111.09	126.24	133.90	141.57	149.23	171.27	193.30	215.34	270.26
19	97.44	112.49	127.54	135.12	142.69	150.27	172.25	194.23	216.21	270.69
20	98.94	113.89	128.85	136.33	143.82	151.30	173.22	195.15	217.07	271.12
21	100.44	115.30	130.15	137.55	144.94	152.34	174.20	196.07	217.94	271.55
22	101.94	116.70	131.45	138.76	146.06	153.37	175.18	196.99	218.80	271.99
23	103.44	118.10	132.76	139.97	147.19	154.41	176.16	197.91	219.67	272.42
24	104.95	119.50	134.06	141.19	148.31	155.44	177.14	198.83	220.53	272.85
25	106.45	120.91	135.36	142.40	149.44	156.47	178.11	199.75	221.40	273.28
26	107.95	122.31	136.67	143.61	150.56	157.51	179.09	200.68	222.26	273.72
27	109.45	123.71	137.97	144.83	151.69	158.54	180.07	201.60	223.13	274.15
28	110.95	125.11	139.27	146.04	152.81	159.58	181.05	202.52	223.99	274.58
29	112.46	126.52	140.58	147.26	153.93	160.61	182.03	203.44	224.86	275.01
30	113.96	127.92	141.88	148.47	155.06	161.65	183.01	204.36	225.72	275.45

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Table I. Long-Term Benchmark Spreads as of Sept. 30, 2009, for Below Investment Grade Bonds

WAL	Below Investment Grade PBR Credit Rating and Moody's/S&P Ratings									
	11	12	13	14	15	16	17	18	19	20
	Ba1/BB+	Ba2/BB	Ba3/BB-	B1/B+	B2/B	B3/B-	Caa1/ CCC+	Caa2/ CCC	Caa3/ CCC-	Ca/CC
1	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
2	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
3	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
4	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
5	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
6	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
7	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
8	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
9	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
10	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
11	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
12	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
13	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
14	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
15	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
16	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
17	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
18	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
19	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
20	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
21	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
22	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
23	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
24	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
25	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
26	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
27	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
28	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
29	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4
30	304.5	360.4	442.8	525.3	607.7	823.6	1,039.6	1,255.5	1,471.4	1,724.4

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Table I. Long-Term Benchmark Spreads as of Sept. 30 2015, for Below Investment Grade Bonds

WAL	Below Investment Grade PBR Credit Rating and Moody's/S&P Ratings									
	11	12	13	14	15	16	17	18	19	20
	Ba1/BB+	Ba2/BB	Ba3/BB-	B1/B+	B2/B	B3/B-	Caa1/ CCC+	Caa2/ CCC	Caa3/ CCC-	Ca/CC
1	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
2	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
3	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
4	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
5	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
6	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
7	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
8	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
9	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
10	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
11	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
12	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
13	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
14	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
15	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
16	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
17	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
18	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
19	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
20	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
21	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
22	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
23	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
24	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
25	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
26	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
27	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
28	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
29	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1
30	325.2	386.4	447.6	508.9	570.1	769.3	968.5	1,167.7	1,366.9	1,566.1

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Table J. Long-Term Benchmark Swap Spreads

(85% Conditional Mean—July 2000 through September 2009)

WAL	Swap Spread
3 M	29.3
6 M	29.9
1 Y	38.8
2 Y	47.5
3 Y	52.3
4 Y	53.4
5 Y	55.2
6 Y	55.4
7 Y	53.8
8 Y	50.6
9 Y	47.0
10 Y	43.6
11 Y	40.0
12 Y	37.7
13 Y	34.9
14 Y	33.3
15 Y	33.0
16 Y	31.7
17 Y	31.4
18 Y	32.0
19 Y	33.3
20 Y	35.1
21 Y	35.7
22 Y	36.4
23 Y	37.4
24 Y	38.5
25 Y	39.7
26 Y	40.7
27 Y	41.7
28 Y	42.7
29 Y	43.8
30 Y	44.2

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Table J. Long-Term Benchmark Swap Spreads

(85% Conditional Mean—July 2000 through September 2015)

WAL	Swap Spread
3M	20.42
6M	26.20
1	29.11
2	32.52
3	35.45
4	36.48
5	36.72
6	36.14
7	34.24
8	31.07
9	27.40
10	23.91
11	21.03
12	18.69
13	16.82
14	15.39
15	14.34
16	13.61
17	13.16
18	12.95
19	12.93
20	13.09
21	13.30
22	13.51
23	13.73
24	13.97
25	14.23
26	14.47
27	14.64
28	14.73
29	14.71
30	14.59

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Table K. Conversion from NAIC ARO Ratings and NAIC Designations to PBR Numeric Rating

Moody's Rating	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3
S&P Rating	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-
Fitch Rating	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-
DBRS Rating	AAA	AA high	AA	AA low	A high	A	A low	BBB high	BBB	BBB low
RealPoint Rating	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-
AM Best Rating	aaa	aa+	aa	aa-	a+	a	a-	bbb+	bbb	bbb-
NAIC Designation	1	1	1	1	1	1	1	2	2	2
NAIC Commercial Mortgage Designation							1			2
Numeric Rating	1	2	3	4	5	6	7	8	9	10

Moody's Rating	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Ca
S&P Rating	BB+	BB	BB-	B+	B	B-	CCC+	CCC	CCC-	CC
Fitch Rating	BB+	BB	BB-	B+	B	B-	CCC+	CCC	CCC-	CC
DBRS Rating	BB high	BB	BB low	B high	B	B low	CCC	CCC	CCC low	CC
RealPoint Rating	BB+	BB	BB-	B+	B	B-	CCC+	CCC	CCC-	D
AM Best Rating	bb+	bb	bb-	b+	b	b-	ccc+	ccc	ccc-	cc
NAIC Designation	3	3	3	4	4	4	5	5	5	6
NAIC Commercial Mortgage Designation	3	4	5							
Numeric Rating	11	12	13	14	15	16	17	18	19	20

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

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Section 1: Background

A. Purpose

These requirements constitute the Commissioners Annuity Reserve Valuation Method (CARVM) for variable annuity contracts by defining the assumptions and methodologies that will comply with the Standard Valuation Law. It also applies similar assumptions and methodologies to contracts that contain characteristics similar to those described in the scope but that are not directly subject to CARVM.

The contracts subject to these requirements may be aggregated with the contracts subject to *Actuarial Guideline XLIII—CARVM For Variable Annuities* (AG 43), published in Appendix C of the AP&P Manual, for purposes of performing and documenting the reserve calculations.

Guidance Note: It is intended that VM-21 requirements will mirror the requirements of AG 43, and reserves for contracts subject to both VM-21 and AG 43 may be computed as a single group. If a company chooses to aggregate business subject to AG 43 with business subject to VM-21 in calculating the reserve, then the provisions in VM-G apply to this aggregate PBR valuation.

B. Principles

The projection methodology used to calculate the CTE amount, as well as the approach used to develop the Alternative Methodology, is based on the following set of principles. These principles should be followed when applying the methodology in these requirements and analyzing the resulting reserves.

Guidance Note: The principles should be considered in their entirety, and it is required that companies meet these principles with respect to only those contracts that fall within the scope of these requirements and are in force as of the valuation date to which these requirements are applied.

Principle 1: The objective of the approach used to determine the CTE amount is to quantify the amount of statutory reserves needed by the company to be able to meet contractual obligations in light of the risks to which the company is exposed.

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Principle 2: The calculation of the CTE amount is based on the results derived from an analysis of asset and liability cash flows produced by the application of a stochastic cash-flow model to equity return and interest rate scenarios. For each scenario, the greatest present value of accumulated surplus deficiency is calculated. The analysis reflects prudent estimate assumptions for deterministic variables and is performed in aggregate (subject to limitations related to contractual provisions) to allow the natural offset of risks within a given scenario. The methodology uses a projected total statutory balance sheet approach by including all projected income, benefit and expense items related to the business in the model and sets the CTE amount at a degree of confidence using the CTE measure applied to the set of scenario specific greatest present values of accumulated statutory deficiencies that is deemed to be reasonably conservative over the span of economic cycles.

Guidance Note: Examples where full aggregation between contracts may not be possible include experience rated group contracts and the operation of reinsurance treaties.

Principle 3: The implementation of a model involves decisions about the experience assumptions and the modeling techniques to be used in measuring the risks to which the company is exposed. Generally, 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 CTE amount at the required CTE 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 CTE amount, the actuary should be guided by evolving practice and expanding knowledge base in the measurement and management of risk.

Guidance Note: The intent of Principle 3 is to describe the conceptual framework for setting assumptions. Section 11 provides the requirements and guidance for setting contract-holder behavior and includes alternatives to this framework if the actuary is unable to fully apply this principle.

Principle 4: 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 CTE amount 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. Any disconnect between the model and reality should be reflected in setting prudent estimate assumptions to the extent not addressed by other means.

Principle 5: 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 CTE amount. 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 reduce the calculated CTE amount without also reducing risk on scenarios similar to those used in the actual cash-flow modeling are inconsistent with these principles. 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.

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C. Risks Reflected

1. The risks reflected in the calculation of reserves under these requirements arise from actual or potential events or activities that are both:

   a. Directly related to the contracts falling under the scope of these requirements or their supporting assets.

   b. Capable of materially affecting the reserve.

2. Categories and examples of risks reflected in the reserve calculations include, but are not necessarily limited to:

   a. Asset Risks

      i. Separate account fund performance.

      ii. Credit risks (e.g., default or rating downgrades).

      iii. Commercial mortgage loan rollover rates (roll-over of bullet loans).

      iv. Uncertainty in the timing or duration of asset cash flows (e.g., shortening (prepayment risk) and lengthening (extension risk).

      v. Performance of equities, real estate and Schedule BA assets.

      vi. Call risk on callable assets.

      vii. Risk associated with hedge instrument (includes basis, gap, price, parameter estimation risks and variation in assumptions).

      viii. Currency risk.

   b. Liability Risks

      i. Reinsurer default, impairment or rating downgrade known to have occurred before or on the valuation date.

      ii. Mortality/longevity, persistency/lapse, partial withdrawal and premium payment risks.

      iii. Utilization risk associated with guaranteed living benefits.

      iv. Anticipated mortality trends based on observed patterns of mortality improvement or deterioration, where permitted.

      v. Annuitization risks.

      vi. Additional premium dump-ins (high interest rate guarantees in low interest rate environments).

   c. Combination Risks

      i. Risks modeled in the company's risk assessment processes that are related to the contracts, as described above.

ii. Disintermediation risk (including such risk related to payment of surrender or partial withdrawal benefits).

iii. Risks associated with revenue-sharing income.

3. The risks not necessarily reflected in the calculation of reserves under these requirements are:

a. Those not reflected in the determination of risk-based capital.

b. Those reflected in the determination of RBC but arising from obligations of the company not directly related to the contracts falling under the scope of these requirements, or their supporting assets, as described above.

4. Categories and examples of risks not reflected in the reserve calculations include, but are not necessarily limited to:

a. Asset risks

b. Liquidity risks associated with a "run on the bank"

c. Liability risks

i. Reinsurer default, impairment or rating downgrade occurring after the valuation date.

ii. Catastrophic events (e.g., epidemics or terrorist events).

iii. Major breakthroughs in life extension technology that have not yet fundamentally altered recently observed mortality experience.

iv. Significant future reserve increases as an unfavorable scenario is realized.

d. General business risks

i. Deterioration of reputation.

ii. Future changes in anticipated experience (reparameterization in the case of stochastic processes), which would be triggered if and when adverse modeled outcomes were to actually occur.

iii. Poor management performance.

iv. The expense risks associated with fluctuating amounts of new business.

v. Risks associated with future economic viability of the company.

vi. Moral hazards.

vii. Fraud and theft.

D. Scope

1. The following categories of annuities or product features, directly written or assumed through reinsurance, are covered by this section of the *Valuation Manual*:

a. Variable deferred annuity contracts subject to the CARVM, whether or not such contracts contain GMDBs or VAGLBs.

b. Variable immediate annuity contracts, whether or not such contracts contain GMDBs or VAGLBs.

c. Group annuity contracts that are not subject to CARVM, but contain guarantees similar in nature to GMDBs, VAGLBs or any combination thereof.

Guidance Note: The term "similar in nature" as used in this Subsection D.1.c and D.1.d is intended to capture current products and benefits, as well as product and benefit designs that may emerge in the future. Examples of the currently known designs are listed in Subsection D.1.d. Any product or benefit design that does not clearly fit the scope should be evaluated on a case-by-case basis taking into consideration factors that include, but are not limited to, the nature of the guarantees, the definitions of GMDB and VAGLB in Subsection E.1.a and E.1.b, and whether the contractual amounts paid in the absence of the guarantee are based on the investment performance of a market-value fund or market-value index (whether or not part of the company's separate account).

d. All other products that contain guarantees similar in nature to GMDBs or VAGLBs, even if the insurer does not offer the mutual funds or variable funds to which these guarantees relate, where there is no other explicit reserve requirement. If such a benefit is offered as part of a contract that has an explicit reserve requirement and that benefit does not currently have an explicit reserve requirement:

i. These requirements shall be applied to the benefit on a stand-alone basis (i.e., for purposes of the reserve calculation, the benefit shall be treated as a separate contract).

ii. The reserve for the underlying contract is determined according to the explicit reserve requirement.

iii. The reserve held for the contract shall be the sum of i and ii.

Guidance Note: For example, a group life contract that wraps a GMDB around a mutual fund generally would fall under the scope of these requirements since there is not an explicit reserve requirement for this type of group life contract. However, for an individual variable life contract with a GMDB and a benefit similar in nature to a VAGLB, the requirements generally would apply only to the VAGLB-type benefit, since there is an explicit reserve requirement that applies to the variable life contract and the GMDB.

2. These requirements do not apply to contracts falling under the scope of the l *Modified Guaranteed Annuity Regulation* (#255); however, it does apply to contracts listed above that include one or more subaccounts containing features similar in nature to those contained in modified guaranteed annuities (MGAs) (e.g., market value adjustments).

3. Separate account products that guarantee an index and do not offer GMDBs or VAGLBs are excluded from the scope of these requirements.

Guidance Note: Current VAGLBs include Guaranteed Minimum Accumulation Benefits, Guaranteed Minimum Income Benefits, Guaranteed Minimum Withdrawal Benefits, Guaranteed Lifetime Withdrawal Benefits and Guaranteed Payout Annuity Floors. These requirements will be applied to future variations on these designs and to new guarantee designs.

E. Definitions

1. Definitions of Benefit Guarantees

a. The term "guaranteed minimum death benefit (GMDB)" means a guaranteed benefit providing, or resulting in the provision that, an amount payable on the death of a contract holder, annuitant, participant or insured will be increased and/or will be at least a minimum amount. Only such guarantees having the potential to produce a contractual total amount payable on death that exceeds the account value—or in the case of an annuity providing income payments, an amount payable on death other than continuation of any guaranteed income payments—are included in this definition. GMDBs that are based on a portion of the excess of the account value over the net of premiums paid less partial withdrawals made (e.g., an earnings enhanced death benefit) are also included in this definition.

b. The term "variable annuity guaranteed living benefit (VAGLB)" means a guaranteed benefit providing, or resulting in the provision that, one or more guaranteed benefit amounts payable or accruing to a living contract holder or living annuitant, under contractually specified conditions (e.g., at the end of a specified waiting period, upon annuitization or upon withdrawal of premium over a period of time), will increase contractual benefits should the contract value referenced by the guarantee (e.g., account value) fall below a given level or fail to achieve certain performance levels. Only such guarantees having the potential to provide benefits with a present value as of the benefit commencement date that exceeds the contract value referenced by the guarantee are included in this definition. Payout annuities without minimum payout or performance guarantees are neither considered to contain nor to be VAGLBs.

c. The term "guaranteed minimum income benefit (GMIB)" means a VAGLB design for which the benefit is contingent on annuitization of a variable deferred annuity or similar contract. The benefit is typically expressed as a contract-holder option, on one or more option dates, to have a minimum amount applied to provide periodic income using a specified purchase basis.

d. The term "guaranteed payout annuity floor (GPAF)" means a VAGLB design guaranteeing that one or more of the periodic payments under a variable immediate annuity will not be less than a minimum amount.

2. Definitions of Reserve Methodology Terminology

a. The term "scenario" means a set of asset growth rates and investment returns from which assets and liabilities supporting a set of contracts may be determined for each year of a projection.

b. The term "cash surrender value" means, for purposes of these requirements, the amount available to the contract holder upon surrender of the contract. 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. For

contracts where all or a portion of the amount available to the contract holder upon surrender is subject to a market value adjustment, however, the cash surrender value shall reflect the market value adjustment consistent with the required treatment of the underlying assets. That is, the cash surrender value shall reflect any market value adjustments where the underlying assets are reported at market value, but shall not reflect any market value adjustments where the underlying assets are reported at book value.

c. The term "scenario greatest present value" means the sum, for a given scenario, of:

i. The greatest of the present values, as of the projection start date, of the projected accumulated deficiencies for the scenario.

ii. The starting asset amount.

d. The term "conditional tail expectation (CTE) amount" means an amount equal to the numerical average of the 30% largest values of the scenario greatest present values.

e. The term "working reserve" means the assumed reserve used in the projections of accumulated deficiencies supporting the calculation of the scenario greatest present values. At any point in the projections, including at the start of the projection, the working reserve shall equal the projected cash surrender value.

For a variable payout annuity without a cash surrender value, the working reserve shall equal the present value, at the valuation interest rate and the valuation mortality table specified for such a product by the Standard Valuation Law of future income payments projected using a return based on the valuation interest rate less appropriate asset-based charges. For annuitizations that occur during the projection, the valuation interest rate as of the current valuation date may be used in determining the working reserve. Alternatively, if an integrated model of equity returns and interest rates is used, a future estimate of valuation interest rates may be incorporated into the working reserve.

For contracts not covered above, the actuary shall determine the working reserve in a manner that is consistent with the above requirements.

f. The term "accumulated deficiency" means an amount measured as of the end of a projection year and equals the projected working reserve less the amount of projected assets, both as of the end of the projection year. Accumulated deficiencies may be positive or negative.

Guidance Note: A positive accumulated deficiency means there is a cumulative loss, and a negative accumulated deficiency means there is a cumulative gain.

g. The term "starting asset amount" means an amount equal to the value of the assets at the start of the projection, as defined in Section 3.D.1.

h. The term "anticipated experience" means the actuary's reasonable estimate of future experience for a risk factor given all available, relevant information pertaining to the contingencies being valued.

i. The term "prudent estimate" means the basis upon which the actuary sets the deterministic assumptions to be used for projections. A prudent estimate

assumption is 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 estimate assumption is developed by applying a margin for uncertainty to the anticipated experience assumption. The margin for uncertainty shall provide for estimation error and margins for adverse deviation. The resulting prudent estimate assumption shall be reasonably conservative over the span of economic cycles and over a plausible range of expected experience, in recognition of the principles described in Subsection B. Recognizing that assumptions are simply assertions of future unknown experience, the margin 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 anticipated experience 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.

This means that valuation assumptions not stochastically modeled are to be consistent with the stated principles in Subsection B, be based on any relevant and credible experience that is available, and should be set to produce, in concert with other prudent estimate assumptions, a CTE amount that is consistent with the stated CTE level.

The actuary shall follow the principles discussed in Section 11 and Section 12 in determining prudent estimate assumptions.

j. The term "gross wealth ratio" means the cumulative return for the indicated time period and percentile (e.g., 1.0 indicates that the index is at its original level).

k. The term "clearly defined hedging strategy" is a designation that applies to strategies undertaken by a company to manage risks through the future purchase or sale of hedging instruments and the opening and closing of hedging positions. In order to qualify as a clearly defined hedging strategy, the strategy must meet the principles outlined in the Subsection B (particularly Principle 5) and shall, at a minimum, identify:

i. The specific risks being hedged (e.g., delta, rho, vega, etc.).

ii. The hedge objectives.

iii. The risks not being hedged (e.g., variation from expected mortality, withdrawal, and other utilization or decrement rates assumed in the hedging strategy, etc.).

iv. The financial instruments that will be used to hedge the risks.

v. The hedge trading rules, including the permitted tolerances from hedging objectives.

vi. The metric(s) for measuring hedging effectiveness.

vii. The criteria that will be used to measure effectiveness.

viii. The frequency of measuring hedging effectiveness.

ix. The conditions under which hedging will not take place.

x. The person or persons responsible for implementing the hedging strategy. The hedge strategy may be dynamic, static or a combination thereof.

It is important to note that strategies involving the offsetting of the risks associated with variable annuity guarantees with other products outside of the scope of the these requirements (e.g., equity-indexed annuities) do not currently qualify as a clearly defined hedging strategy under these requirements.

l. The term "revenue sharing," for purposes of these requirements, means any arrangement or understanding by which an entity responsible for providing investment or other types of services makes payments to the company (or to one of its affiliates). Such payments are typically in exchange for administrative services provided by the company (or its affiliate), such as marketing, distribution and recordkeeping. Only payments that are attributable to charges or fees taken from the underlying variable funds or mutual funds supporting the contracts that fall under the scope of these requirements shall be included in the definition of revenue sharing.

m. The term "domiciliary commissioner," for purposes of these requirements, means the chief insurance regulatory official of the state of domicile of the company.

n. The term "aggregate reserve" means the minimum reserve requirement as of the valuation date for the contracts falling within the scope of these requirements.

o. The term "1994 Variable Annuity Minimum Guaranteed Death Benefits (MGDB) Mortality Table" means the mortality table shown in Appendix 1.

Section 2: Reserve Methodology

A. General Description

The aggregate reserve for contracts falling within the scope of these requirements shall equal the CTE amount but not less than the standard scenario amount, where the aggregate reserve is calculated as the standard scenario amount plus the excess, if any, of the CTE amount over the standard scenario amount.

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 statutory requirements that would allow the treaty to be accounted for as reinsurance.

An aggregate reserve before reinsurance also shall be calculated if needed for regulatory reporting or other purposes, using methods described in Section 4.

C. The Standard Scenario Amount

The standard scenario amount is the aggregate of the reserves determined by applying the standard scenario method to each of the contracts falling within the scope of these requirements. The standard scenario method is outlined in Section 5.

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D. The CTE Amount

The CTE amount shall be determined based on a projection of the contracts falling within the scope of these requirements, and the assets supporting these contracts, over a broad range of stochastically generated projection scenarios and using prudent estimate assumptions.

The stochastically generated projection scenarios shall meet the scenario calibration criteria described in Section 7.

The CTE amount may be determined in aggregate for all contracts falling within the scope of these requirements (i.e., a single grouping). At the option of the company, it may be determined by applying the methodology outlined below to sub-groupings of contracts, in which case the CTE amount shall equal the sum of the amounts computed for each such subgrouping.

The CTE amount shall be determined using the following steps:

1. For each scenario, projected aggregate accumulated deficiencies are determined at the start of the projection (i.e., "time 0") and at the end of each projection year as the sum of the accumulated deficiencies for each contract grouping.

2. The scenario greatest present value is determined for each scenario based on the sum of the aggregate accumulated deficiencies and aggregate starting asset amounts for the contracts for which the aggregate reserve is being computed.

> **Guidance Note:** The scenario greatest present value is, therefore, based on the greatest projected accumulated deficiency, in aggregate, for all contracts for which the aggregate reserve is computed hereunder, rather than based on the sum of the greatest projected accumulated deficiency for each grouping of contracts.

3. The scenario greatest present values for all scenarios are then ranked from smallest to largest, and the CTE amount is the average of the largest 30% of these ranked values.

   The projections shall be performed in accordance with Section 3. The actuary shall document the assumptions and procedures used for the projections and summarize the results obtained as described in Section 4 and Section 10.

E. Alternative Methodology

For variable deferred annuity contracts that contain either no guaranteed benefits or only GMDBs (i.e., no VAGLBs), the CTE amount may be determined using the alternative methodology described in Section 6 rather than using the approach described in Subsection D. 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 CTE amount 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 Section 4 and Section 10.

F. Allocation of Results to Contracts

The aggregate reserve shall be allocated to the contracts falling within the scope of these requirements using the method outlined in Section 8.

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Section 3: Determination of CTE Amount Based on Projections

A. Projection of Accumulated Deficiencies

1. General Description of Projection

The projection of accumulated deficiencies shall be made ignoring federal income tax and reflect the dynamics of the expected cash flows for the entire group of contracts, reflecting all product features—including the guarantees provided under the contracts. Insurance company expenses (including overhead and investment expense), 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 instruments are to be reflected on a basis consistent with the requirements herein. Cash flows from any fixed account options also shall be included. Any market value adjustment assessed on projected withdrawals or surrenders also shall be included (whether or not the cash surrender value reflects market value adjustments). Throughout the projection, where estimates are used, such estimates shall be on a prudent estimate basis.

Federal income tax shall not be included in the projection of accumulated deficiencies.

2. Grouping of Variable Funds and Subaccounts

The portion of the starting asset amount held in the separate account represented by the variable funds and the corresponding account values may be grouped for modeling using an approach that recognizes the investment guidelines and objectives of the funds. In assigning each variable fund and the variable subaccounts to a grouping for projection purposes, the fundamental characteristics of the fund shall be reflected, and the parameters shall have the appropriate relationship to the required calibration points of the S&P 500. The grouping shall reflect characteristics of the efficient frontier (i.e., returns generally cannot be increased without assuming additional risk).

An appropriate proxy for each variable subaccount shall be designed in order to develop the investment return paths. The development of the scenarios for the proxy funds is a fundamental step in the modeling and can have a significant impact on results. As such, the actuary must map each variable account to an appropriately crafted proxy fund normally expressed as a linear combination of recognized market indices (or sub-indices).

3. Grouping of Contracts

Projections may be performed for each contract in force on the date of valuation or by grouping contracts into representative cells of model plans using all characteristics and criteria having a material impact on the size of the reserve. Grouping shall be the responsibility of the actuary but may not be done in a manner that intentionally understates the resulting reserve.

4. Modeling of Hedges

The appropriate costs and benefits of hedging instruments that are currently held by the company in support of the contracts falling under the scope of these requirements shall be included in the projections. If the company is following a clearly defined hedging strategy and the hedging strategy meets the requirements of Section 9, the projections shall take into account the appropriate costs and benefits of hedge positions expected to be held in the future through the execution of that strategy.

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To the degree either the currently held hedge positions or the hedge positions expected to be held in the future introduce basis, gap, price or assumption risk, a suitable reduction for effectiveness of hedges shall be made. The actuary is responsible for verifying compliance with a clearly defined hedging strategy and the requirements in Section 9 for all hedge instruments included in the projections.

While hedging strategies may change over time, any change in hedging strategy shall be documented and include an effective date of the change in strategy.

The use of products not falling under the scope of these requirements (e.g., equity-indexed annuities) as a hedge shall not be recognized in the determination of accumulated deficiencies.

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

Upon request of the company's domiciliary commissioner and for information purposes to show the effect of including future hedge positions in the projections, the company shall show the results of performing an additional set of projections reflecting only the hedges currently held by the company in support of the contracts falling under the scope of these requirements. Because this additional set of projections excludes some or all of the derivative instruments, the investment strategy used may not be the same as that used in the determination of the CTE amount.

5. Revenue Sharing

a. Projections of accumulated deficiencies may include income from projected future revenue-sharing, net of applicable projected expenses (net revenue-sharing income) if the following requirements are met:

i. The net revenue-sharing income is received by the company.

> **Guidance Note**: For purposes of this section, net revenue-sharing income is considered to be received by the company if it is paid directly to the company through a contractual agreement with either the entity providing the net revenue-sharing income or an affiliated company that receives the net revenue-sharing income. Net revenue-sharing income also would be considered to be received if it is paid to a subsidiary that is owned by the company and if 100% of the statutory income from that subsidiary is reported as statutory income of the company. In this case, the actuary needs to assess the likelihood that future net revenue-sharing income is reduced due to the reported statutory income of the subsidiary being less than future net revenue-sharing income received.

ii. Signed contractual agreement or agreements are in place as of the valuation date and support the current payment of the net revenue-sharing income.

iii. The net revenue-sharing income is not already accounted for directly or indirectly as a company asset.

b. The amount of net revenue-sharing income to be used shall reflect the actuary's assessment of factors that include, but are not limited to, the following (not all of

these factors will necessarily be present in all situations):

i. The terms and limitations of the agreement(s), including anticipated revenue, associated expenses and any contingent payments incurred or made by either the company or the entity providing the net revenue-sharing as part of the agreement(s).

ii. The relationship between the company and the entity providing the net revenue-sharing income that might affect the likelihood of payment and the level of expenses.

iii. The benefits and risks to both the company and the entity paying the net revenue-sharing income of continuing the arrangement.

iv. The likelihood that the company will collect the net revenue-sharing income during the term(s) of the agreement(s) and the likelihood of continuing to receive future revenue after the agreement(s) has ended.

v. The ability of the company to replace the services provided to it by the entity providing the net revenue-sharing income or to provide the services itself, along with the likelihood that the replaced or provided services will cost more to provide.

vi. The ability of the entity providing the net revenue-sharing income to replace the services provided to it by the company or to provide the services itself, along with the likelihood that the replaced or provided services will cost more to provide.

c. The amount of projected net revenue-sharing income also shall reflect a margin (which decreases the assumed net revenue-sharing income) directly related to the uncertainty of the revenue. The greater the uncertainty, the larger the margin. Such uncertainty is driven by many factors, including the potential for changes in the securities laws and regulations, mutual fund board responsibilities and actions, and industry trends. Since it is prudent to assume that uncertainty increases over time, a larger margin shall be applied as time that has elapsed in the projection increases.

d. All expenses required or assumed to be incurred by the company in conjunction with the arrangement providing the net revenue-sharing income, as well as any expenses assumed to be incurred by the company in conjunction with the assumed replacement of the services provided to it (as discussed in Subsection A.5.b.v), shall be included in the projections as a company expense under the requirements of Subsection A.1. In addition, expenses incurred by either the entity providing the net revenue-sharing income or an affiliate of the company shall be included in the applicable expenses discussed in Subsection A.1 and Subsection A.5.a that reduce the net revenue-sharing income.

e. The actuary is responsible for reviewing the revenue-sharing agreements, verifying compliance with these requirements and documenting the rationale for any source of net revenue-sharing income used in the projections.

f. The amount of net revenue-sharing income assumed in a given scenario shall not exceed the sum of (a) and (b), where:

i. Is the contractually guaranteed net revenue-sharing income projected under the scenario.

ii. Is the actuary's estimate of non-contractually guaranteed net revenue-sharing income before reflecting any margins for uncertainty multiplied by the following factors:

a) 1.0 in the first projection year.

b) 0.9 in the second projection year.

c) 0.8 in the third projection year.

d) 0.7 in the fourth projection year.

e) 0.6 in the fifth projection year.

f) 0.5 in the sixth and all subsequent projection years. The resulting amount of non-contractually guaranteed net revenue-sharing income after application of this factor shall not exceed 0.25% per year on separate account assets in the sixth and all subsequent projection years.

6. Length of Projections

Projections of accumulated deficiencies shall be run for as many future years as needed so that no materially greater reserve value would result from longer projection periods.

7. AVR/Interest Maintenance Reserve (IMR)

The AVR and the IMR shall be handled consistently with the treatment in the company's cash-flow testing.

B. Determination of Scenario Greatest Present Values

1. Scenario Greatest Present Values

For a given scenario, the scenario greatest present value is the sum of:

a. The greatest present value, as of the projection start date, of the projected accumulated deficiencies defined in Section 1.E.2.f.

b. The starting asset amount.

2. Discount Rates

In determining the scenario greatest present values, accumulated deficiencies shall be discounted using the same interest rates at which positive cash flows are invested, as determined in Subsection D.4. Such interest rates shall be reduced to reflect expected credit losses. Note that the interest rates used do not include a reduction for federal income taxes.

C. Projection Scenarios

1. Minimum Required Scenarios

The number of scenarios for which projected greatest present values of accumulated deficiencies shall be computed shall be the responsibility of the actuary and shall be considered to be sufficient if any resulting understatement in total reserves, as compared with that resulting from running additional scenarios, is not material.

2. Scenario Calibration Criteria

Returns for the groupings of variable funds shall be determined on a stochastic basis such that the resulting distribution of the gross wealth ratios of the scenarios meets the scenario calibration criteria specified in Section 7.

D. Projection Assets

1. Starting Asset Amount

For the projections of accumulated deficiencies, the value of assets at the start of the projection shall be set equal to the approximate value of statutory reserves at the start of the projection. Assets shall be valued consistently with their annual statement values. The amount of such asset values shall equal the sum of the following items, all as of the start of the projection:

a. All of the separate account assets supporting the contracts.

b. An amount of assets held in the general account equal to the approximate value of statutory reserves as of the start of the projections less the amount in (a).

In many instances, the initial general account assets may be negative, resulting in a projected interest expense. General account assets chosen for use as described above shall be selected on a consistent basis from one reserve valuation hereunder to the next.

Any hedge assets meeting the requirements described in Subsection.A.4 shall be reflected in the projections and included with other general account assets under item (b). To the extent the sum of the value of such hedge assets and the value of assets in item (a) is greater than the approximate value of statutory reserves as of the start of the projections, then item (b) may include enough negative general account assets or cash such that the sum of items (a) and (b) equals the approximate value of statutory reserves as of the start of the projections.

Guidance Note: Further elaboration on potential practices with regard to this issue may be included in a practice note.

The actuary shall document which assets were used as of the start of the projection, the approach used to determine which assets were chosen and shall verify that the value of the assets equals the approximate value of statutory reserves at the start of the projection.

2. Valuation of Projected Assets

For purposes of determining the projected accumulated deficiencies, the value of projected assets shall be determined in a manner consistent with their value at the start of the projection. For assets assumed to be purchased during a projection, the value shall be determined in a manner consistent with the value of assets at the start of the projection that have similar investment characteristics.

3. Separate Account Assets

For purposes of determining the starting asset amounts in Subsection D.1. and the valuation of projected assets in Subsection D.2., assets held in a separate account shall be summarized into asset categories determined by the actuary as discussed in Subsection.A.2.

4. General Account Assets

General account assets shall be projected, net of projected defaults, using assumed investment returns consistent with their book value and expected to be realized in future periods as of the date of valuation. Initial assets that mature during the projection and positive cash flows projected for future periods shall be invested at interest rates, which, at the option of the actuary, are one of the following:

a. The forward interest rates implied by the swap curve in effect as of the valuation date.

Guidance Note: The swap curve is based on the Federal Reserve H.15 interest swap rates. The rates are for a fixed rate payer in return for receiving three-month LIBOR. One place where these rates can be found is *www.federalreserve.gov/releases/h15/default.htm.*

b. The 200 interest rate scenarios available as prescribed for Phase I, C-3 RBC calculation, coupled with the separate account return scenarios by mating them up with the first 200 such scenarios and repeating this process until all separate account return scenarios have been mated with a Phase I scenario.

c. Interest rates developed for this purpose from a stochastic model that integrates the development of interest rates and the separate account returns.

When the option described in (a)—the forward interest rates implied by the swap curve)—is used, an amount shall be subtracted from the interest rates to reflect the current market expectations about future interest rates using the process described in Subsection.E.1.

The actuary may switch from (a) to (b), from (a) to (c) or from (b) to (c) from one valuation date to the next, but may not switch in the other direction without approval from the domiciliary commissioner.

E. Projection of Annuitization Benefits (Including GMIBs)

1. Assumed Annuitization Purchase Rates at Election

For purposes of projecting annuitization benefits (including annuitizations stemming from the election of a GMIB), the projected annuitization purchase rates shall be determined assuming that market interest rates available at the time of election are the interest rates used to project general account assets, as determined in Subsection D.4. However, where the interest rates used to project general account assets are based upon the forward interest rates implied by the swap curve in effect as of the valuation date (i.e., the option described in Subsection D.4.a is used, herein referred to as a point estimate), the margin between the cost to purchase an annuity using the guaranteed purchase basis and the cost using the interest rates prevailing at the time of annuitization shall be adjusted as discussed below.

If a point estimate is being used, it is important that the margin assumed reflects the current market expectations about future interest rates at the time of annuitization, as described more fully below, and a downward adjustment to the interest rate assumed in the purchase rate basis. The latter adjustment is necessary since a greater proportion of contract holders will select an annuitization benefit when it is worth more than the cash surrender value than when it is not. As a practical matter, this effect can be approximated by using an interest rate assumption in the purchase rate basis that is 0.30% below that implied by the forward swap curve, as described below.

To calculate market expectations of future interest rates, the par or current coupon swap curve is used (documented daily in Federal Reserve H.15 with some interpolation needed). Deriving the expected rate curve from this swap curve at a future date involves the following steps:

a. Calculate the implied zero-coupon rates. This is a well-documented "bootstrap" process. For this process, we use the equation $100=C^n * (v + v^2 + \ldots + v^n) + 100v^n$ where the "v^t" terms are used to stand for the discount factors applicable to cash flows 1,2,…n years hence and C^n is the n-year swap rate. Each of these discount factors are based on the forward curve and, therefore, are based on different rates (i.e., "v^2" does not equal v times v). Given the one-year swap rate, one can solve for v. Given v and the two-year swap rate, one can then back into v^2, and so on.

b. Convert the zero coupon rates to one year forward rates by calculating the discount factor needed to get from v^{t-1} to v^t.

c. Develop the expected rate curve.

This recognizes that, for example, the five-year forward one-year rate is not the rate the market expects on one-year instruments five years from now. The reason is that as the bond gets shorter, the "risk premium" in the rate diminishes. This is sometimes characterized as "rolling down" the yield curve. Table A shows the historic average risk premium at various durations. From this table, one can see that to get the rate the market expects a one-year swap to have five years from now, one must subtract the risk premium associated with six-year rates (0.95%) and add back that associated with one-year rates (0.50%). This results in a net reduction of 0.45%.

Table A: Risk Premium by Duration

Duration	Risk Premium	Duration	Risk Premium
1	0.500%	6	0.950%
2	0.750%	7	1.000%
3	0.750%	8	1.100%
4	0.850%	9+	1.150%

The Exhibit below combines the three steps. Column A through Column D convert the swap curve to the implied forward rate for each future payment date. Column E through Column H remove the current risk premium, add the risk

premium t years in the future (the Exhibit shows the rate curve five years in the future), and uses that to get the discount factors to apply to the one-year, two-year,…five-year cash flows five years from now.

Exhibit: Derivation of discount rates expected in the future

	A	B	C	D	E	F	G	H
1 2 3	Projection Years	Swap Curve Rate	PV of Zero Coupon	Forward 1 Year Rate	Risk Premium	Risk Premium 5 Years Out	Expected Forward Rate In 5 Years	PV of Zero Coupon in 5 Years
4	1	2.57%	0.97494	2.5700%	0.5000%			
5	2	3.07%	0.94118	3.5879%	0.75000%			
6	3	3.44%	0.90302	4.2251%	0.75000%			
7	4	3.74%	0.86231	4.7208%	0.85000%			
8	5	3.97%	0.82124	5.0010%	0.90000%			
9	6	4.17%	0.77972	5.3249%	0.95000%	0.50000%	4.8749%	0.95352
10	7	4.34%	0.73868	5.5557%	1.00000%	0.75000%	5.3057%	0.90547
11	8	4.48%	0.69894	5.6860%	1.10000%	0.75000%	5.3360%	0.85961
12	9	4.60%	0.66050	5.8209%	1.15000%	0.85000%	5.5209%	0.81463
13	10	4.71%	0.62303	6.0131%	1.15000%	0.90000%	5.7631%	0.77024
14 Cell formulas for Projection Year 10			=(1-B13 *SUM (C4:C12))/ (1+B13)	=(C12/C13)-1		=E8	=D13-E13+F13	=H12/(1+G13)

Where interest rates are projected stochastically using an integrated model, although one would "expect" the interest rate n years hence to be that implied for an appropriate duration asset by the forward swap curve as described above, there is a steadily widening confidence interval about that point estimate with increasing time until the annuitization date. The "expected margin" in the purchase rate is less than that produced by the point estimate based on the expected rate, since a greater proportion of contract holders will have an annuitization benefit whose worth is in excess of cash surrender value when margins are low than when margins are high. As a practical matter, this effect can be approximated by using a purchase rate margin based on an earnings rate 0.30% below that implied by the forward swap curve. If a stochastic model of interest rates is used instead of a point estimate, then no such adjustment is needed.

2. Projected Election of Guaranteed Minimum Income Benefit and Other Annuitization Options

For contracts projected to elect annuitization options (including annuitizations stemming from the election of a GMIB), the projections may assume one of the following at the actuary's option:

a. The contract is treated as if surrendered at an amount equal to the statutory reserve that would be required at such time for the payout annuity benefits.

b. The contract is assumed to stay in force, the projected periodic payments are paid, and the Working Reserve is equal to one of the following:

i. The statutory reserve required for the payout annuity, if it is a fixed payout annuity.

ii. If it is a variable payout annuity, the working reserve for a variable payout annuity.

If the projected payout annuity is a variable payout annuity containing a floor guarantee (such as a GPAF) under a specified contractual option, only option ii shall be used.

Where mortality improvement is used to project future annuitization purchase rates, as discussed in 1 above, mortality improvement also shall be reflected on a consistent basis in either the determination of the reserve in i. above or the projection of the periodic payments in ii.

F. Relationship to RBC Requirements

1. These requirements anticipate that the projections described herein may be used for the determination of RBC for some or all of the contracts falling within the scope of these requirements. There are several differences between these requirements and the RBC requirements, and among them are two major differences. First, the CTE level is different—CTE (70) for these requirements and CTE (90) for the RBC requirements. Second, the projections described in these requirements are performed on a basis that ignores federal income tax. That is, under these requirements, the accumulated deficiencies do not include projected federal income tax and the interest rates used to discount the scenario greatest present value (i.e., the interest rates determined in Subsection.D.4. contain no reduction for federal income tax). Under the RBC requirements, the projections do include projected federal income tax, and the discount interest rates used in the RBC requirement do contain a reduction for federal income tax.

2. To further aid the understanding of these requirements and any instructions relating to the RBC requirement, it is important to note the equivalence in meaning between the following terms, subject to the differences noted above:

a. The accumulated deficiency, the amount that is added to the starting asset amount in Section 2.D, is similar to the additional asset requirement referenced in the RBC requirement.

b. The CTE amount referenced in these requirements is similar to the total asset requirement referenced in the RBC requirement.

G. Compliance with ASOPs

When determining the CTE amount using projections, the analysis shall conform to the ASOP as promulgated from time to time by the Actuarial Standards Board.

Under these requirements, the actuary must make various determinations, verifications and certifications. The company shall provide the actuary with the necessary information sufficient to permit the actuary to fulfill the responsibilities set forth in these requirements and responsibilities arising from applicable ASOP, including ASOP No. 23, *Data Quality*.

H. Compliance with Principles

When determining the CTE amount using projections, any interpretation and application of the requirements of these requirements shall follow the principles discussed in Section 1.B.

Section 4: Reinsurance and Statutory Reporting Issues

A. Treatment of Reinsurance Ceded in the Aggregate Reserve

1. Aggregate Reserve Net of and Prior to Reinsurance Ceded

As noted in Section 2.B., the aggregate reserve is determined net of reinsurance ceded. Therefore, it is necessary to determine the components needed to determine the aggregate reserve (i.e., the standard scenario amount, and either the CTE amount determined using projections or the CTE amount determined using the Alternative Methodology) on a net of reinsurance basis. In addition, as noted in Section 2.B., it may be necessary to determine the aggregate reserve determined on a "direct" basis, or prior to reflection of reinsurance ceded. Where this is needed, each of these components shall be determined prior to reinsurance. Subsection A.2. through Subsection A.4. discuss methods necessary to determine these components on both a "net of reinsurance" and a "prior to reinsurance" basis. Note that due allowance for reasonable approximations may be used where appropriate.

2. CTE Amount Determined Using Projections

In order to determine the aggregate reserve net of reinsurance ceded, accumulated deficiencies, scenario greatest present values and the resulting CTE amount shall be determined reflecting the effects of reinsurance treaties that meet the statutory requirements that would allow the treaty to be accounted for as reinsurance within the projections. This involves including, where appropriate, all anticipated reinsurance premiums or other costs and all reinsurance recoveries, where both premiums and recoveries are determined by recognizing any limitations in the reinsurance treaties, such as caps on recoveries or floors on premiums.

In order to determine the CTE amount prior to reinsurance ceded, accumulated deficiencies, scenario greatest present values and the resulting CTE amount shall be determined ignoring the effects of reinsurance within the projections. One acceptable approach involves a projection based on the same starting asset amount as for the aggregate reserve net of reinsurance and by ignoring, where appropriate, all anticipated reinsurance premiums or other costs and all reinsurance recoveries in the projections.

3. CTE Amount Determined using the Alternative Methodology

If a company chooses to use the Alternative Methodology, as allowed in Section 2.E, it is important to note that the methodology produces reserves on a prior to reinsurance ceded basis. Therefore, where reinsurance is ceded, the Alternative Methodology must be modified to reflect the reinsurance costs and reinsurance recoveries under the reinsurance treaties in the determination of the aggregate reserve net of reinsurance. In addition, the Alternative Methodology, unadjusted for reinsurance, shall be applied to the contracts falling under the scope of these requirements to determine the Aggregate Reserve prior to reinsurance.

4. Standard Scenario Amount

Where reinsurance is ceded, the standard scenario amount shall be calculated as described in Section 5 to reflect the reinsurance costs and reinsurance recoveries under the reinsurance treaties. If it is necessary, the standard scenario amount shall be calculated prior to reinsurance ceded using the methods described in Section 5, but ignoring the effects of the reinsurance ceded.

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B. Aggregate Reserve to Be Held in the General Account

The amount of the reserve held in the general account shall not be less than the excess of the aggregate reserve over the sum of the basic reserve, as defined in Section 5.B, attributable to the variable portion of all such contracts.

C. Actuarial Certification and Memorandum

1. Actuarial Certification

Actuarial certification of the work done to determine the aggregate reserve shall be required. A qualified actuary (referred to throughout these requirements as "the actuary") shall certify that the work performed has been done in a way that substantially complies with all applicable ASOP. The scope of this certification does not include an opinion on the adequacy of the aggregate reserve, the company's surplus or the company's future financial condition. The actuary also shall note any material change in the model or assumptions from that used previously and the estimated impact of such changes.

Section 10 contains more information on the contents of the required actuarial certification.

Guidance Note: The adequacy of total company reserves, which includes the aggregate reserve, is addressed in the company's actuarial opinion as required by VM-30.

2. Required Memorandum

An actuarial memorandum shall be constructed documenting the methodology and assumptions upon which the aggregate reserve is determined. The memorandum also shall include sensitivity tests that the actuary feels appropriate, given the composition of the company's block of business (i.e., identifying the key assumptions that, if changed, produce the largest changes in the aggregate reserve). This memorandum shall have the same confidential status as the actuarial memorandum supporting the actuarial opinion and shall be available to regulators upon request.

Section 10 contains more information on the contents of the required memorandum.

Guidance Note: This is consistent with Section 3A(4)(h) of the Standard Valuation Law, which states: "Except as provided in paragraphs (l), (m) and (n), documents, materials or other information in the possession or control of the Department of Insurance that are a memorandum in support of the opinion, and any other material provided by the company to the commissioner in connection with the memorandum, shall be confidential by law and privileged, shall not be subject to [insert open records, freedom of information, sunshine or other appropriate phrase], shall not be subject to subpoena, and shall not be subject to discovery or admissible in evidence in any private civil action. However, the commissioner is authorized to use the documents, materials or other information in the furtherance of any regulatory or legal action brought as a part of the commissioner's official duties."

3. CTE Amount Determined Using the Alternative Methodology

Where the Alternative Methodology is used, there is no need to discuss the underlying assumptions and model in the required memorandum. Certification that expense, revenue, fund mapping and product parameters have been properly reflected, however, shall be required.

Section 10 contains more information on the contents of the required actuarial certification and memorandum.

4. Material Changes

If there is a material change in results due to a change in assumptions from the previous year, the memorandum shall include a discussion of such change in assumptions and an estimate of the impact it has on the results.

Section 5: Standard Scenario Requirements

A. Overview

1. Application to Determine Reserves

A standard scenario reserve shall be determined for each of the contracts falling under the scope of these requirements by applying Subsection C. This includes those contracts to which the Alternative Methodology is applied.

The standard scenario reserve for a contract with guaranteed living benefits or guaranteed death benefits is based on a projection of the account value based on specified returns for supporting assets equal to the account value. An initial drop is applied to the supporting assets and account value on the valuation date. Subsequently, account values are projected at specified rates earned by the supporting assets less contract and fund charges. The assumptions for the projection of account values and margins are prescribed in Subsection C.3. For any contract with guarantees, the standard scenario reserve includes the greatest present value of the benefit payments in excess of account values applied over the present value of revenue produced by the margins.

2. The Standard Scenario Amount

The standard scenario amount is defined in Section 2.C of these requirements as the aggregate of the reserves determined by applying the Standard Scenario Method to each of the contracts falling under the scope of these requirements. Except as provided in Subsection C.2.a, the Standard Scenario Amount equals the sum over all contracts of the standard scenario reserve determined for each contract as of the statement date as described in Subsection A.2.b.

The Standard Scenario Method requires the standard scenario amount to not be less than the sum over all contracts of the standard scenario reserve determined for the contract as of the statement date as described in Subsection C, where the discount rate is equal to *DR*, which is defined as the valuation interest rate specified by the Standard Valuation Law for annuities valued on an issue year basis, using Plan Type A and a guarantee duration greater than 10 years but not more than 20 years. The presence of guarantees of interest on future premiums and/or cash settlement options is to be determined using the terms of the contracts.

3. Illustrative Application of the Standard Scenario to a Projection or Model Office

If the CTE Amount is determined based on a projection of an in force prior to the statement date and/or by the use of a model office, which is a grouping of contracts into representative cells, then additional determinations of Subsection A.2.b shall be performed on the prior in force and/or model office. The calculations are for illustrative purposes to assist in validating the reasonableness of the projection and/or the model office.

The following table identifies the illustrative additional determinations required by this section using the discount rate, *DR*, as defined in Subsection A.2.b. The additional determinations required are based on how the CTE projection or Alternative Methodology is applied. For completeness, the table also includes the determinations required by Subsection A.2.b.

a. Run A in the table is required for all companies by Subsection A.2.b. No additional determinations are required if a company's stochastic or alternative methodology result is calculated on individual contracts as of the statement date.

b. A company that uses a model office as of the statement date to determine its stochastic or alternative methodology result must provide an additional determination for the model office based on the discount rate *DR*, run B.

c. A company that uses a contract by contract listing of a prior in force to determine its stochastic or alternative methodology with result PS and then projects requirements to the statement date with result S must provide an additional determination for the prior in-force based on the discount rate *DR*, run C.

d A company that uses a model office of a prior in force to determine its stochastic or alternative methodology requirements with result PM and then projects requirements to the statement date with result S must provide an additional determination for the prior model office based on the discount rate *DR*, run D.

Standard Scenario Run	VM-21 Variations	Validation Measures	
		Model Office Projection	Projection of Prior In Force
A. Valuation on the statement date on in-force contracts with discount rate *DR*	None	None	None
B. Valuation on the statement date on the model office with discount rate *DR*	If not material to model office validation	A/B compare to 1.00	None
C. Valuation on a prior in-force date on prior In-force contracts with discount rate *DR*	If not material to projection validation	None	A/C - S/PS compare to 0
D. Valuation on a prior in-force date on a model office with discount rate *DR*	If not material to model office or projection validation.	(A/D – S/PM) compare to 0	

Modification of the requirements in Subsection C when applied to a prior in force or a model office is permitted if such modification facilitates validating the projection of in force or the model office. All such modifications should be documented.

B. Basic and Basic Adjusted Reserve – Application of *Actuarial Guideline XXXIII—Determining CARVM Reserves for Annuity Contracts With Elective Benefits* (AG 33) in the AP&P Manual

1. The basic reserve for a given contract shall be determined by applying statutory statement valuation requirements applicable immediately prior to adoption of these requirements to the contract ignoring any guaranteed death benefits in excess of account values or guaranteed living benefits applying proceeds in excess of account values.

2. The calculation of the basic reserve shall assume a return on separate account assets based on the year of issue statutory valuation rate less appropriate asset based charges, including charges for any guaranteed death benefits or guaranteed living benefits. It also shall assume a return for any fixed separate account and general account options equal to the rates guaranteed under the contract.

3. The basic reserve shall be no less than the cash surrender value on the valuation date.

4. The basic adjusted reserve shall be that determined based on Subsection B.1 and Subsection B.2, except that in Subsection B.1, free partial withdrawal provisions shall be disregarded when determining surrender charges in applying the statutory statement valuation requirement prior to adoption of these requirements. Subsection B.3 shall not apply to the basic adjusted reserve.

C. Standard Scenario Reserve – Application of the Standard Scenario Method

1. General

Where not inconsistent with the guidance given here, the process and methods used to determine the Standard Scenario Reserve under the Standard Scenario Method shall be the same as required in the calculation of the CTE amount as described in Section 2 of these requirements. Any additional assumptions needed to determine the standard scenario reserve shall be explicitly documented.

2. Results for the Standard Scenario Method

For each contract, the standard scenario reserve is the reserve based on a or b where:

a. For contracts without any guaranteed benefits, where not subsequently disapproved by the domiciliary commissioner, the standard scenario reserve is the basic reserve described in Subsection B.1, Subsection B.2 and Subsection B.3.

b. For all other contracts, the standard scenario reserve is equal to the greater of cash surrender value on the valuation date and the quantity i + ii - iii, where:

i. Is the basic adjusted reserve calculated for the contract, as described in Subsection B.4.

ii. Is the greater of zero and the greatest present value at the discount rate measured as of the end of each projection year of the negative of the accumulated net revenue described below using the assumptions described in Subsection C.3. The accumulated net revenue at the end of a projection year is equal to (a) + (b) - (c), where:

a) Is the accumulated net revenue at the end of the prior projection year accumulated at the discount rate to the end of the current projection year? The accumulated net revenue at the beginning of the projection (i.e., time 0) is zero.

b) Are the margins generated during the projection year on account values accumulated at the discount rate to the end of the projection year (the factors and assumptions to be used in calculating the margins and account values are in Subsection C.3?

c) Are the contract benefits in excess of account values applied, individual reinsurance premiums and individual reinsurance benefits payable or receivable during the projection year accumulated at the discount rate to the end of the projection year? Individual reinsurance is defined in Subsection C.3.b.

iii. Is the contract's allocation of the value of hedges and aggregate reinsurance as described in Subsection C.4? Aggregate reinsurance is defined in Subsection C.3.b.

No reinsurance shall be considered in the standard scenario amount if such reinsurance does not meet the statutory requirements that would allow the treaty to be accounted for as reinsurance. The actuary shall determine the projected reinsurance premiums and benefits reflecting all treaty limitations and assuming any options in the treaty to the other party are exercised to decrease the value of reinsurance to the reporting company (e.g., options to increase premiums or terminate coverage). The positive value of any reinsurance treaty that is not guaranteed to the insurer or its successor shall be excluded from the value of reinsurance. The commissioner may require the exclusion of a reinsurance treaty or any portion of a reinsurance treaty if the terms of the reinsurance treaty or the portion required to be excluded serves solely to reduce the calculated standard scenario reserve without also reducing risk on scenarios similar to those used to determine the CTE reserve. Any reinsurance reflected in the standard scenario reserve shall be appropriate to the business and not merely constructed to exploit "foreknowledge" of the components of the Standard Scenario Method.

3. Assumptions for Use in Subsection C.2.b.ii. for Accumulated Net Revenue and Account Values

a. Account value return assumptions

The bases for return assumptions on assets supporting the account value are shown in Table I. The "initial" returns shall be applied to the account value supported by each asset class on the valuation date as immediate drops, resulting in the account value at time 0. The "Year 1," "Years 2 – 5" and "Year 6+" returns for the equity, bond and balanced classes are gross annual effective rates of return and are used (along with other decrements and/or increases) to produce the account value as of the end of each projection interval. For purposes of this section, money market funds supporting account value shall be considered part of the bond class.

The fixed fund rate is the greater of the minimum rate guaranteed in the contract or 4% but not greater than the current rates being credited to fixed funds on the valuation date.

Account values shall be projected using the appropriate gross rates from Table I for equity, bond and balanced classes applied to the supporting assets less all fund and contract charges according to the provisions of the funds and contract and applying the fixed funds rate from Table I as if it were the resulting net rate after deduction for fund or contract charges.

The annual margins on account value are defined as follows:

i. During the surrender charge amortization period, as determined following the step outlined in Subsection C.5:

a) 0.20% of account value; plus

b) Any net revenue-sharing income, as defined in Section 3.A.5., that is contractually guaranteed to the insurer and its liquidator, receiver, and statutory successor; plus

c) For all of the guaranteed living benefits of a given contract combine, the greater of:

i) 0.20% of account value; or

ii) Explicit and optional contract charges for guaranteed living benefits; plus

Guidance Note: This excludes any guaranteed living benefit that is added to the contract simply for the purpose of increasing the revenue allowed under this section.

d) For all guaranteed death benefits of a given contract combined, the greater of:

i) 0.20% of account value; or

ii) Explicit and optional contract charges for guaranteed death benefits.

Guidance Note: This excludes any guaranteed death benefit that is added to the contract simply for the purpose of increasing the revenue allowed under this section.

ii. After the surrender charge amortization period:

The amount determined in (i) above; plus 50% of the excess, if any, of all contract charges (excluding net revenue-sharing income) over the sum of i.(a) , i.(c) and i.(d) above.

However, on fixed funds after the surrender charge period, a margin of up to the amount in (i) above plus 0.4% may be used.

Table I

	Initial	Year 1	Years 2 – 5	Year 6+
Equity Class	-13.5%	0%	4.0%	5.50%
Bond Class	0%	0%	4.85%	4.85%
Balanced Class	-8.1%	0%	4.34%	5.24%
Fixed Separate Accounts and General Account (net)	0%	Fixed Fund Rate	Fixed Fund Rate	Fixed Fund Rate

b. Reinsurance credit

Individual reinsurance is defined as reinsurance where the total premiums for and benefits of the reinsurance can be determined by applying the terms of the reinsurance to each contract covered without reference to the premiums or benefits of any other contract covered and summing the results over all contracts covered. Reinsurance that is not individual is aggregate.

Individual reinsurance premiums projected to be payable on ceded risk and receivable on assumed risk shall be included in the projected net revenue. Similarly, individual reinsurance benefits projected to be receivable on ceded risk and payable on assumed risk shall be included in the projected net revenue. No aggregate reinsurance shall be included in projected net revenue.

c. Lapses, partial withdrawals and in-the-moneyness

Partial withdrawals elected as guaranteed living benefits, see Subsection C.3.g, or required contractually (e.g., a contract operating under an automatic withdrawal provision on the valuation date) are to be deducted from the account value in each projection interval consistent with the projection frequency used, as described in Subsection C.3.f, and according to the terms of the contract. No other partial withdrawals, including free partial withdrawals, are to be deducted from account value. All lapse rates should be applied as full contract surrenders.

For purposes of determining the dynamic lapse assumptions shown in Table II below, a guaranteed living benefit is in the money (ITM) for any projection interval if the account value at the beginning of the projection interval is less than the current value of the guaranteed living benefit (as defined below) also at the beginning of that projection interval.

The current value of the guaranteed living benefit at the beginning of any projection interval is either the amount of the current lump sum payment (if exercisable) or the present value of future lump sum or income payments. More specific guidance is provided below. For the purpose of determining the present value, the discount rate shall be equal *DR* as defined in Subsection A.2.b. If future living benefit payments are life contingent (i.e., either the right of future exercise or the right to future income benefits expires with the death of the annuitant or the owner), then the company shall determine the present value of such payments using the mortality table specified in Subsection C.3.e.

If a guaranteed living benefit is exercisable (withdrawal can start or, in the case of a guaranteed minimum withdrawal benefit [GMWB], has begun) at the beginning of the projection interval, then the current value of the guaranteed

living benefit shall be determined assuming immediate or continued exercise of that benefit.

If a guaranteed living benefit is not exercisable (e.g., due to minimum age or duration requirements) at the beginning of that projection interval, then the current value of the guaranteed living benefit shall be determined assuming exercise of the guaranteed living benefit at the earliest possible future projection interval. If the right to exercise the guaranteed living benefit is contingent on the survival of the annuitant or the owner, then the current value of the guaranteed living benefit shall assume survival to the date of exercise using the mortality table specified in Subsection C.3.e.

Determination of the current value of a guaranteed living benefit that is exercisable or payable at a future projection interval shall take account of any guaranteed growth in the basis for the guarantee (e.g., where the basis grows according to an index or an interest rate).

For a GMWB, the current value shall be determined assuming the earliest penalty-free withdrawal of guaranteed benefits after withdrawals begin and by applying the constraints of any applicable maximum or minimum withdrawal provisions. If the GMWB is currently exercisable and the right to future GMWB payments is contingent upon the survival of the annuitant or owner, then the current value shall assume survival using the mortality table specified in Subsection C.3.e. After a GMWB that has payments that are contingent upon the survival of the annuitant or owner has commenced, then the current value shall assume survival using the Annuity 2000 Mortality Table.

For an unexercised GMIB, the current value shall be determined assuming the option with a reserve closest to the reserve for a 10-year certain and life option. The reserve values and the value of the GMIB on the assumed date of exercise shall be determined using the discount rate *DR* specified in Subsection A.2.b. and for life contingent payments, the Annuity 2000 Mortality Table. The current value of an unexercised GMIB, however, shall be set equal to the account value if the contract holder can receive higher income payments on the assumed date of exercise by electing the same option under the normal settlement option provisions of the contract.

For the purpose of applying the lapse assumptions specified in Table II below or contract-holder elections rates specified in Subsection C.3.g, the contract shall be considered "out of the money" (OTM) for a projection interval if the current value of the guaranteed living benefit at the beginning of the projection interval is less than or equal to the account value at the beginning of the same projection interval. If the current value of the guaranteed living benefit at the beginning of the projection interval is greater than the account value also at the beginning of the projection interval, the contract shall be considered ITM, and the percent ITM shall equal:

100 * ((current value of the guaranteed living benefit /account value) - 1)

If a contract has multiple living benefit guarantees, then the guarantee having the largest current value shall be used to determine the percent in the money.

Table II – Lapse Assumptions

	During Surrender Charge Period	After Surrender Charge Period		
Death Benefit Only Contracts	5%	10%		
All Guaranteed Living Benefits OTM	5%	10%		
		ITM < 10%	10%≤ITM< 20%	20%≤ITM
Any Guaranteed Minimum Accumulation Benefit ITM	2%	2%	0%	0%
Any Other Guaranteed Living Benefits ITM	3%	7%	5%	2%

d. Account transfers and future feposits

No transfers between funds shall be assumed in the projection used to determine the greatest present value amount required under Subsection C.2.b.ii unless required by the contract (e.g., transfers from a dollar cost averaging fund or contractual rights given to the insurer to implement a contractually specified portfolio insurance management strategy or a contract operating under an automatic re-balancing option). When transfers must be modeled, to the extent not inconsistent with contract language, the allocation of transfers to funds must be in proportion to the contract's current allocation to funds.

Margins generated during a projection interval on funds supporting account value are transferred to the accumulation of net revenue and are subsequently accumulated at the DR. Assets for each class supporting account values are to be reduced in proportion to the amount held in each asset classes at the time of transfer of margins or any portion of account value applied to the payment of benefits.

No future deposits to account value shall be assumed unless required by the terms of the contract to prevent contract or guaranteed benefit lapse, in which case they must be modeled. When future deposits must be modeled, to the extent not inconsistent with contract language, the allocation of the deposit to funds must be in proportion to the contract's current allocation to such funds.

e. Mortality

Mortality at 70% of the 1994 Variable Annuity MGDB Mortality Tables (1994 MGDB tables) through age 85 increasing by 1% each year to 100% of the 1994 MGDB tables at age 115 shall be assumed in the projection used to the determine the greatest present value amount required under Subsection C.2.b.ii.

f. Projection frequency

The projection used to determine the greatest present value amount required under Subsection C.2.b.ii shall be calculated using an annual or more frequent time step, such as quarterly. For time steps more frequent than annual, assets supporting account values at the start of a year may be retained in such funds until year-end (i.e., margin earned during the year will earn the fund rates instead of the DR until year end) or removed after each time step. However, the same approach shall be applied for all years. Similarly, projected benefits, lapses,

elections and other contract-holder activity can be assumed to occur annually or at the end of each time step, but the approach shall be consistent for all years.

g. Contract-holder election rates

Contract-holder election rates for exercisable ITM guaranteed living benefits other than GMWBs shall be 5% per annum in every projection interval where the living benefit is less than 10% ITM, 15% per annum in every projection interval where the living benefit is 10% or more ITM and less than 20% ITM, and 25% per annum in every projection interval where the living benefit is more than 20% ITM. In addition, the election rate for an exercisable ITM guaranteed living benefit shall be 100% at the last model duration to elect such benefit. This 100% election rate shall be used when a guaranteed minimum accumulation benefit is at the earliest date that the benefit is exercisable and ITM. However, the contract-holder election rate for any exercisable ITM guaranteed living benefit shall be zero if exercise would cause the extinction of a guaranteed living benefit having a larger current value. For this purpose, GMDBs are not benefits subject to election.

For guaranteed minimum withdrawal benefits, a partial withdrawal, if allowed by contract provisions, equal to the applicable percentage in Table III applied to the contract's maximum allowable partial withdrawal shall be assumed. However, if the contract's minimum allowable partial withdrawal exceeds the partial withdrawal from applying the rate in Table III to the contract's maximum allowable partial withdrawal, then the contract's minimum allowable partial withdrawal shall be assumed.

Table III – Guaranteed Withdrawal Assumptions

	Attained Age Less Than 50	Attained Age 50 to 59	Attained Age 60 or Greater
Withdrawals do not reduce other elective guarantees that are in the money	50%	75%	100%
Withdrawals reduce elective guarantees that are in the money	25%	50%	75%

h. Indices

If an interest index is required to determine projected benefits or reinsurance obligations, the index must assume interest rates have not changed since the last reported rates before the valuation date. If an equity index is required, the index shall be consistent with the last reported index before the valuation date, the initial drop in equity returns, and the subsequent equity returns in the standard scenario projection. The sources of information and how they are used to determine the indexes shall be documented and, to the extent possible, consistent from year to year.

4. Assumptions for use in Subsection C.2.b.iii.

a. The value of aggregate reinsurance

The value of aggregate reinsurance shall be calculated separately from the accumulated net revenue. The value of aggregate reinsurance is the discounted

value, using the statutory valuation rate described in the following paragraph, of the excess of (a) the projected benefit payments from the reinsurance; over (b) the projected gross reinsurance premiums, where (a) and (b) are determined under the assumptions described in Subsection C.3 for all applicable contracts in aggregate.

In order for the value of the aggregate reinsurance to be consistent with the underlying standard scenario reserve, the discount rate shall be a weighted average of the valuation rates (*DR*) of the contracts that are supported by the aggregate reinsurance treaty. The weights used to determine this discount rate shall be reasonably related to the risks that are being covered by the aggregate reinsurance (e.g., account value or values of guaranteed benefits) and shall be applied consistently from year to year. If an appropriate method to determine this discount rate does not exist, the value of the aggregate reinsurance shall be determined using the statutory valuation rate in effect on the valuation date for annuities valued on an issue year basis using Plan Type A and a guarantee duration greater than 10 years but not more than 20 years, determined assuming there are cash settlement options but no interest guarantees on future premiums.

b. The value of approved hedges

The value of approved hedges shall be calculated separately from the accumulated net revenue. The value of approved hedges is the difference between: a) the discounted value at the one-year constant maturity treasury (CMT) as of the valuation date of the pre-tax cash flows from the approved hedges; less b) their statement values on the valuation date.

Guidance Note: For purposes of this section, the term CMT refers to the nominal yields on actively traded non-inflation-indexed issues adjusted to constant maturities, as released daily by the Federal Reserve Board. As of this writing, the current and historical one-year rates may be found at *www.federalreserve.gov/releases/h15/data/Business_day/H15_TCMNOM_Y1.txt*, and the current and historical five-year rates may be found at *www.federalreserve.gov/releases/h15/data/Business_day/H15_TCMNOM_Y5.txt.*

To be an approved hedge for purposes of the standard scenario reserve, a derivative or other investment has to be an actual asset held by the company on the valuation date; be used as a hedge supporting the contracts falling under the scope of these requirements; and comply with any statutes, laws, or regulations (including applicable documentation requirements) of the domiciliary state or jurisdiction related to the use of derivative instruments.

The domiciliary commissioner may require the exclusion of any portion of the value of approved hedges upon a finding that the company's documentation, controls, measurement, execution of strategy or historical results are not adequate to support a future expectation of risk reduction commensurate with the value of approved hedges.

The cash-flow projection for approved hedges that expire in less than one year from the valuation date should be based on holding the hedges to their expiration. For hedges with an expiration of more than one year, the value of hedges should be based on liquidation of the hedges one year from the valuation date. Where applicable, the liquidation value of hedges shall be consistent with the assumed returns in the standard scenario from the start of the projection to the date of

liquidation, Black-Scholes pricing, a risk-free rate equal to the five-year CMT as of the valuation date and the annual volatility implicit as of the valuation date in the statement value of the hedges when the statement value of hedges are valued with Black-Scholes pricing and a risk-free rate equal to the 5-year CMT as of the valuation date.

Guidance Note: Conceptually, the item being hedged, the contract guarantees and the approved hedges are accounted for at the average present value of the worst 30% of all scenarios, the tail scenarios for a CTE (70) measure. However, the statement value of approved hedges is at market. Therefore, the standard scenario value of approved hedges is a proxy of the adjustment needed to move approved hedges from a market value to a tail value.

There is no credit in the standard scenario for dynamic hedging beyond the credit that results from hedges actually held on the valuation date.

c. Allocation of the value of hedges and the value of aggregate reinsurance

The value of approved hedges and aggregate reinsurance shall be allocated to the contracts, which are supported by the applicable aggregate reinsurance agreements and approved hedges. A contract's allocation shall be the lesser of the amount in Subsection C.2.b.ii for the contract or the product of (a) and (b) where:

i. Is the sum of the value of the applicable approved hedges plus the value of the applicable aggregate reinsurance for all contracts supported by the same hedges and/or the Aggregate reinsurance agreement?

and

ii. Is the ratio of the amount in Subsection C.2.b.ii for the contract to the sum of the amount in Subsection C.2.b.ii for all contracts supported by the same hedges and/or the Aggregate reinsurance agreement?

d. Retention of components

For the seriatim standard scenario reserve on the statement date under Subsections A.2.a and Subsection A.2.b, the actuary should have available to the commissioner the following values for each contract:

i. The standard scenario reserve prior to adjustment under Subsection C.4.c.

ii. The standard scenario reserve net of the adjustment in SubsectionC.4.c.

5. Determination of the Surrender Charge Amortization Period to Be Used in Subsection C.3.a.i. and Subsection C.3.a.ii.

The purpose of the surrender charge amortization period is to help determine how much of the surrender charge is amortized in the basic adjusted reserve portion of the standard scenario amount and how much needs to be amortized in the accumulated net revenue portion. Once determined, the surrender charge amortization period determines the duration over which the lower level of margins, as described in Subsection C.3.a.i., is used. After that duration, the higher level of margins, as described in Subsection C.3.a.ii, is used.

A separate surrender charge amortization period is determined for each contract and is based on amounts determined in the calculation of the basic adjusted reserve for that contract. A key component of the calculation is the amount of the surrender charge that is not amortized in the basic adjusted reserve calculation for that contract. This is represented by the difference between the account value and the cash surrender value projected within the basic adjusted reserve calculation for the contract.

The surrender charge amortization period for a given contract is determined by following the steps:

a. Measure the duration of the greatest present value used in the basic adjusted reserve.

The basic adjusted reserve is determined for a contract by taking the greatest present value of a stream of projected benefits. The benefit stream that determines the greatest present value typically includes an "ultimate" event (e.g., 100% surrender, 100% annuitization or maturity). The "BAR duration" is the length of time between the valuation date and the projected "ultimate" event.

b. Determine the amount of the surrender charge not amortized in the basic adjusted reserve.

The surrender charge not amortized in the basic adjusted reserve is the difference between the projected account value and the projected cash surrender value at the BAR duration (i.e., at the time of that projected "ultimate" event). This value for a given contract shall not be less than zero.

c. Determine the surrender charge amortization period before rounding.

This equals i time ii plus iii, where:

i. Equals the ratio of the amount determined in step 2 to the account value on the valuation date.

ii Equals 100.

iii. Equals the BAR duration determined in step 1.

d. Determine the surrender charge amortization period for the contract.

This is the amount determined in step 3, rounded to the nearest number that represents a projection duration, taking into account the projection frequency described in Subsection C.3.f. For example, if step 3 produces a value of 2.15 and the projection frequency is quarterly, then the surrender charge amortization period for the contract is 2.25.

Section 6: Alternative Methodology

A. General Methodology

1. General Methodology Description

For variable deferred annuity contracts that either contain no guaranteed benefits or only GMDBs, including "earnings enhanced death benefits," (i.e., no VAGLBs), the CTE amount may be determined by using the method outlined below rather than by using the approach described in Section 2.D (i.e., based on projections), provided the approach

described in Section 2.D has not been used in prior valuations or else approval has been obtained from the domiciliary commissioner.

The CTE amount determined using the Alternative Methodology for a group of contracts with GMDBs shall be determined as the sum of amounts obtained by applying factors to each contract in force as of a valuation date and adding this to the contract's cash surrender value. The resulting CTE amount shall not be less than the cash surrender value in aggregate for the group of contracts to which the Alternative Methodology is applied.

Guidance Note: The amount that is added to a contract's cash surrender value may be negative, zero or positive, thus resulting in a reserve for a given contract that could be less than, equal to or greater than the cash surrender value.

The CTE amount determined using the Alternative Methodology for a group of contracts that contain no guaranteed benefits shall be determined using an application of AG 33, as described below.

Guidance Note: The term "contracts that contain no guaranteed benefits" means that there are no guaranteed benefits at any time during the life of the contract (past, present or future).

For purposes of performing the Alternative Methodology, materially similar contracts within the group may be combined together into subgroups to facilitate application of the factors. Specifically, all contracts comprising a "subgroup" must display substantially similar characteristics for those attributes expected to affect reserves (e.g., definition of guaranteed benefits, attained age, contract duration, years-to-maturity, market-to-guaranteed value, asset mix, etc.). Grouping shall be the responsibility of the actuary but may not be done in a manner that intentionally understates the resulting reserve.

2. Definitions of Terms Used in this Section

a. Annualized Account Charge Differential: This term is the charge as percentage account value (revenue for the company) minus the expense as percentage of account value.

b. Asset Exposure: Asset exposure refers to the greatest possible loss to the insurance company from the value of assets underlying general or separate account contracts falling to zero.

c. Benchmark: Benchmarks have similar risk characteristics to the entity (e.g., asset class, index or fund) to be modeled.

d. Deterministic Calculations: In a deterministic calculation, a given event (e.g., asset returns going up by 7% and then down by 5%) is assumed to occur with certainty. In a stochastic calculation, events are assigned probabilities.

e. Foreign Securities: These are securities issued by entities outside the U.S. and Canada.

f. Grouped Fund Holdings: Grouped fund holdings relate to guarantees that apply across multiple deposits or for an entire contract instead of on a deposit-by-deposit basis.

g. Guaranteed Value: The guaranteed value is the benefit base or a substitute for the account value (if greater than the account value) in the calculation of living

benefits or death benefits. The methodology for setting the guaranteed value is defined in the variable annuity contract.

h. High-Yield Bonds: High-yield bonds are below investment grade, with NAIC ratings (if assigned) of 3, 4, 5 or 6. Compared to investment grade bonds, these bonds have higher risk of loss due to credit events. Funds containing securities predominately containing securities that are not NAIC rated as 1 or 2 (or similar agency ratings) are considered to be high-yield.

i. Investment Grade Fixed Income Securities: Securities with NAIC ratings of 1 or 2 are investment grade. Funds containing securities predominately with NAIC ratings of 1 or 2 or with similar agency ratings are considered to be investment grade.

j. Liquid Securities: These securities can be sold and converted into cash at a price close to its true value in a short period of time.

k. Margin Offset: Margin offset is the portion of charges plus any revenue-sharing allowed under Section 3.A.5 available to fund claims and amortization of the unamortized surrender charges allowance.

l. Multi-Point Linear Interpolation: This methodology is documented in mathematical literature and calculates factors based on multiple attributes categorized with discrete values where the attributes' actual values may be between the discrete values.

m. Model Office: A model office converts many contracts with similar features into one contract with specific features for modeling purposes.

n. Pre-Packaged Scenarios: The prepackaged scenarios are the year-by-year asset returns that may be used (but are not mandated) in projections related to the alternative methodology. These scenarios are available on the Academy website.

o. Quota-Share Reinsurance: In this type of reinsurance treaty, the same proportion is ceded on all cessions. The reinsurer assumes a set percentage of risk for the same percentage of the premium, minus an allowance for the ceding company's expenses.

p. Resets: A reset benefit results in a future minimum guaranteed benefit being set equal to the contract's account value at previous set date(s) after contract inception.

q. Risk Mitigation Strategy: A risk mitigation strategy is a device to reduce the probability and/or impact of a risk below an acceptable threshold.

r. Risk Profile: Risk profile in these requirements relates to the prescribed asset class categorized by the volatility of returns associated with that class.

s. Risk Transfer Arrangements: A risk transfer arrangement shifts risk exposures (e.g., the responsibility to pay at least a portion of future contingent claims) away from the original insurer.

t. Roll-Up: A roll-up benefit results in the guaranteed value associated with a minimum contractual guarantee increasing at a contractually defined interest rate.

u. Volatility: Volatility refers to the annualized standard deviation of asset returns.

3. Contract-by-Contract Application for Contracts That Contain No Guaranteed Living or Death Benefits

The Alternative Methodology reserve for each contract that contains no guaranteed living or death benefits shall be determined by applying AG 33. The application shall assume a return on separate account assets equal to the year of issue valuation interest rate less appropriate asset based charges. It also shall assume a return for any fixed separate account and general account options equal to the rates guaranteed under the contract.

The reserve for such contracts shall be no less than the cash surrender value on the valuation date, as defined in Section 1.E.2.

4. Contract-by-Contract Application for Contracts That Contain GMDBs only

For each contract, factors are used to determine a dollar amount, equal to *R CA FE* GC (as described below), that is to be added to that contract's cash surrender value as of the valuation date. The dollar amount to be added for any given contract may be negative, zero or positive. The factors that are applied to each contract shall reflect the following attributes as of the valuation date.

a. The contractual features of the variable annuity product.

b. The actual issue age, period since issue, attained age, years-to-maturity and gender applicable to the contract.

c. The account value and composition by type of underlying variable or fixed fund.

d. Any surrender charges.

e. The GMDB and the type of adjustment made to the GMDB for partial withdrawals (e.g., proportional or dollar-for-dollar adjustment).

f. Expenses to be incurred and revenues to be received by the company as estimated on a prudent estimate basis as described in Section 1.E.2.i and complying with the requirements for revenue sharing as described in Section 3.A.5.

5. Factor Components

Factors shall be applied to determine each of the following components.

Guidance Note: Material to assist in the calculation of the components is available on the Academy website at *www.actuary.org/life/phase2.asp.*

CA = Provision for amortization of the unamortized surrender charges calculated by the insurer based on each contract's surrender charge schedule, using prescribed assumptions, except that lapse rates shall be based on the insurer's prudent estimate, but with no provision for federal income taxes or mortality.

FE = Provision for fixed dollar expenses less fixed dollar revenue calculated using prescribed assumptions, the contract's actual expense charges, the insurer's anticipated actual expenses and lapse rates, both estimated on a prudent estimate basis, and with no provision for federal income taxes or mortality.

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GC = Provision for the costs of providing the GMDB less net available spread-based charges determined by the formula *F GV G AV R*, where GV and AV are as defined in Subsection C.1.

R = A scaling factor that is a linear function of the ratio of the margin offset to total account charges (*W*) and takes the form $R(_{0,1})_{0\ 1}\ W$. The intercept and slope factors for this linear function may vary according to:

- Product type.
- Pro-rata or dollar-for-dollar reductions in guaranteed value following partial withdrawals.
- Fund class.
- Attained age.
- Contract duration.
- Asset-based charges.
- 90% of the ratio of account value to guaranteed value, determined in the aggregate for all contracts sharing the same product characteristics.

Tables of factors for *F, G,* $_0$ and $_1$ values reflecting a 65% confidence interval and ignoring federal income tax are available from the NAIC. In calculating $R(_{0,\ 1})$ directly from the linear function provided above, the margin ratio *W* must be constrained to values greater than or equal to 0.2 and less than or equal to 0.6.

Interpolated values of *F, G* and *R* (calculated using the linear function described above) for all contracts having the same product characteristics and asset class shall be derived from the pre-calculated values using multi-point linear interpolation over the following four contract-level attributes:

a. Attained age.

b. Contract duration.

c. Ratio of account value to GMDB.

d. The total of all asset-based charges, including any fund management fees or allowances based on the underlying variable annuity funds received by the insurer.

The gross asset-based charges for a product shall equal the sum of all contractual asset-based charges plus fund management fees or allowances based on the underlying variable annuity funds received by the insurer determined by complying with the requirements for prudent estimate described in Section 1.E.2.i and revenue sharing described in Section 3.A.5. Net asset-based charges equal gross asset-based charges less any company expenses assumed to be incurred expressed as a percentage of account value. All expenses that would be assumed if the CTE amount were being computed as described in Section 3.A.1 should be reflected either in the calculation of the net asset based charges or in the expenses reflected in the calculation of the amount *FE*.

No adjustment is made for federal income taxes in any of the components listed above.

For purposes of determining the CTE amount using the Alternative Methodology, any interpretation and application of the requirements of these requirements shall follow the principles discussed in Section 1.B.

B. Calculation of *CA* and *FE*

1. General Description

Components *CA* and *FE* shall be calculated for each contract, thus reflecting the actual account value and GMDB, as of the valuation date, which is unique to each contract.

Components *CA* and *FE* are defined by deterministic "single-scenario" calculations that account for asset growth, interest and inflation at prescribed rates. Mortality is ignored for these two components. Lapse rates shall be determined on a prudent estimate basis as described in Section 1.E.2.i. Lapse rates shall be adjusted by the formula shown below (the dynamic lapse multiplier), which bases the relationship of the GMDB (denoted as GV in the formula) to the account value (denoted as AV in the formula) on the valuation date. Thus, projected lapse rates are smaller when the GMDB is greater than the account value and larger when the GMDB is less than the account value.

$$\lambda = MIN\left[U, MAX\left[L, 1 - M \times \left(\frac{GV}{AV} - D\right)\right]\right]$$

Projected fund performance underlying the account values is as shown in the table below. Unlike the *GC* component, which requires the entire account value to be mapped, using the fund categorization rules set forth in Subsection D, to a single "equivalent" asset class (as described in Subsection D.3), the *CA* and *FE* calculation separately projects each variable subaccount (as mapped to the eight prescribed categories shown in Subsection D using the net asset returns shown in the following table). If surrender charges are based wholly on deposits or premiums as opposed to account value, use of this table may not be necessary.

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

2. Component *CA*

Component *CA* is computed as the present value of the projected change in surrender charges plus the present value of an implied borrowing cost of 25 bps at the beginning of each future period applied to the surrender charge at such time.

This component can be interpreted as the "amount needed to amortize the unamortized surrender charge allowance for the *persisting* policies plus the implied borrowing cost." By definition, the amortization for non-persisting lives in each time period is exactly offset by the collected surrender charge revenue (ignoring timing differences and any waiver upon death). The unamortized balance must be projected to the end of the surrender charge period using the net asset returns and Dynamic Lapse Multiplier, both as described above and the year-by-year amortization discounted also as described above. For simplicity, mortality is ignored in the calculations. Surrender charges and free partial withdrawal provisions are as specified in the contract. Lapse and withdrawal rates are determined on a prudent estimate basis, and may vary according to the attributes of the business being valued including, but not limited to, attained age, contract duration, etc.

3. Component *FE*

Component *FE* establishes a provision for fixed dollar expenses (e.g., allocated costs, including overhead expressed as "per contract" *and* those expenses defined on a "per contract" basis) less any fixed dollar revenue (e.g., annual administrative charges or contract fees) through the earlier of contract maturity or 30 years. *FE* is computed as the present value of the company's assumed fixed expenses projected at an assumed annual rate of inflation starting in the second projection year. This rate grades uniformly from the current inflation rate (CIR) into an ultimate inflation rate of 3% per annum in the 8th year after the valuation date. The CIR is the greater of 3% and the inflation rate assumed for expenses in the company's most recent asset adequacy analysis for similar business.

C. Calculation of the *GC* Component

1. *GC* Factors

GC is calculated as *F GV G AV R*, where *GV* is the amount of the GMDB and *AV* is the contract account value, both as of the valuation date. *F*, *G* and the slope and intercept for the linear function used to determine *R* (identified symbolically as $_0$ and $_1$) are pre-calculated factors available from the NAIC and know herein as the "pre-calculated factors." The factors shall be interpolated as described in Subsection C.6 and modified as necessary as described in Subsection C.7 and Subsection C.8.

2. Five Steps

There are five major steps in determining the *GC* component for a given contract:

a. Classifying the asset exposure, as specified in Subsection C.3.

b. Determining the risk attributes, as specified in Subsection C.4. and Subsection C.5.

c. Retrieving the appropriate nodal factors from the factor grid, as described in Subsection C.6.

d. Interpolating the nodal factors, where applicable (optional), as described in Subsection C.6.

e. Applying the factors to the contract values.

3. Classifying Asset Exposure

For purposes of calculating *GC* (unlike what is done for components *CA* and *FE*), the

entire account value for each contract must be assigned to one of the eight prescribed fund classes shown in Subsection D, using the fund categorization rules in Subsection D.

4. Product Designs

Factors *F*, *G* and $R(_{1,2})$ are available with the pre-calculated factors for the following GMDB product designs:

a. Return of premium (ROP).

b. Premiums less withdrawals accumulated at 3% per annum, capped at 2.5 times premiums less withdrawals, with no further increase beyond age 80 ("ROLL3").

c. Premiums less withdrawals accumulated at 5% per annum, capped at 2.5 times premiums less withdrawals, with no further increase beyond age 80 ("ROLL5").

d. An annual ratchet design (maximum anniversary value), for which the guaranteed benefit never decreases and is increased to equal the previous contract anniversary account value, if larger, with no further increases beyond age 80 ("MAV").

e. A design having a guaranteed benefit equal to the larger of the benefits in designs 3 and 4, above ("HIGH").

f. An enhanced death benefit ("EDB") equal to 40% of the net earnings on the account (i.e., 40% of account value less total premiums paid plus withdrawals made) with this latter benefit capped at 40% of premiums less withdrawals.

5. Other Attributes

Factors *F*, *G* and $R(_{1}, _{2})$ are available within the pre-calculated factors for the following set of attributes:

a. Two partial withdrawal rules – one for contracts having a pro-rata reduction in the GMDB and another for contracts having a dollar-for-dollar reduction.

b. The eight asset classes described in Subsection D.2.

c. Eight attained ages, with a five-year age setback for females.

d. Five contract durations.

e. Seven values of GV/AV.

f. Three levels of asset-based income.

6. Interpolation of *F*, *G* and $R(_{1}, _{2})$

a. Apply to a contract having the product characteristics listed in Subsection E.1 and shall be determined by selecting values for the appropriate partial withdrawal rule and asset class and then using multi-point linear interpolation among published values for the last four attributes shown in Subsection C.5.

b. Interpolation over all four dimensions is not required, but if not performed over one or more dimensions, the factor used must result in a conservative (higher) value of *GC*. However, simple linear interpolation using the *AV:GV* ratio is

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mandatory. In this case, the company must choose nodes for the other three dimensions according to the following rules: next highest attained age, nearest duration and nearest annualized account charge differential, as listed in Subsection E.3 (i.e., capped at +100 and floored at –100 bps).

c. For $R(\ _1,\ _2\ )$, the interpolation should be performed on the scaling factors *R* calculated using $_1$, $_2$, using the ratio of margin offset to total asset charges (*W*), not on the factors $_1$ and $_2$ themselves.

d. An Excel workbook, Excel add-in and companion dynamic link library (.dll) program is available from the NAIC that can be used to determine the correct values and perform the multi-point linear interpolation.

e. Alternatively, published documentation can be referenced on performing multi-point linear interpolation and the required 16 values determined using a key that is documented in the table *Components of Key Used for GC Factor Look-Up* located in Subsection E.3.

7. Adjustments to *GC* for Product Variations & Risk Mitigation/Transfer

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

a. A variation in product form wherein the definition of the guaranteed benefit is materially different from those for which factors are available (see Subsection C.8).

b. A risk mitigation or other management strategy, other than a hedging strategy, that cannot be accommodated through a straightforward and direct adjustment to the published values.

Adjustments may not be made to *GC* for hedging strategies.

Any adjustments to the published factors must be fully documented and supported through stochastic analysis. Such analysis may require stochastic simulations, but would not ordinarily be based on full in-force projections. Instead, a representative "model office" should be sufficient. Use of these adjusted factors must be supported by a periodic review of the appropriateness of the assumptions and methods used to perform the adjustments, with changes made to the adjustments when deemed necessary by such review.

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

However, if the contract design is sufficiently different from those provided and/or the risk mitigation strategy is nonlinear in its impact on the CTE amount, and there is no practical or obvious way to obtain a good result from the

prescribed factors/formulas, any adjustments or approximations must be supported using stochastic modeling. Notably this modeling need not be performed on the whole portfolio, but can be undertaken on an appropriate set of representative policies.

8. Adjusting *F* and *G* for Product Design Variations

This subsection describes the typical process for adjusting *F* and *G* factors due to a variation in product design. Note that *R* (as determined by the slope and intercept terms in the factor table) would not be adjusted.

a. Select a contract design among those described in Subsection C.4 that is similar to the product being valued. Execute cash-flow projections using the documented assumptions (see table of *Liability Modeling Assumptions & Product Characteristics* in Subsection E.1 and table of *Asset Based Fund Charges* in Subsection E.2) and the prepackaged scenarios for a set of representative cells (combinations of attained age, contract duration, asset class, AV/GMDB ratio and asset-based charges). These cells should correspond to nodes in the table of pre-calculated factors. Rank (order) the sample distribution of results for the present value of net cost. Determine those scenarios that comprise CTE (65).

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

b. Using the results from step 1, average the present value of cost for the CTE (65) scenarios and divide by the current guaranteed value. For the J^{th} cell, denote this value by F_J. Similarly, average the present value of the margin offset revenue for the same subset of scenarios and divide by account value. For the J^{th} cell, denote this value by G_J.

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

$$F_J^* \ \frac{f}{F_J} \text{ and } G_J^* \frac{g}{G_J}$$

d. Execute "product specific" cash-flow projections using the documented assumptions and prepackaged scenarios for the same set of representative cells. Here, the company should model the actual product design. Rank (order) the sample distribution of results for the present value of net cost. Determine those scenarios that comprise CTE (65).

e. Using the results from step 4, average the present value of cost for the CTE (65) scenarios and divide by the current guaranteed value. For the J^{th} cell, denote this value by F_J. Similarly, average the present value of margin offset revenue for the same subset of scenarios and divide by account value. For the J^{th} cell, denote this value by G_J.

f. To calculate the CTE amount for the specific product in question, the company should implement the Alternative Methodology as documented, but use $F_J \ F_J^*$ in place of *F* and $G_J \ G_J^*$ instead of *G*. The same *R* factors as appropriate for the

product evaluated in step 1 shall be used for this step (i.e., the product used to calibrate the cash-flow model).

9. Adjusting *GC* for Mortality Experience

The factors that have been developed for use in determining *GC* assume male mortality at 100% of the 1994 Variable Annuity MGDB ALB Mortality Table. Companies electing to use the Alternative Methodology that have not conducted an evaluation of their mortality experience shall use these factors. Other companies should use the procedure described below to adjust for the actuary's Prudent Estimate of mortality. The development of Prudent Estimate mortality shall follow the requirements and guidance of Section 12. Once a company uses the modified method for a block of business, the option to use the unadjusted factors is no longer available for that part of its business. In applying the factors to actual in-force business, a five-year age setback should be used for female annuitants.

a. Develop a set of mortality assumptions based on Prudent Estimate. In setting these assumptions, the actuary shall be guided by the definition of Prudent Estimate and the principles discussed in Sections 11 and 12.

b. Calculate two sets of net single premiums (NSP) at each attained age: one valued using 100% of the 1994 Variable Annuity MGDB Age Last Birthday (ALB) Mortality Table (with the aforementioned five-year age setback for females) and the other using prudent estimate mortality. These calculations shall assume an interest rate of 3.75% and a lapse rate of 7% per year.

c. The *GC* factor is multiplied by the ratio, for the specific attained age being valued, of the NSP calculated using the prudent estimate mortality to the NSP calculated using the 1994 Variable Annuity MGDB ALB Mortality Table (with the aforementioned five-year age setback for females).

D. Fund Categorization

1. Criteria

The following criteria should be used to select the appropriate factors, parameters and formulas for the exposure represented by a specified guaranteed benefit. When available, the volatility of the long-term annualized total return for the fund(s)—or an appropriate benchmark—should conform to the limits presented. For this purpose, "long-term" is defined as twice the average projection period that would be applied to test the product in a stochastic model (generally, at least 30 years).

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

2. Asset Classes

Variable subaccounts must be categorized into one of the following eight asset classes. For purposes of calculating *CA* or *FE*, each contract will have one or more of the following asset classes represented, whereas for component *GC*, all subaccounts will be mapped into a single asset class.

a. Fixed account: This class is credited interest at guaranteed rates for a specified term or according to a "portfolio rate" or "benchmark" index. This class offers a minimum positive guaranteed rate that is periodically adjusted according to company policy and market conditions.

b. Money market/short-term: This class is invested in money market instruments with an average remaining term-to-maturity of less than 365 days.

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

d. Balanced: This class is a combination of fixed income securities with a larger equity component. The fixed income component should exceed 25% of the portfolio. Additionally, any aggressive or "specialized" equity component should not exceed one-third (33.3%) of the total equities held. Should the fund violate either of these constraints, it should be categorized as an equity fund. This class usually has a long-term volatility in the range of 8%–13%.

e. Diversified equity: This class is invested in a broad-based mix of U.S. and foreign equities. The foreign equity component (maximum 25% of total holdings) must be comprised of liquid securities in well-developed markets. Funds in this class would exhibit long-term volatility comparable to that of the S&P 500. These funds should usually have a long-term volatility in the range of 13%–18%.

f. Diversified international equity: This class is similar to the diversified equity class, except that the majority of fund holdings are in foreign securities. This class should usually have a long-term volatility in the range of 14%–19%.

g. Intermediate risk equity: This class has a mix of characteristics from both the diversified and aggressive equity classes. This class has a long-term volatility in the range of 19%–25%.

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

3. Selecting Appropriate Investment Classes

The selection of an appropriate investment type should be done at the level for which the guarantee applies. For guarantees applying on a deposit-by-deposit basis, the fund selection is straightforward. However, where the guarantee applies across deposits or for an entire contract, the approach can be more complicated. In such instances, the approach is to identify for each contract where the "grouped holdings" fit within the categories listed and to classify the associated assets on this basis.

A seriatim process is used to identify the "grouped" fund holdings, to assess the risk profile of the current fund holdings (possibly calculating the expected long-term volatility of the funds held with reference to the indicated market proxies) and to classify the entire

"asset exposure" into one of the specified choices. Here, "asset exposure" refers to the underlying assets (separate and/or general account investment options) on which the guarantee will be determined. For example, if the guarantee applies separately for each deposit year within the contract, then the classification process would be applied separately for the exposure of each deposit year.

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

a. Map each separate and/or general account investment option to one of the prescribed asset classes. For some funds, this mapping will be obvious, but for others, it will involve a review of the fund's investment policy, performance benchmarks, composition and expected long-term volatility.

b. Combine the mapped exposure to determine the expected long-term "volatility of current fund holdings." This will require a calculation based on the expected long-term volatility for each fund and the correlations between the prescribed asset classes as given in the table "*Correlation Matrix for Prescribed Asset Classes*" in Subsection D.4.

c. Evaluate the asset composition and expected volatility (as calculated in step b) of current holdings to determine the single asset class that best represents the exposure, with due consideration to the constraints and guidelines presented earlier in this Section.

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

e. In step (b), the company should calculate the "volatility of current fund holdings" (for the exposure being categorized) by the following formula:

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

Using the volatilities and correlations in the following table where

$$w_i = \frac{AV_i}{\sum_k AV_k}$$

is the relative value of fund I expressed as a proportion of total contract value, ρ_{ij} is the correlation between asset classes I and j, and σ_i is the volatility of asset class i. An example is provided after the table.

4. Correlation Matrix for Prescribed Asset Classes

Annual Volatility		Fixed Account	Money Market	Fixed Income	Balanced	Diverse Equity	Intl Equity	Interm Equity	Aggr Equity
1.0%	Fixed Account	**1**	0.50	0.15	0	0	0	0	0
1.5%	Money Market	0.50	**1**	0.20	0	0	0	0	0
5.0%	Fixed Income	0.15	0.20	**1**	0.30	0.10	0.10	0.10	0.05
10.0%	Balanced	0	0	0.30	**1**	0.95	0.60	0.75	0.60
15.5%	Diverse Equity	0	0	0.10	0.95	**1**	0.60	0.80	0.70
17.5%	Intl Equity	0	0	0.10	0.60	0.60	**1**	0.50	0.60
21.5%	Interm Equity	0	0	0.10	0.75	0.80	0.50	**1**	0.70
26.0%	Aggr Equity	0	0	0.05	0.60	0.70	0.60	0.70	**1**

5. Fund Categorization Example

As an example, suppose three funds (fixed income, diversified U.S. equity and aggressive equity) are offered to clients on a product with a contract level guarantee (i.e., across all funds held within the contract). The current fund holdings (in dollars) for five sample contracts are shown in the following table.

	1	**2**	**3**	**4**	**5**
MV Fund X (Fixed Income)	5,000	4,000	8,000	-	5,000
MV Fund Y (Diversified Equity)	9,000	7,000	2,000	6,000	-
MV Fund Z (Aggressive Equity)	1,000	4,000	-	4,000	5,000
Total Market Value	15,000	15,000	10,000	10,000	10,000
Total Equity Market Value	10,000	11,000	2,000	10,000	5,000
Fixed Income % (*A*)	33%	27%	80%	0%	50%
Fixed Income Test (*A*>75%)	No	No	Yes	No	No
Aggressive % of Equity (B)	10%	36%	n/a	40%	100%
Balanced Test (*A*>25% & *B*<33.3%)	Yes	No	n/a	No	No
Volatility of Current Fund Holdings	10.9%	13.2%	5.3%	19.2%	13.4%
Fund Classification	**Balanced**	**Diversified*** [3]	**Fixed Income**	**Intermediate**	**Diversified**

[3] Although the volatility suggests "balanced fund," the balanced fund criteria were not met. Therefore, this "exposure" is moved "up" to diversified equity. For those funds classified as diversified equity, additional analysis would be required to assess whether they should be instead designated as "diversified international equity."

As an example, the "volatility of current fund holdings" for contract #1 is calculated as $\sqrt{A + B}$ where:

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

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

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

E. Tables

1. Liability Modeling Assumptions & Product Characteristics used for *GC* Factors

Asset Based Charges (MER)	Vary by fund class. See Subsection E.2.
Base Margin Offset	100 bps per annum.
GMDB Description	1. ROP = return of premium. 2. ROLL3 = 3% roll-up, capped at 2.5 premium, frozen at age 80. 3. ROLL5 = 5% roll-up, capped at 2.5 premium, frozen at age 80. 4. MAV = annual ratchet (maximum anniversary value), frozen at age 80. 5. HIGH = Higher of 5% roll-up and annual ratchet. 6. EDB = 40% Enhanced death benefit (capped at 40% of deposit). Note that the pre-calculated factors were originally calculated with a combined ROP benefit, but they have been adjusted to remove the effect of the ROP. Thus, the factors for this benefit five are solely for the EDB.
Adjustment to GMDB Upon Partial Withdrawal	Separate factors for "pro-rata by market value" and "dollar-for-dollar."
Surrender Charges	Ignored (i.e., zero). Included in the *CA* component.
Single Premium/Deposit	$100,000. No future deposits; no intra-contract fund rebalancing.
Base Contract Lapse Rate (Total Surrenders)	Pro-rata by MV: 10% p.a. at all contact durations (before dynamics). Dollar-for-dollar: 2% p.a. at all contract durations (no dynamics).
Partial Withdrawals	Pro-rata by MV: None (i.e., zero). Dollar-for-dollar: Flat 8% p.a. at all contract durations (as a % of AV). No dynamics or anti-selective behavior.
Mortality	100% of the 1994 Variable Annuity MGDB Mortality Table (MGDB 94 ALB). For reference, $1000q_x$ rates at ages 65 and 70 for 100% of MGDB 94 ALB Male are 18.191 and 29.363. respectively. Note that Subsection C.9 allows modification to this assumption.
Gender/Age Distribution	100% male. Methodology accommodates different attained ages. A five-year age setback will be used for female annuitants.
Max. Annuitization Age	All policies terminate at age 95.
Fixed Expenses	Ignored (i.e., zero). Included in the *FE* component.
Annual Fee and Waiver	Ignored (i.e., zero). Included in the *FE* component.
Discount Rate	5.75% pre-tax.
Dynamic Lapse Multiplier (Applies only to policies where GMDB is adjusted "pro-rata by MV" upon withdrawal)	$\lambda = MIN\left[U, MAX\left[L, 1 - M \times \left(\frac{GV}{AV} - D\right)\right]\right]$ *U*=1, *L*=0.5, *M*=1.25, *D*=1.1 ☐ Applied to the "Base Contract Lapse Rate." ☐ Does not apply to partial withdrawals.

2. Asset-Based Fund Charges (bps per annum)

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

3. Components of Key Used for *GC* Factor Look-Up

(First Digit always "1")

Contract Attribute	Key: Possible Values & Description
Product Definition, P	0 : 0 Return-of-premium. 1 : 1 Roll-up (3% per annum). 2 : 2 Roll-up (5% per annum). 3 : 3 Maximum anniversary value (MAV). 4 : 4 High of MAV and 5% roll-up. 5 : 5 Enhanced death benefit (excludes the ROP GMDB, which would have to be added separately if the contract in question has an ROP). benefit.)
GV Adjustment Upon Partial Withdrawal, A	0 : 0 Pro-rata by market value. 1 : 1 Dollar-for-dollar.
Fund Class, F	0 : 0 Fixed Account. 1 : 1 Money Market. 2 : 2 Fixed Income (Bond). 3 : 3 Balanced Asset Allocation. 4 : 4 Diversified Equity. 5 : 5 International Equity. 6 : 6 Intermediate Risk Equity. 7 : 7 Aggressive / Exotic Equity.
Attained Age (Last Birthday), X	0 : 35 4 : 65 1 : 45 5 : 70 2 : 55 6 : 75 3 : 60 7 : 80
Contract Duration (years-since-issue), D	0 : 0.5 1 : 3.5 2 : 6.5 3 : 9.5 4 : 12.5
Account Value-to-Guaranteed Value Ratio, φ	0 : 0.25 4 : 1.25 1 : 0.50 5 : 1.50 2 : 0.75 6 : 2.00 3 : 1.00
Annualized Account Charge Differential from A4.5)B) Assumptions	0 : −100 bps 1 : +0 2 : +100

Section 7: Scenario Calibration Criteria

A. General

This section outlines the requirements for the stochastic models used to simulate fund performance. Specifically, it sets certain standards that must be satisfied and offers guidance to the actuary in the development and validation of the scenario models. Background material and analysis are presented to support the recommendation. The section focuses on the S&P 500 as a proxy for returns on a broadly diversified U.S. equity fund, but there is also advice on how the techniques and requirements would apply to other types of funds. General modeling considerations such as the number of scenarios and projection frequency are also discussed.

Guidance Note: For more details on the development of these requirements, including the development of the calibration points, see the Academy recommendation on C-3 Phase II RBC.

The calibration points given in this section are applicable to gross returns (before the deduction of any fees or charges). To determine the net returns appropriate for the projections required by these requirements, the actuary shall reflect applicable fees and contract-holder charges in the development of projected account values. The projections also shall include the costs of managing the investments and converting the assets into cash when necessary.

As a general rule, funds with higher expected returns should have higher expected volatilities, and in the absence of well-documented mitigating factors (e.g., a highly reliable and favorable correlation to other fund returns), they should lead to higher reserve requirements.

Guidance Note: While the model need not strictly adhere to "mean-variance efficiency," prudence dictates some form of consistent risk/return relationship between the proxy investment funds. In general, it would be inappropriate to assume consistently "superior" expected returns (i.e., risk/return point above the frontier).

State or path dependent models are not prohibited, but must be justified by the historic data and meet the calibration criteria. To the degree that the model uses mean-reversion or path-dependent dynamics, this must be well-supported by research and clearly documented in the memorandum supporting the required actuarial certification.

The equity scenarios used to determine reserves must be available in an electronic format to facilitate any regulatory review.

B. Gross Wealth Ratios

Gross wealth ratios derived from the stochastic return scenarios for use with a separate account variable fund category for diversified U.S. equities must satisfy calibration criteria consistent with that for the S&P 500 shown in the following table. Under these calibration criteria, gross wealth ratios for quantiles less than 50% may not exceed the value from the table corresponding to the quantile, while at quantiles greater than 50%, gross wealth ratios may not be less than the corresponding value for the quantile from the table. Gross wealth ratios must be tested for holding period one, five, 10 and 20 years throughout the projections, except as noted in Subsection C.

The "wealth factors" are defined as gross accumulated values (i.e., before the deduction of fees and charges) with complete reinvestment of income and maturities, starting with a unit investment. These can be less than 1, with "1" meaning a zero return over the holding period.

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S&P 500 Total Return Gross Wealth Ratios at the Calibration Points

Calibration Point	One Year	Five Year	Ten Year	Twenty Year
2.5%	0.78	0.72	0.79	
5.0%	0.84	0.81	0.94	1.51
10.0%	0.90	0.94	1.16	2.10
90.0%	1.28	2.17	3.63	9.02
95.0%	1.35	2.45	4.36	11.70
97.5%	1.42	2.72	5.12	

The scenarios need not strictly satisfy all calibration points, but the actuary should be satisfied that any differences do not materially reduce the resulting reserves. In particular, the actuary should be mindful of which tail most affects the business being valued. If reserves are less dependent on the right (left) tail for all products under consideration (e.g., a return of premium guarantee would primarily depend on the left tail, an enhanced death benefit equal to a percentage of the gain would be most sensitive to the right tail, etc.), it is not necessary to meet the right (left) calibration points.

Guidance Note: See the preamble to the AP&P Manual for an explanation of materiality.

For models that require starting values for certain state variables, long-term ("average" or "neutral") values should be used for calibration. The same values should normally be used to initialize the models for generating the actual projection scenarios unless an alternative assumption can be clearly justified. It should be noted that a different set of initialization parameters might produce scenarios that do not satisfy all the calibration points shown in the above table. However, the S&P 500 scenarios used to determine reserves must meet the calibration criteria.

Guidance Note: For example, a stochastic log volatility (SLV) model requires the starting volatility. Also, the regime-switching lognormal model requires an assumption about the starting regime.

Guidance Note: A clear justification exists when state variables are observable or "known" to a high degree of certainty and not merely estimated or inferred based on a "balance of probabilities."

C. Calibration Requirements Beyond 20 Years

It is possible to parameterize some path and/or state-dependent models to produce higher volatility (and/or lower expected returns) in the first 20 years in order to meet the calibration criteria, but with lower volatility (and/or higher expected returns) for other periods during the forecast horizon. While this property may occur for certain scenarios (e.g., the state variables would evolve over the course of the projection and thereby affect future returns), it would be inappropriate and unacceptable for a company to alter the model parameters and/or its characteristics for periods beyond year 20 in a fashion not contemplated at the start of the projection and primarily for the purpose(s) of reducing the volatility and/or severity of ultimate returns.

Guidance Note: Such adjustments must be clearly documented and justified by the historic data.

D. Other Funds

Calibration of other markets (funds) is left to the judgment of the actuary, but the scenarios so generated must be consistent with the calibration points in the table in Subsection B. This does not imply a strict functional relationship between the model parameters for various markets/funds, but it would generally be inappropriate to assume that a market or fund consistently "outperforms" (lower risk, higher expected return relative to the efficient frontier) over the long term.

The actuary shall document the actual 1-, 5-, 10- and 20-year wealth factors of the scenarios at the same frequencies as in the "S&P 500 Total Return Gross Wealth Ratios at the Calibration Points" table in Subsection B. The annualized mean and standard deviation of the wealth factors for the 1-, 5-, 10- and 20-year holding periods also must be provided. For equity funds, the actuary shall explain the reasonableness of any significant differences from the S&P 500 calibration points.

When parameters are fit to historic data without consideration of the economic setting in which the historic data emerged, the market price of risk may not be consistent with a reasonable long-term model of market equilibrium. One possibility for establishing "consistent" parameters (or scenarios) across all funds would be to assume that the market price of risk is constant (or nearly constant) and governed by some functional (e.g., linear) relationship. That is, higher expected returns can only be garnered by assuming greater risk.

Guidance Note: As an example, the standard deviation of log returns often is used as a measure of risk. Specifically, two return distributions *X* and *Y* would satisfy the following relationship:

$$\text{Market Price of Risk} = \left(\frac{\mathrm{E}[\mathrm{R}_X] - \mathrm{r}}{\sigma_X}\right) = \left(\frac{E[R_Y] - \mathrm{r}}{\sigma_Y}\right)$$

Where $E[R]$ and σ are respectively the (unconditional) expected returns and volatilities, and r is the expected risk-free rate over a suitably long holding period commensurate with the projection horizon. One approach to establish consistent scenarios would set the model parameters to maintain a near-constant market price of risk.

A closely related method would assume some form of "mean-variance" efficiency to establish consistent model parameters. Using the historic data, the mean-variance (alternatively, "drift-volatility") frontier could be constructed from a plot of (mean, variance) pairs from a collection of world market indices. The frontier could be assumed to follow some functional form, with the coefficients determined by standard curve fitting or regression techniques. Recognizing the uncertainty in the data, a "corridor" could be established for the frontier. Model parameters would then be adjusted to move the proxy market (fund) inside the corridor.

Guidance Note: The function forms quadratic polynomials, and logarithmic functions tend to work well.

Clearly, there are many other techniques that could be used to establishing consistency between the scenarios. While appealing, the above approaches do have drawbacks, and the actuary should not be overly optimistic in constructing the model parameters or the scenarios.

Guidance Note: For example, mean-variance measures ignore the asymmetric and fat-tailed profile of most equity market returns.

Funds can be grouped and projected as a single fund if such grouping is not anticipated to materially reduce reserves. However, care should be taken to avoid exaggerating the benefits of diversification. The actuary must document the development of the investment return scenarios and be able to justify the mapping of the company's variable accounts to the proxy funds used in the modeling.

E. Correlation of Fund Returns

In constructing the scenarios for the proxy funds, the company may require parameter estimates for a number of different market indices. When more than one index is projected, it is generally necessary to allow for correlations in the simulations. It is not necessary to assume that all markets are perfectly positively correlated, but an assumption of independence (zero correlation) between the equity markets would inappropriately exaggerate the benefits of diversification. An examination of the historic data suggests that correlations are not stationary and that they tend to increase during times of high volatility or negative returns. As such, the actuary should take care not to underestimate the correlations in those scenarios used for the reserve calculations.

If the projections include the simulation of interest rates (other than for discounting surplus strain), as well as equity returns, the processes may be independent provided that the actuary can demonstrate that this assumption (i.e., zero correlation) does not materially underestimate the resulting reserves.

F. Number of Scenarios and Efficiency in Estimation

For straight Monte Carlo simulation (with equally probable "paths" of fund returns), the number of scenarios should typically equal or exceed 1000. The appropriate number will depend on how the scenarios will be used and the materiality of the results. The actuary should use a number of scenarios that will provide an acceptable level of precision.

Fewer than 1,000 scenarios may be used provided that the actuary has determined through prior testing (perhaps on a subset of the portfolio) that the CTE values so obtained materially reproduce the results from running a larger scenario set.

Variance reduction and other sampling techniques are intended to improve the accuracy of an estimate more efficiently than simply increasing the number of simulations. Such methods can be used provided the actuary can demonstrate that they do not lead to a material understatement of results. Many of the techniques are specifically designed for estimating means, not tail measures, and could in fact reduce accuracy (and efficiency) relative to straight Monte Carlo simulation.

Guidance Note: With careful implementation, many variance reduction techniques can work well for CTE estimators. For example, see Manistre, B.J. and Hancock, G. (2003), "Variance of the CTE Estimator," 2003 Stochastic Modeling Symposium, Toronto, September 2003.

The above requirements and warnings are not meant to preclude or discourage the use of valid and appropriate sampling methods, such as Quasi Random Monte Carlo (QRMC), importance sampling or other techniques designed to improve the efficiency of the simulations (relative to pseudo-random Monte Carlo methods). However, the actuary should maintain documentation that adequately describes any such techniques used in the projections. Specifically, the documentation should include the reasons why such methods can be expected not to result in systematic or material under-statement of the resulting reserves compared to using pseudo-random Monte Carlo numbers.

G. Frequency of Projection and Time Horizon

Use of an annual cash-flow frequency ("timestep") is generally acceptable for benefits/features that are not sensitive to projection frequency. The lack of sensitivity to projection frequency should be validated by testing wherein the actuary should determine that the use of a more frequent (i.e., shorter) time step does not materially increase reserves. A more frequent time increment always should be used when the product features are sensitive to projection period frequency.

Care must be taken in simulating fee income and expenses when using an annual time step. For example, recognizing fee income at the end of each period after market movements, but prior to persistency decrements, normally would be an inappropriate assumption. It also is important that the frequency of the investment return model be linked appropriately to the projection horizon in the liability model. In particular, the horizon should be sufficiently long so as to capture the vast majority of costs (on a present value basis) from the scenarios.

Guidance Note: As a general guide, the forecast horizon should not be less than 20 years.

H. Prepackaged Scenarios

The Academy has provided 10,000 scenarios on its website for the following 19 asset classes.

Guidance Note: The prepackaged scenarios can be found at *https://www.soa.org/Files/Zip/research-economic-generators.zip* and are fully documented at *https://www.soa.org/Files/Research/Projects/research-2016-economic-scenario-generators.pdf*.

Guidance Note: Because the reserves calculated using projections involve cash-flow projections, the prepackaged scenarios were developed under the "real world" probability measure (as opposed to a "risk-neutral" basis). Therefore, the prepackaged scenarios may not be appropriate for purposes of projecting the market value of future hedge instruments within a projection (to the extent such instruments are used in the projections). For this purpose, it may be more appropriate to use risk neutral scenarios to determine the market value of hedge instruments in the cash-flow projections that are based on real world scenarios.

1. 3-month Treasury Yields
2. 6-month Treasury Yields
3. 1-year Treasury Yields
4. 2-year Treasury Yields
5. 3-year Treasury Yields
6. 5-year Treasury Yields
7. 7-year Treasury Yields
8. 10-year Treasury Yields
9. 20-year Treasury Yields
10. 30-year Treasury Yields
11. Money Market/Short-Term

12. U.S. Intermediate Term Government Bonds

13. U.S. Long Term Corporate Bonds

14. Diversified Fixed Income

15. Diversified Balanced Allocation

16. Diversified Large Capitalized U.S. Equity

17. Diversified International Equity

18. Intermediate Risk Equity

19. Aggressive or Specialized Equity

The scenarios are available as gross monthly accumulation factors (or Treasury yields) over a 30-year horizon in comma-separated value format (*.*csv*). These scenarios have been appropriately correlated so that the K^{th} scenario for each asset class must be used together and considered one "future investment return scenario." Hence, the scenarios can be combined (by blending the accumulation factors) to create additional "proxy" scenarios for the company's funds.

Guidance Note: It is inappropriate to misalign the ordering of scenarios (e.g., scenario J for "Diversified U.S. Equity" cannot be combined with scenario K for "Diversified International Equity," where $J \neq K$).

Guidance Note: It is important to blend the accumulation factors (not the returns) in order to achieve the desired asset mix.

For example, suppose the actuary wanted to construct scenarios for a "balanced fund" that targets a 60/40 allocation between bonds and U.S. equities. If we denote $[AF^{X}]$ as the matrix of accumulation factors for asset class X, then the balanced scenarios would be defined by $[AF^{BAL}] = 0.60 \times [AF^{BOND}] + 0.40 \times [AF^{S\&P\ 500}]$. Care should be taken to avoid exaggerating the benefits of diversification. The actuary shall document the development of the investment return scenarios and be able to justify the mapping of the company's variable accounts to the proxy funds used in the modeling.

The Treasury yields are expressed as nominal semi-annual bond equivalent yields in decimal format. All other returns are expressed as periodic (not cumulative) market accumulation factors (i.e., monthly "gross wealth ratios"). Interest rates are assumed to change at the start of each month; hence, the value in column T applies for month T-1. The market accumulation factor in column T represents the growth in month T-1.

If all or a portion of these scenarios are used, then the actuary shall verify that the scenario calibration criteria are met.

Section 8: Allocation of the Aggregate Reserves to the Contract Level

Section 2 states that the aggregate reserve shall be allocated to the contracts falling within the scope of these requirements. When the CTE amount is greater than the standard scenario amount, this allocation requires that the excess be allocated to the contracts falling within the scope of these requirements.

A. Allocation when the Aggregate Reserve Equals the CTE Amount

1. Single Subgrouping

When the aggregate reserve is equal to the CTE amount and the CTE amount is determined in aggregate for all contracts falling within the scope of these requirements (i.e., a single grouping), as described in Section 2.D, the excess of the CTE amount over the standard scenario amount shall be allocated to each contract on the basis of the difference between the standard scenario reserve and the cash surrender value on the valuation date for the contract. If the cash surrender value is not defined or not available, the standard scenario amount will be the basis of allocation.

Guidance Note: Note that since the standard scenario reserve for a contract is, by definition, greater than or equal to the cash surrender value, it is understood that the difference between the standard scenario reserve and the cash surrender value for each contract will never be less than zero.

2. Multiple Subgroupings

When the aggregate reserve is equal to the CTE amount and the CTE amount is determined using more than one sub-grouping, as described in Section 2.D, the allocation of the excess of the CTE amount over the standard scenario amount and shall reflect that sub-grouping of contracts used to determine the CTE amount, as described in Section 2.D.

For example, when the CTE amount is determined using sub-grouping, the excess of the aggregate (i.e., the total for all contracts within the scope of these requirements) CTE amount over the aggregate standard scenario amount shall be allocated only to those contracts that are part of sub-groupings whose contributions to the CTE amount exceed their contribution to the standard scenario amount.

In the case of such sub-groupings, the excess of the aggregate CTE amount over the aggregate standard scenario amount shall be allocated to each sub-grouping in proportion to the difference between the CTE and the standard scenario reserve for each sub-grouping for which that excess is positive.

Once the allocation to each sub-grouping is determined, the excess of the reserve allocated to such sub-grouping over the standard scenario amount determined for that sub-grouping shall be allocated to each contract within that sub-grouping on the basis of the difference between the standard scenario reserve and the cash surrender value on the valuation date for the contracts. If the cash surrender value is not defined or not available, the standard scenario amount will be the basis of allocation.

As an example, consider a company with the results of the following three sub-groupings:

Sub-grouping	A	B	C	Total
Conditional Tail Expectation Amount	28	40	52	120

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Standard Scenario Amount	20	45	30	95
Aggregate Reserve				**120**
(1) – (2)	8	-5	22	25
Allocation	6.67	0	18.33	25

In this example, the excess of the CTE amount over the standard scenario amount, in aggregate, equals 25 (i.e., the "Total" column of row 1 less row 2, or 120 – 95). This excess of 25 would be allocated only to those contracts that are part of sub-groupings whose contributions to the CTE amount exceed their contributions to the standard scenario amount. In this example, that would be contracts in sub-groupings A and C (since in sub-grouping B, the contribution to the standard scenario amount exceeds the contribution to the CTE amount). Therefore, the excess of 25 would be allocated to the contracts in sub-groupings A and C in proportion to the difference between the CTE amount and the standard scenario reserve for those sub-groupings (i.e., row 4). In this example, the total difference between the CTE amount and the standard scenario reserve for the contracts in sub-groupings A and C equals 8 + 22, or 30. This would result in 8/30 of the excess of the CTE amount over the standard scenario amount (or 6.67) to be allocated to the contracts in sub-groupings A and 22/30 of the excess of the CTE amount over the standard scenario amount (or 18.33) to be allocated to the contracts in sub-groupings C as shown on line (5) above.

In this example, the allocation of the aggregate reserve to contracts within sub-grouping B would equal the standard scenario reserve for those contracts (as described in Subsection B below). For sub-groupings A and C, the difference between the allocation of the aggregate reserve to each of those sub-grouping and the standard scenario amount determined for each of those sub-grouping would be allocated to each contract within each of those sub-groupings based on the difference between the standard scenario reserve and the cash surrender value for each of the contracts within the relevant sub-group. The result would be an allocated aggregate reserve for a given contract that would be equal to the standard scenario reserve for that contract plus the amount of the difference between 1) and 2) below that is allocated to that contract, where:

a. Equals the allocation of the aggregate reserve to that contract's sub-grouping.

b. Equals the standard scenario amount determined for that contract's sub-grouping.

B. Allocation when the Aggregate Reserve equals the Standard Scenario Amount

The standard scenario amount, as required by Section 2.C, is calculated on a contract-by-contract basis, as described in Section 5. Therefore, when the aggregate reserve is equal to the standard scenario amount, the reserve allocated to each contract shall be the reserve calculated for each contract under the Standard Scenario method.

Section 9: Modeling of Hedges

A. Initial Considerations

The appropriate costs and benefits of hedging instruments that are currently held by the company in support of the contracts falling under the scope of these requirements (excluding those that involve the offsetting of the risks associated with variable annuity guarantees with other products outside of the scope of these requirements, such as equity-indexed annuities) shall be included in the calculation of the CTE amount, determined in accordance with Section 2.D and Section 3.D (i.e., CTE amount using projections). If the company is following a clearly defined hedging

strategy ("hedging strategy"), in accordance with an investment policy adopted by the board of directors, or a committee of board members, the company is eligible to reduce the amount of the CTE amount using projections otherwise calculated. The investment policy must clearly articulate the company's hedging objectives, including the metrics that drive rebalancing/trading. This specification could include maximum tolerable values for investment losses, earnings, volatility, exposure, etc. in either absolute or relative terms over one or more investment horizons vis-à-vis the chance of occurrence. Company management is responsible for developing, documenting, executing and evaluating the investment strategy, including the hedging strategy, used to implement the investment policy.

For this purpose, the investment assets refer to all the assets, including derivatives supporting covered products and guarantees. This also is referred to as the investment portfolio. The investment strategy is the set of all asset holdings at all points in time in all scenarios. The hedging portfolio, which also is referred to as the hedging assets, is a subset of the investment assets. The hedging strategy is the hedging asset holdings at all points in time in all scenarios. There is no attempt to distinguish what is the hedging portfolio and what is the investment portfolio in this section. Nor is the distinction between investment strategy and hedging strategy formally made here. Where necessary to give effect to the intent of this section, the requirements applicable to the hedging portfolio or the hedging strategy are to apply to the overall investment portfolio and investment strategy.

This particularly applies to restrictions on the reasonableness or acceptability of the models that make up the stochastic cash-flow model used to perform the projections, since these restrictions are inherently restrictions on the joint modeling of the hedging and non-hedging portfolio. To give effect to these requirements, they must apply to the overall investment strategy and investment portfolio.

The cost and benefits of hedging instruments that are currently held by the company in support of the contracts falling under the scope of these requirements shall be included in the stochastic cash-flow model used to calculate the CTE amount in accordance with Section 2.D (the "model"). If the company is following a clearly defined hedging strategy, the model shall take into account the cost and benefits of hedge positions expected to be held by the company in the future based on the operation of the hedging strategy.

Before either a new or revised hedging strategy can be used to reduce the amount of the CTE amount otherwise calculated, the hedging strategy should be in place (i.e., effectively implemented by the company) for at least three months. The company may meet the time requirement by having evaluated the effective implementation of the hedging strategy for at least three months without actually having executed the trades indicated by the hedging strategy (e.g., mock testing or by having effectively implemented the strategy with similar annuity products for at least three months).

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

B. Background

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

The fundamental characteristic of the first method is that all hedging positions, both the currently held positions and those expected to be held in the future, are included in the stochastic cash-flow

model used to determine the scenario greatest present value, as discussed in Section 2.D, for each scenario.

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

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

No hedging strategy is perfect. A given hedging strategy may eliminate or reduce some but not all risks, transforms some risks into others, introduces new risks, or has other imperfections. For example, a delta-only hedging strategy does not adequately hedge the risks measured by the "Greeks" other than delta. Another example is that financial indices underlying typical hedging instruments typically do not perform exactly like the separate account funds, and hence the use of hedging instruments has the potential for introducing basis risk.

C. Calculation of CTE Amount (Reported)

The company should begin by calculating "CTE amount (best efforts)"—the results obtained when the CTE amount is based on incorporating the hedging strategy (including currently held hedge positions) into the stochastic cash-flow model, including all of the factors and assumptions needed to execute the hedging strategy (e.g., stochastic implied volatility).

Because most models will include at least some approximations or idealistic assumptions, CTE amount (best efforts) may overstate the impact of the hedging strategy. To compensate for potential overstatement of the impact of the hedging strategy, the company shall recalculate the CTE amount assuming the company has no dynamic hedging strategy (i.e., reflect only hedge positions held by the company on the valuation date). The result so obtained is called "CTE amount (adjusted)." In some situations, the determination of CTE amount (adjusted) may include both direct and indirect techniques.

Finally, the reported value for the CTE amount is given by:

CTE Amount (reported) = E x CTE Amount (best efforts) + (1 – E) × CTE Amount (adjusted)

The value for *E* (an "effectiveness factor") reflects the actuary's view as to the level of sophistication of the stochastic cash-flow model and its ability to properly reflect the parameters of the hedging strategy (i.e., the "Greeks" being covered by the strategy) as well as the associated costs, risks, and benefits *E* will be no greater than 0.70. As the sophistication of the stochastic cash-flow model increases, the value for *E* increases (i.e., the greater the ability of the CTE amount (best efforts) model to capture all risks and uncertainties, the higher the value of *E*). If the model used to determine the "CTE amount (best efforts)" effectively reflects all of the parameters used in the hedging strategy, the value of *E* may be up to 0.70. If certain economic risks are not

hedged, yet the model does not generate scenarios that sufficiently capture those risks, *E* must be in the lower end of the range. If hedge cash flows are not modeled directly, *E* will be no greater than 0.30. Simplistic hedge cash-flow models will have a value of *E* in the low range between 0.00 and 0.70.

Additionally, the company shall demonstrate that, based on an analysis of at least the most recent 12 months, the model is able to replicate the hedging strategy in a way that justifies the value used for *E*. A company that does not have 12 months of experience to date shall set *E* to a value no greater than 0.30.

D. Specific Considerations and Requirements

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

A discontinuous hedging strategy is a hedging strategy where the relationships between the sensitivities to equity markets and interest rates (commonly referred to as the Greeks) associated with the guaranteed contract-holder options embedded in the variable annuities and other in-scope products and these same sensitivities associated with the hedging assets are subject to material discontinuities. This includes, but is not limited to, a hedging strategy where material hedging assets will be obtained when the variable annuity account balances reach a predetermined level in relationship to the guarantees. Any hedging strategy, including a delta hedging strategy, can be a discontinuous hedging strategy if implementation of the strategy permits material discontinuities between the sensitivities to equity markets and interest rates associated with the guaranteed contract-holder options embedded in the variable annuities and other in-scope products and these same sensitivities associated with the hedging assets. There may be scenarios that are particularly costly to discontinuous hedging strategies, especially where those result in large discontinuous changes in sensitivities (Greeks) associated with the hedging assets. Where discontinuous hedging strategies contribute materially to a reduction in the CTE amount, the actuary must evaluate the interaction of future trigger definitions and the discontinuous hedging strategy, in addition to the items mentioned in the previous paragraph. This includes an analysis of model assumptions that, when combined with the reliance on the discontinuous hedging strategy, may result in adverse results relative to those modeled.

Implementing a strategy that has a strong dependence on acquiring hedging assets at specific times that depend on specific values of an index or other market indicators may not be implemented as precisely as planned.

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

1. Hedging strategies with no initial investment that never lose money in any scenario and in some scenarios make money.

2. Hedging strategies that, with a given amount of initial money, never make less than accumulation at the one-period risk free rates in any scenario but make more than this in one or more scenarios.

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

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

E. Certification and Documentation

The actuary must provide a certification that the values for *E*, CTE amount (adjusted) and CTE amount (best efforts) were calculated using the process discussed above and the assumptions used in the calculations were reasonable for the purpose of determining the CTE amount. The actuary shall document the method(s) and assumptions (including data) used to determine CTE amount (adjusted) and CTE amount (best efforts) and maintain adequate documentation as to the methods, procedures and assumptions used to determine the value of *E*.

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

A financial officer of the company (e.g., chief financial officer [CFO], treasurer or chief investment officer [CIO]) or a person designated by them who has direct or indirect supervisory authority over the actual trading of assets and derivatives must certify that the hedging strategy meets the definition of a clearly defined hedging strategy and that the clearly defined hedging strategy is the hedging strategy being used by the company in its actual day to day risk mitigation efforts.

Section 10: Certification Requirements

A. Management Certification

Management must provide signed and dated written representations as part of the valuation documentation that the valuation appropriately reflects management's intent and ability to carry out specific courses of actions on behalf of the entity where such is relevant to the valuation.

B. Actuarial Certification

1. General Description

The certification shall be provided by a qualified actuary and consist of at least the following:

a. A paragraph identifying the actuary and his or her qualifications.

b. A scope paragraph identifying the reserves as of the valuation date for contracts included in the certification categorized by the approaches used to determine the reserves (e.g., Alternative Methodology, projections, standard scenario).

c. A reliance paragraph describing those areas, if any, where the certifying actuary has relied on other experts:

i. A reliance statement from each of those relied on should accompany the certification.

ii. The reliance statements should note the information being provided and a statement as to the accuracy, completeness or reasonableness, as applicable, of the information.

d. A paragraph certifying that the reserve was calculated in accordance with the principles and these requirements.

e. A paragraph certifying that the assumptions used for these calculations are prudent estimate assumptions for the products, scenarios and purpose being tested.

f. A paragraph stating that the qualified actuary is not opining on the adequacy of the company's surplus or its future financial condition.

C. Supporting Memorandum

1. General Description

A supporting memorandum shall be created to document the methodology and assumptions used to determine the aggregate reserve. The information shall include the comparison of the standard scenario amount to the CTE amount required by Section 2.A in the determination of the aggregate reserve.

2. Alternative Methodology using Published Factors

a. If a seriatim approach was not used, disclose how contracts were grouped.

b. Disclosure of assumptions to include:

i. Component *CA*

a) Mapping to prescribed asset categories.

b) Lapse and withdrawal rates.

ii. Component *FE*

a) Determination of fixed dollar costs and revenues.

b) Lapse and withdrawal rates.

c) Inflation rates.

iii. Component *GC*

a) Disclosure of contract features and how the company mapped the contract form to those forms covered by the Alternative Methodology factors.

1) Product definition – If not conservatively assigned to a published factor, company-specific factors or stochastic modeling is required.

2) Partial withdrawal provision.

3) Fund class – Disclose the process used to determine the single asset class that best represents the exposure for a contract. If individual funds are mapped into prescribed categories, the process used to map the individual funds should be disclosed.

4) Attained age.

5) Contract duration.

6) Ratio of account value to guaranteed value.

7) Annualized account charge differential from base assumption.

b) Derivation of equivalent account charges.

c) Derivation of margin offset.

d) Disclosure of interpolation procedures and confirmation of node determination.

c. Disclosure, if applicable, of reinsurance that exists and how it was handled in applying published factors (for some reinsurance, creation of company-specific factors or stochastic modeling may be required) and discuss how reserves before reinsurance were determined.

3. Alternative Factors Based on Company-Specific Factors

a. Disclosure of requirements consistent with published factors, as noted in Subsection C.2.

b. Stochastic analysis supporting adjustments to published factors should be fully documented. This analysis needs to be submitted when initially used and be available upon request in subsequent years. Adjustments may include:

i. Contract design.

ii. Risk mitigation strategy (excluding hedging).

iii. Reinsurance.

4. Stochastic Modeling

a. Assets

i. Description, including type and quality.

ii. Investment and disinvestment assumptions.

iii. Describe assets used at the start of the projection.

iv. Source of asset data.

v. Asset valuation basis.

vi. Documentation of assumptions.

a) Default costs.

b) Prepayment functions.

c) Market value determination.

d) Yield on assets acquired.

e) Mapping and grouping of funds to modeled asset classes.

vii. Hedging strategy.

a) Documentation of strategy.

b) Identification of current positions.

c) Description on how strategy was incorporated into modeling.

1) Basis risk, gap risk, price risk, assumption risk.

2) Document the methods and criterion used to estimate the a priori effectiveness of the hedging strategy.

d) Documentation required for specific consideration raised in Section 9.D.

e) Documentation and certification required by Section 9.E.

b. Liabilities

i. Product descriptions.

ii. Source of liabilities.

iii. Grouping of contracts.

iv. Reserve method and modeling (e.g., working reserves were set to CSV).

v. Investment reserves.

vi. Describe how reinsurance was handled in the models, including how reserves gross of reinsurance were modeled.

vii. Documentation of assumptions (i.e., list assumptions, discuss the sources and the rationale for using the assumptions).

a) Premiums and subsequent deposits.

b) Withdrawal, lapse and termination rates.

1) Partial withdrawal (including treatment of dollar-for-dollar offsets on GMDBs and VAGLBs, and required minimum distributions).

2) Lapses/surrenders.

c) Crediting strategy.

d) Mortality.

e) Annuitization rates.

f) Income purchase rates.

g) GMIB and GMWB utilization rates.

h) Commissions.

i) Expenses.

j) Persistency bonuses.

k) Investment/fund choice.

l) Revenue sharing.

m) Asset allocation, rebalancing and transfer assumptions.

1) Dollar cost averaging.

vii. The section showing the assumptions used for lapse and utilization assumptions for contracts with guaranteed living benefits in the development of the CTE amount, as described in Section 11.G.

c. Scenarios

i. Description of scenario generation for interest rates and equity returns

a) Disclose the number "n" of scenarios used and the methods used to determine the sampling error of the CTE (70) statistic when using "n" scenarios.

b) Time step of model (e.g., monthly, quarterly, annual).

c) Correlation of fund returns.

ii. Calibration

a) Gross wealth ratios for equity funds.

1) Disclosure of adjustments to model parameters, if any.

2) Disclosure of 1-year, 5-year and 10-year wealth factors, as well as mean and standard deviation.

b) Consistency of other funds to equity funds.

c) Correlation between all funds.

d) Estimate of market return volatility assumptions underlying the generated scenarios compared to actual observed volatility underlying market values.

iii. Extent of use of prepackaged scenarios and support for mapping variable accounts to proxy funds.

d. Description and results of sensitivity tests performed. At the request of the domiciliary commissioner, the company shall provide a sensitivity test showing an estimate of the impact of the market return volatility assumption when market volatility is materially higher than assumed in the generated scenarios.

e. Documentation of all material changes in the model or assumptions from that used previously and the estimated impact of such changes. This documentation, or a summary of this documentation, shall be included in an executive summary or some other prominent place in the memorandum.

f. A description of the methods used to validate the model and a summary of the results of the validation testing.

5. Standard Scenario

a. For the amounts in b, c and d below, report the basic reserve in Section 5.C.2.b.i, the projection requirements in Section 5.C.2.b.ii, the value of aggregate reinsurance in Section 5.C.4.a, the value of hedges in Section 5.C.4.b, the total allocation of the value of hedges and aggregate reinsurance in Section 5.C.2.b.iii and the standard scenario reserve.

b. Report the standard scenario amount as of the valuation date.

c. If applicable, report the standard scenario amount on the in force prior to the valuation date that was used to project the reserve requirements to the valuation date.

d. If applicable, report the standard scenario amount on the model office used to represent the in force.

e. Discuss modifications, if any, in the application of the standard scenario requirements to produce the amounts in b, c and d above.

f. Document any assumptions, judgments or procedures not prescribed in the standard scenario method or in these requirements that are used to produce the standard scenario amount.

g. If applicable, documentation of approval by the commissioner to use the basic reserve as the standard scenario amount.

h. Document the company's calculation of *DR*.

i. Document the allocation of funds to equity, bond, balanced and fixed classes.

j. A statement by the actuary that none of the reinsurance treaties included in the standard scenario serve solely to reduce the calculated standard scenario reserve without also reducing risk on scenarios similar to those used to determine the CTE reserve. This should be accompanied by a description of any reinsurance treaties that have been excluded from the standard scenario along with an explanation of why the treaty was excluded.

Section 11: Contract-Holder Behavior Assumptions

A. General

Contract-holder behavior assumptions encompass actions such as lapses, withdrawals, transfers, recurring deposits, benefit utilization, option election, etc. Contract-holder behavior is difficult to predict, and behavior assumptions can significantly affect the results. In the absence of relevant and fully credible empirical data, the actuary should set behavior assumptions on the conservative end of the plausible spectrum (consistent with the definition of prudent 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 performance, time/product duration, etc.

2. Options embedded in the product may affect behavior.

3. Options may be elective or non-elective in nature. Living benefits often are elective, and death benefit options are generally non-elective.

4. Elective contract-holder 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 contract holders 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 (irrational behavior is defined as situations where some contract holders may not always act in their best financial interest). The rational component should be dynamic but the concept of rationality need not be interpreted in strict financial terms and might change over time in

response to observed trends in contract-holder behavior based on increased or decreased financial efficiency in exercising their contractual options.

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:

   a. For what purpose was the product purchased?

   b. Is the option elective or non-elective?

   c. Is the value of the option well-known?

8. External influences, including emergence of viatical/life settlement companies, may affect behavior.

B. Aggregate vs. Individual Margins

As noted in Section 1.E.2.i, prudent estimate assumptions are developed by applying a margin for uncertainty to the anticipated experience assumption. The issue of whether the level of the margin applied to the anticipated experience assumption is determined in aggregate or independently for each and every behavior assumption is discussed in Principle 3 in Section 1.B, which states:

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 CTE amount at the required CTE 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 CTE amount, the actuary should be guided by evolving practice and expanding knowledge base in the measurement and management of risk.

Although this principle discusses the concept of determining the level of margins in aggregate, it notes that the application of this concept shall be guided by evolving practice and expanding knowledge. From a practical standpoint, it may not always be possible to completely apply this concept to determine the level of margins in aggregate for all behavior assumptions.

Therefore, the actuary shall determine prudent estimate assumptions independently for each behavior (e.g., mortality lapses and benefit utilization), using the requirements and guidance in this section and throughout these requirements, unless the actuary can demonstrate that an appropriate method was used to determine the level of margin in aggregate for two or more behaviors.

C. Sensitivity Testing

The impact of behavior can vary by product, time period, etc. Sensitivity testing of assumptions is required and shall be more complex than, for example, base lapse assumption minus 1% across all contracts. A more appropriate sensitivity test in this example might be to devise parameters in a dynamic lapse formula to reflect more out-of-the-money contracts lapsing and/or more holders of in-the-money contracts persisting and eventually using the guarantee. The actuary should apply more caution in setting assumptions for behaviors where testing suggests that stochastic modeling results are sensitive to small changes in such assumptions. For such sensitive behaviors, the actuary shall use higher margins when the underlying experience is less than fully relevant and credible.

D. Specific Considerations and Requirements

Within materiality considerations, the actuary should consider all relevant forms of contract-holder behavior and persistency, including, but not limited to, the following:

1. Mortality (additional guidance and requirements regarding mortality is contained in Section 12).

2. Surrenders.

3. Partial withdrawals (systematic and elective).

4. Fund transfers (switching/exchanges).

5. Resets/ratchets of the guaranteed amounts (automatic and elective).

6. Future deposits.

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 provisions. For example:

a. The impact of fund transfers (intra-contract fund "switching") might be ignored, unless required under the terms of the contract (e.g., automatic asset re-allocation/rebalancing, dollar cost averaging accounts, etc.).

b. Future deposits might be excluded from the model, unless required by the terms of the contracts under consideration and then only in such cases where future premiums can reasonably be anticipated (e.g., with respect to timing and amount).

However, the actuary should exercise caution in assuming that current behavior will be indefinitely maintained. For example, it might be appropriate to test the impact of a shifting asset mix and/or consider future deposits to the extent they can reasonably be anticipated and increase the calculated amounts.

Normally, the underlying model assumptions would differ according to the attributes of the contract being valued. This would typically mean that contract-holder behavior and persistency may be expected to vary according to such characteristics as (this is not an exhaustive list):

i. Gender.

ii. Attained age.

iii. Issue age.

iv. Contract duration.

v. Time to maturity.

vi. Tax status.

vii. Fund value.

viii. Investment option.

ix. Guaranteed benefit amounts.

x. Surrender charges, transaction fees or other contract charges.

xi. Distribution channel.

Unless there is clear evidence to the contrary, behavior assumptions should be no less conservative than past experience. Margins for contract-holder behavior assumptions shall assume, without relevant and credible experience or clear evidence to the contrary, that contract-holders' efficiency will increase over time.

In determining contract-holder behavior assumptions, the company shall use actual experience data directly applicable to the business segment (i.e., direct data) if it is available. In the absence of direct data, the company should then look to use data from a segment that are similar to the business segment (i.e., other than direct experience), whether or not the segment is directly written by the company. If data from a similar business segment are used, the assumption shall be adjusted to reflect differences between the two segments. Margins shall reflect the data uncertainty associated with using data from a similar but not identical business segment. The actuary shall document any significant similarities or differences between the two business segments, the data quality of the similar business segment, and the adjustments and the margins applied.

Where relevant and fully credible empirical data do not exist for a given contract-holder behavior assumption, the actuary shall set the contract-holder behavior assumption to reflect the increased uncertainty such that the contract-holder behavior assumption is shifted towards the conservative end of the plausible range of expected experience that serves to increase the aggregate reserve. If there are no relevant data, the actuary shall set the contract-holder behavior assumption to reflect the increased uncertainty such that the contract-holder behavior assumption is at the conservative end of the range. Such adjustments shall be consistent with the definition of prudent estimate, with the principles described in Section 1.B., and with the guidance and requirements in this section.

Ideally, contract-holder behavior would be modeled dynamically according to the simulated economic environment and/or other conditions. It is important to note, however, that contract-holder behavior should neither assume that all contract holders act with 100% efficiency in a financially rational manner nor assume that contract holders will always act irrationally.

E. Dynamic Assumptions

Consistent with the concept of prudent estimate assumptions described earlier, the liability model should incorporate margins for uncertainty for all risk factors that are not dynamic (i.e., the non-scenario tested assumptions) and are assumed not to vary according to the financial interest of the contract holder.

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

Risk factors that are modeled dynamically should encompass the plausible range of behavior consistent with the economic scenarios and other variables in the model, including the non-scenario tested assumptions. The actuary shall test the sensitivity of results to understand the materiality of making alternate assumptions and follow the guidance discussed above on setting assumptions for sensitive behaviors.

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F. Consistency with the CTE Level

All behaviors (i.e., dynamic, formulaic and non-scenario tested) should be consistent with the scenarios used in the CTE calculations (generally, the approximately top one-third 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 estimate assumptions for behavior that are reasonable and appropriate in such scenarios. For variable annuities, these "valuation" scenarios would typically display one or more of the following attributes:

1. Declining and/or volatile separate account asset values.

2. Market index volatility, price gaps and/or liquidity constraints.

3. Rapidly changing interest rates.

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:

a. Remain logically and internally consistent across the scenarios tested.

b. Represent plausible outcomes.

c. Lead to appropriate, but not excessive, asset requirements.

The actuary should remember that the continuum of "plausibility" 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 their risk profiles by collecting and maintaining the data required to conduct credible and meaningful studies of contract-holder behavior.

G. Additional Considerations and Requirements for Assumptions Applicable to Guaranteed Living Benefits

Experience for contracts without guaranteed living benefits may be of limited use in setting a lapse assumption for contracts with in-the-money or at-the-money guaranteed living benefits. Such experience may only be used if it is appropriate (e.g., lapse experience on contracts without a living benefit may have relevance to the early durations of contracts with living benefits) and relevant to the business and is accompanied by documentation that clearly demonstrates the relevance of the experience, as discussed in the following paragraph.

The supporting memorandum required by Section 10 shall include a separately identifiable section showing the assumptions used for lapse and utilization assumptions for contracts with guaranteed living benefits in the development of the CTE amount. This section shall be considered part of the supporting memorandum and shall show the formulas used to set the assumptions and describe the key parameters affecting the level of the assumption (e.g., age, duration, in-the-moneyness, during and after the surrender charge period). The section shall include a summary that shows the lapse and utilization rates that result from various combinations

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of the key parameters. The section shall show any experience data used to develop the assumptions and describe the source, relevance and credibility of that data. If relevant and credible data were not available, the section should discuss how the assumption is consistent with the requirement that the assumption is to be on the conservative end of the plausible range of expected experience. The section also shall discuss the sensitivity tests performed to support the assumption. This separately identifiable section shall be made available on a stand-alone basis if requested by the domiciliary commissioner. If it is requested, the section shall have the same confidential status as the supporting memorandum and the actuarial memorandum supporting the actuarial opinion, as discussed in Section 4.C.2.

Regarding lapse assumptions for contracts with guaranteed living benefits, the section shall include, at a minimum, the following:

1. Actual to expected lapses on two bases, where "expected" equals one of the following:

   a. Prudent estimate assumptions used in the development of the CTE amount.

   b. The assumptions used in the standard scenario.

2. The lapse assumptions used in the development of CTE amount and corresponding actual experience separated by:

   a. Logical blocks of business (based on company's assessment).

   b. Duration. (At a minimum, this should show during the surrender charge period vs. after the surrender charge period.)

   c. In-the-moneyness (consistent with how dynamic assumptions are determined).

   d. Age (to the extent age affects the election of benefits lapse).

      This data shall be separated by experience incurred in the following periods:

      i. In the past year.

      ii. In the past three years.

      iii. All years.

Section 12: Specific Guidance and Requirements for Setting Prudent Estimate Mortality Assumptions

A. Overview

1. Intent

   The guidance and requirements in this section apply for setting prudent estimate mortality assumptions when determining the CTE amount (whether using projections or the Alternative Methodology). The intent is for prudent estimate mortality assumptions to be based on facts, circumstances and appropriate actuarial practice, with only a limited role for unsupported actuarial judgment. (Where more than one approach to appropriate actuarial practice exists, the actuary should select the practice that the actuary deems most appropriate under the circumstances.)

2. Description

Prudent estimate mortality assumptions are determined by first developing expected mortality curves based on either available experience or published tables. Where necessary, margins are applied to the experience to reflect data uncertainty. The expected mortality curves are then adjusted based on the credibility of the experience used to determine the expected mortality curve. Subsection B addresses guidance and requirements for determining expected mortality curves, and Subsection C addresses guidance and requirements for adjusting the expected mortality curves to determine prudent estimate mortality.

Finally, the credibility-adjusted tables shall be adjusted for mortality improvement (where such adjustment is permitted or required) using the guidance and requirements in Subsection D.

3. Business Segments

For purposes of setting prudent estimate mortality assumptions, the products falling under the scope of these requirements shall be grouped into business segments with different mortality assumptions. 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.

4. Margin for Data Uncertainty

The expected mortality curves that are determined in Subsection B may need to include a margin for data uncertainty. The margin 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 Section, if mortality must be increased (decreased) to provide for uncertainty, the business segment is referred to as a plus (minus) segment.

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.

B. Determination of Expected Mortality Curves

1. Experience Data

In determining expected mortality curves, the company shall use actual experience data directly applicable to the business segment (i.e., direct data) if it is available. In the absence of direct data, the company should then look to use data from a segment that is similar to the business segment (i.e., other than direct experience). See Subsection B.2. for additional considerations. Finally, if there is no data, the company shall use the applicable table, as required in Subsection B.3.

2. Data Other Than Direct Experience

If expected mortality curves for a segment are being determined using data from a similar 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.). The actuary also shall document the data quality of the mortality experience of the similar business. Adjustments shall be applied to the data to reflect differences between the business segments, and margins shall be applied to the adjusted expected mortality curves to reflect the data uncertainty associated with using data from a similar but not identical business segment. The actuary shall document the adjustments and the margins applied.

To the extent the mortality of a business segment is reinsured, any mortality charges that are consistent with the company's own pricing and applicable to a substantial portion of the mortality risk also may be a reasonable starting point for the determination of the company's expected mortality curves. The actuary shall document the application of such reinsurance charges and how they were used to set the company's expected mortality curves for the segment.

3. No Data Requirements

When little or no experience or information is available on a business segment, the company shall use expected mortality curves that would produce expected deaths no less than using 100% of the 1994 Variable Annuity MGDB Mortality Table for a plus segment and expected deaths no greater than 100% of the Annuity 2000 Table for a minus segment. 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.

4. 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 B.1 or other than direct data discussed in Subsection B.2).

a. Underreporting of Deaths

Mortality data shall be examined for possible underreporting of deaths. Adjustments shall be made to the data if there is any evidence of underreporting. Alternatively, exposure by lives or amounts on contracts for which death benefits were in the money may be used to determine expected mortality curves. Underreporting on such exposures should be minimal; however, this reduced subset of data will have less credibility.

b. Experience by Contract Duration

Experience of a plus segment shall be examined to determine if mortality by contract duration increases materially due to selection at issue. In the absence of information, the actuary shall assume that expected mortality will increase by contract duration for an appropriate select period. As an alternative, if the actuary determines that mortality is affected by selection, the actuary could apply margins to the expected mortality in such a way that the actual mortality modeled does not depend on contract duration.

c. 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., three to seven 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).

d. Other Considerations

In determining expected 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.

5. Documentation Requirements

a. 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:

i. 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.

ii. Describe how each segment was determined to be a plus or minus segment.

iii. 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.

iv. Document the age of the experience data used to determine expected mortality curves, and comment on the relevance of the data.

v. Document the mathematics used to adjust mortality based on credibility, and summarize the result of applying credibility to the mortality segments.

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vi. Discuss any assumptions made on mortality improvements, the support for such assumptions and how such assumptions adjusted the modeled mortality.

viii. Describe how the expected mortality curves compare to recent historic experience, and comment on any differences.

ix. 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 #3 and Section 11.

If the study was done on a similar business segment, identify the differences in the business segment on which the data were gathered and the business segment on which the data were used to determine mortality assumptions for the statutory valuation. Describe how these differences were reflected in the mortality used in modeling.

If mortality assumptions for the statutory valuation were based in part on reinsurance rates, document how the rates were used to set expected mortality (e.g., assumptions made on loadings in the rates and/or whether the assuming company provided their expected mortality and the rationale for their assumptions).

b. Plus Segments

For a plus segment, the documentation also shall 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.

c. Minus Segments

For a minus segment, the documentation also shall 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.

C. Adjustment for Credibility to Determine Prudent Estimate Mortality

1. Adjustment for Credibility

The expected mortality curves determined in Subsection B shall be adjusted based on the credibility of the experience used to determine the curves in order to arrive at prudent estimate mortality. The adjustment for credibility shall result in blending the expected mortality curves with a mortality table consistent with a statutory valuation mortality table. For a plus segment, the table shall be consistent with 100% of the 1994 Variable Annuity MGDB Table (or a more recent mortality table adopted by the NAIC to replace this table). For a minus segment, the table shall be consistent with 100% of the 2000 Annuity Table (or a more recent mortality table adopted by the NAIC to replace that table). The approach used to adjust the curves shall suitably account for credibility.

Guidance Note: For example, when credibility is zero, an appropriate approach should result in a mortality assumption consistent with 100% of the statutory valuation mortality table used in the blending.

2. Adjustment of Statutory Valuation Mortality for Improvement

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For purposes of the adjustment for credibility, the statutory valuation mortality table for a plus segment may be and the statutory valuation 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 statutory valuation mortality table to the experience weighted average date underlying the data used to develop the expected mortality curves (discussed in Subsection B).

3. Credibility Procedure

The credibility procedure used shall:

a. Produce results that are reasonable in the professional judgment of the actuary.

b. Not tend to bias the results in any material way.

c. Be practical to implement.

d. Give consideration to the need to balance responsiveness and stability.

e. Take into account not only the level of aggregate claims but the shape of the mortality curve.

f. 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.

4. 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.

Any adjustment for mortality improvement beyond the valuation date is discussed in Subsection D.

D. Future Mortality Improvement

The mortality assumption resulting from the requirements of Subsection C shall be adjusted for mortality improvements beyond the valuation date if such an adjustment would serve to increase the resulting CTE amount. If such an adjustment would reduce the CTE amount, such assumptions are permitted, but not required. In either case, the assumption must be based on current relevant data with a margin for uncertainty (increasing assumed rates of improvement if that results in a higher reserve or reducing them otherwise).

Appendix 1: 1994 Variable Annuity MGDB Mortality Table

FEMALE Age Last Birthday

AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$
1	0.519	24	0.344	47	1.371	70	16.957	93	192.270
2	0.358	25	0.346	48	1.488	71	18.597	94	210.032
3	0.268	26	0.352	49	1.619	72	20.599	95	228.712
4	0.218	27	0.364	50	1.772	73	22.888	96	248.306
5	0.201	28	0.382	51	1.952	74	25.453	97	268.892
6	0.188	29	0.403	52	2.153	75	28.372	98	290.564
7	0.172	30	0.428	53	2.360	76	31.725	99	313.211
8	0.158	31	0.455	54	2.589	77	35.505	100	336.569
9	0.154	32	0.484	55	2.871	78	39.635	101	360.379
10	0.159	33	0.514	56	3.241	79	44.161	102	385.051
11	0.169	34	0.547	57	3.713	80	49.227	103	411.515
12	0.185	35	0.585	58	4.270	81	54.980	104	439.065
13	0.209	36	0.628	59	4.909	82	61.410	105	465.584
14	0.239	37	0.679	60	5.636	83	68.384	106	488.958
15	0.271	38	0.739	61	6.460	84	75.973	107	507.867
16	0.298	39	0.805	62	7.396	85	84.432	108	522.924
17	0.315	40	0.874	63	8.453	86	94.012	109	534.964
18	0.326	41	0.943	64	9.611	87	104.874	110	543.622
19	0.333	42	1.007	65	10.837	88	116.968	111	548.526
20	0.337	43	1.064	66	12.094	89	130.161	112	550.000
21	0.340	44	1.121	67	13.318	90	144.357	113	550.000
22	0.343	45	1.186	68	14.469	91	159.461	114	550.000
23	0.344	46	1.269	69	15.631	92	175.424	115	1000.000

MALE Age Last Birthday

AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$
1	0.587	24	0.760	47	2.366	70	29.363	93	243.533
2	0.433	25	0.803	48	2.618	71	32.169	94	264.171
3	0.350	26	0.842	49	2.900	72	35.268	95	285.199
4	0.293	27	0.876	50	3.223	73	38.558	96	305.931
5	0.274	28	0.907	51	3.598	74	42.106	97	325.849
6	0.263	29	0.935	52	4.019	75	46.121	98	344.977
7	0.248	30	0.959	53	4.472	76	50.813	99	363.757
8	0.234	31	0.981	54	4.969	77	56.327	100	382.606
9	0.231	32	0.997	55	5.543	78	62.629	101	401.942
10	0.239	33	1.003	56	6.226	79	69.595	102	422.569
11	0.256	34	1.005	57	7.025	80	77.114	103	445.282
12	0.284	35	1.013	58	7.916	81	85.075	104	469.115
13	0.327	36	1.037	59	8.907	82	93.273	105	491.923
14	0.380	37	1.082	60	10.029	83	101.578	106	511.560
15	0.435	38	1.146	61	11.312	84	110.252	107	526.441
16	0.486	39	1.225	62	12.781	85	119.764	108	536.732
17	0.526	40	1.317	63	14.431	86	130.583	109	543.602
18	0.558	41	1.424	64	16.241	87	143.012	110	547.664
19	0.586	42	1.540	65	18.191	88	156.969	111	549.540
20	0.613	43	1.662	66	20.259	89	172.199	112	550.000
21	0.642	44	1.796	67	22.398	90	188.517	113	550.000
22	0.677	45	1.952	68	24.581	91	205.742	114	550.000
23	0.717	46	2.141	69	26.869	92	223.978	115	1000.000

FEMALE Age Nearest Birthday

AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$
1	0.628	24	0.344	47	1.316	70	16.239	93	184.435
2	0.409	25	0.344	48	1.427	71	17.687	94	201.876
3	0.306	26	0.348	49	1.549	72	19.523	95	220.252
4	0.229	27	0.356	50	1.690	73	21.696	96	239.561
5	0.207	28	0.372	51	1.855	74	24.107	97	259.807
6	0.194	29	0.392	52	2.050	75	26.832	98	281.166
7	0.181	30	0.415	53	2.256	76	29.954	99	303.639
8	0.162	31	0.441	54	2.465	77	33.551	100	326.956
9	0.154	32	0.470	55	2.713	78	37.527	101	350.852
10	0.155	33	0.499	56	3.030	79	41.826	102	375.056
11	0.163	34	0.530	57	3.453	80	46.597	103	401.045
12	0.175	35	0.565	58	3.973	81	51.986	104	428.996
13	0.195	36	0.605	59	4.569	82	58.138	105	456.698
14	0.223	37	0.652	60	5.250	83	64.885	106	481.939
15	0.256	38	0.707	61	6.024	84	72.126	107	502.506
16	0.287	39	0.771	62	6.898	85	80.120	108	518.642
17	0.309	40	0.839	63	7.897	86	89.120	109	531.820
18	0.322	41	0.909	64	9.013	87	99.383	110	541.680
19	0.331	42	0.977	65	10.215	88	110.970	111	547.859
20	0.335	43	1.037	66	11.465	89	123.714	112	550.000
21	0.339	44	1.091	67	12.731	90	137.518	113	550.000
22	0.342	45	1.151	68	13.913	91	152.286	114	550.000
23	0.344	46	1.222	69	15.032	92	167.926	115	1000.000

MALE Age Nearest Birthday

AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$	AGE	$1000q_x$
1	0.701	24	0.738	47	2.246	70	28.068	93	234.658
2	0.473	25	0.782	48	2.486	71	30.696	94	255.130
3	0.393	26	0.824	49	2.751	72	33.688	95	276.308
4	0.306	27	0.860	50	3.050	73	36.904	96	297.485
5	0.280	28	0.892	51	3.397	74	40.275	97	317.953
6	0.268	29	0.922	52	3.800	75	44.013	98	337.425
7	0.257	30	0.948	53	4.239	76	48.326	99	356.374
8	0.238	31	0.971	54	4.706	77	53.427	100	375.228
9	0.230	32	0.992	55	5.234	78	59.390	101	394.416
10	0.233	33	1.003	56	5.854	79	66.073	102	414.369
11	0.245	34	1.004	57	6.601	80	73.366	103	436.572
12	0.267	35	1.006	58	7.451	81	81.158	104	460.741
13	0.302	36	1.020	59	8.385	82	89.339	105	484.644
14	0.352	37	1.054	60	9.434	83	97.593	106	506.047
15	0.408	38	1.111	61	10.629	84	105.994	107	522.720
16	0.463	39	1.182	62	12.002	85	115.015	108	534.237
17	0.509	40	1.268	63	13.569	86	125.131	109	542.088
18	0.544	41	1.367	64	15.305	87	136.815	110	546.908
19	0.573	42	1.481	65	17.192	88	150.191	111	549.333
20	0.599	43	1.599	66	19.208	89	164.944	112	550.000
21	0.627	44	1.725	67	21.330	90	180.886	113	550.000
22	0.658	45	1.867	68	23.489	91	197.834	114	550.000
23	0.696	46	2.037	69	25.700	92	215.601	115	1000.000

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VM-25: HEALTH INSURANCE RESERVES MINIMUM RESERVE REQUIREMENTS

A. Purpose

Reserve requirements for individual accident and health insurance policies issued on and after the *Valuation Manual* operative date and reserve requirements for group accident and health insurance certificates issued on and after the *Valuation Manual* operative date are applicable requirements found in the AP&P Manual; Appendix A, which includes A-10; and applicable requirements found in the AP&P Manual Appendix C, which includes *Actuarial Guideline XXVIII—Statutory Claim Reserves For Group Long-Term Disability Contracts With a Survivor Income Benefit Provision* (AG 38); *Actuarial Guideline XLIV—Group Term Life Waiver of Premium Disabled Life Reserves* (AG 44); *Actuarial Guideline XLVII—The Application of Company Experience in the Calculation of Claim Reserves Under the 2012 Group Long-Term Disability Valuation Table* (AG 47); and *Actuarial Guideline L—2013 Individual Disability Income Valuation Table* (AG 50).

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VM-26: CREDIT LIFE AND DISABILITY RESERVE REQUIREMENTS

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Section 1: Purpose

A. The purpose of this section is to define the minimum valuation standard for credit life insurance and credit disability insurance.

B. The method described in this section shall constitute the CRVM for contracts for which this section is applicable.

C. Definitions

1. The term "2001 CSO Mortality Table" means that mortality table, consisting of separate rates of mortality for male and female lives, developed by the Academy CSO Task Force from the Valuation Basic Mortality Table developed by the SOA Individual Life Insurance Valuation Mortality Task Force, and adopted by the NAIC in December 2002. The 2001 CSO Mortality Table is included in the *Proceedings of the NAIC (2nd Quarter 2002)*. Unless the context indicates otherwise, the "2001 CSO Mortality Table" includes both the ultimate form of that table and the select and ultimate form of that table and includes both the smoker and nonsmoker mortality tables and the composite mortality tables. It also includes both the age-nearest-birthday and age-last-birthday bases of the mortality tables.

2. The term "2001 CSO Male Composite Ultimate Mortality Table" means a specific mortality table, included in the 2001 CSO Mortality Table, that contains mortality rates that are composites of smokers and nonsmokers on male lives after the select period, including both the age-nearest-birthday and age-last-birthday bases of the mortality tables.

3. The term "claim reserve" means a liability established with respect to any incurred contractual benefits not yet paid as of the valuation date.

4. The term "company" means a licensed insurer.

5. The term "contract reserve" means a liability established with respect to in-force contracts equal to the excess of the present value of claims expected to be incurred after a valuation date over the present value of future valuation net premiums.

6. The term "date of disablement" means the earliest date the insured is considered disabled under the definition of disability in the contract. Normally, this date will coincide with the start of any elimination period.

7. The term "elimination period" means a specified number of days, weeks or months starting at the beginning of each period of loss, during which no benefits are payable.

8. The term "gross premium" means the amount of premium charged by the company.

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9. The term "net premium refund liability" means the amount of money the insurance company owes to an insured when the insured cancels their loan or insurance prior to its scheduled termination date, net of amounts that the insurer will recover from other parties.

10. The term "unearned premium reserve" means that portion of the premium paid or due to the company that is applicable to the period of coverage extending beyond the valuation date. Thus, if an annual premium of $120 was paid on Nov. 1, $20 would be earned as of Dec. 31, and the remaining $100 would be unearned. The unearned premium reserve could be on a gross basis as in this example or on a valuation net premium basis.

Section 2: Minimum Standard for Valuation of Credit Life Insurance

A. Claim Reserves

1. A company shall hold claim reserves for all incurred but unpaid claims on all credit life insurance policies as of the valuation date, and shall hold appropriate claim expense reserves for the estimated expense of settlement of all incurred but unpaid claims.

2. A company shall test all claim reserves for prior valuation years for adequacy and reasonableness, including consideration of any residual unpaid liability.

3. Assumptions used for setting credit life claim reserves shall be based on the company's experience, if such experience is credible, or upon other assumptions designed to place a sound value on the liabilities. Assumptions should be adjusted regularly to maintain reasonable margins.

4. A generally accepted actuarial reserving method or other reasonable method or a combination of methods shall be used to estimate credit life insurance claim liabilities. The methods used for estimating liabilities generally may be aggregate methods, or various reserve items may be separately valued. Approximations based on groupings and averages also may be employed. Adequacy of the claim reserves must be determined in the aggregate.

B. Contract Reserves

1. If separate benefits are included in a credit life insurance contract, the reserve for each benefit must comply with these requirements.

2. Reserves must be based on actuarial assumptions that produce reserves at least as great as those called for in any contract provision as to reserve basis and method, and are in accordance with all other contract provisions.

3. Reserves must be established for all unmatured contractual obligations, which have not matured, of the company arising out of the provisions of the credit life insurance contract and must be computed in accordance with presently accepted ASOP.

4. The reserve method for use in determining the minimum standard for valuation of credit life insurance is the CRVM specified in section VM-05 of this *Valuation Manual*. If benefits are guaranteed for less than one year, the method produces a reserve equal to the mortality cost from the valuation date to the end of the coverage period.

5. The interest rates for use in determining the minimum standard for valuation of credit life insurance are the calendar year statutory valuation interest rates specified in section VM-05 of this *Valuation Manual*.

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6. The minimum mortality assumptions for use in determining the minimum standard for valuation of credit life insurance for both male and female insured individuals is the 2001 CSO Male Composite Ultimate Mortality Table. If a credit life insurance policy or certificate insures two lives, the minimum standard shall be twice the mortality in the 2001 CSO Male Composite Ultimate Mortality Table based on the age of the older insured.

7. Use of approximations are permitted, such as those involving age groupings; average amounts of indemnity; grouping of similar contract forms; the computation of the reserve for one contract benefit as a percentage of, or by other relation to, the aggregate contract reserves exclusive of the benefit or benefits so valued; and the use of group methods and approximate averages for fractions of a year or otherwise.

Section 3: Minimum Standard for Valuation of Credit Disability Insurance

A. Claim Reserves

1. A company shall hold claim reserves for all incurred but unpaid claims on all credit disability insurance policies, which is measured as the present value of future benefits or amounts not yet due as of the valuation date that are expected to arise under claims that have been incurred as of the valuation date, and shall hold appropriate claim expense reserves for the estimated expense of settlement of all incurred but unpaid claims.

2. A company shall test all claim reserves for prior valuation years for adequacy and reasonableness using claim runoff schedules in accordance with the statutory financial statement, including consideration of any residual unpaid liability.

3. The maximum interest rate for use in determining the minimum standard for valuation of credit disability insurance claim reserves is the maximum rate allowed in section VM-05 of this *Valuation Manual* in the valuation of whole life insurance issued on the date the credit disability claim was incurred.

4. The morbidity assumption for use in determining the minimum standard for valuation of credit disability insurance shall be based on the company's experience, if such experience is credible, or upon other assumptions designed to place a sound value on the liabilities. For claim liabilities and claim reserves to reflect "sound values" and/or reasonable margins, valuation tables based on credible experience should be adjusted regularly to maintain reasonable margins.

5. A generally accepted actuarial reserving method or other reasonable method or a combination of methods shall be used to estimate credit disability insurance claim liabilities. The methods used for estimating liabilities generally may be aggregate methods, or various reserve items may be separately valued. Approximations based on groupings and averages also may be employed. Adequacy of the claim reserves must be determined in the aggregate.

B. Contract Reserves

1. Contract reserves are required for all contractual obligations, which have not matured, of a company arising out of the provisions of a credit disability insurance contract consistent with claim reserves and unearned premium reserve, if any, held for their respective obligations.

2. The methods and procedures for determining contract reserves for credit disability insurance must be consistent with the methods and procedures for claim reserves for any

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contract, unless appropriate adjustment is made to assure provision for the aggregate liability. The date of incurral must be the same in both determinations.

3. The morbidity assumptions for use in determining the minimum standard for valuation of single premium credit disability insurance contract reserves are:

   a. For plans having less than a 15-day elimination period, the 1985 Commissioners Individual Disability Table A (85CIDA) with claim incidence rates increased by 12%.

   b. For plans having greater than a 14-day elimination period, the 85CIDA for a 14-day elimination period with claim incidence rates increased by 12%.

4. The minimum contract reserve for credit disability insurance, other than single premium credit disability insurance, is the gross pro-rata unearned premium reserve.

5. The maximum interest rate for use in determining the minimum standard for valuation of single premium credit disability insurance contract reserves is the maximum rate allowed in section VM-05 of this *Valuation Manual* in the valuation of whole life insurance issued on the same date as the credit disability insurance contract.

6. A company shall not use a separate mortality assumption for valuation of single premium credit disability insurance contract reserves since premium is refunded upon death of the insured.

7. Use of approximations are permitted, such as those involving age groupings, average amounts of indemnity and grouping of similar contract forms; the computation of the reserve for one contract benefit as a percentage of, or by other relation to, the aggregate contract reserves exclusive of the benefit or benefits so valued; and the use of group methods and approximate averages for fractions of a year or otherwise.

8. Annually, a company shall conduct a review of prospective contract liabilities on contracts valued by tabular reserves to determine the continuing adequacy and reasonableness of the tabular reserves. The company shall make appropriate increments to such tabular reserves if such tests indicate that the basis of such reserves is not adequate.

Section 4: Additional Reserves for Credit Insurance

A. For all credit life and disability contracts in the aggregate, if the net premium refund liability exceeds the aggregate recorded contract reserve, the company must establish an additional reserve liability. This additional liability is equal to the excess of the net refund liability over the contract reserve recorded. The net refund liability may include consideration of commission, premium tax and other expenses recoverable. For example, the insurance company may recover amounts from the state for premium taxes and from producers for prepaid commissions. In all cases, such amounts shall be evaluated for probability of recovery.

Section 5: Reinsurance

A. Increases to, or credits against, reserves carried, arising because of reinsurance assumed or reinsurance ceded, must be determined in a manner consistent with these minimum reserve standards and with all applicable provisions of the reinsurance contracts that affect the company's liabilities.

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VM-30: ACTUARIAL OPINION AND MEMORANDUM REQUIREMENTS

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Section 1: Scope

A. General

1. The following provisions contain the requirements for the actuarial opinion of reserves and for supporting actuarial memoranda in accordance with Section 3 of the Standard Valuation Law, and are collectively referred to as Actuarial Opinion and Memorandum (AOM) requirements.

2. Actuarial opinion and supporting actuarial memoranda requirements are provided in this VM-30 for companies that file the life, accident and health annual statement, or the fraternal annual statement. Companies that file the property /casualty (P/C) annual statement or the health annual statement will follow the actuarial opinion and supporting actuarial memoranda requirements pursuant to the instructions for those annual statements. Such companies are not subject to actuarial opinion and supporting actuarial memoranda requirements in this VM-30 unless the instructions for the P/C annual statement or the instructions for the health annual statement provide for requirements in VM-30.

> **Guidance Note:** It is the intent to allow the annual statement instructions to address all issues relating to the actuarial opinion and memorandum for these two statements (P/C annual statement and the health annual statement), but not preclude the use of requirements as appropriate in VM-30 in the instructions for these two statements.

3. The AOM requirements shall be applied in a manner that allows the appointed actuary to use his or her professional judgment in performing the actuarial analysis and developing the actuarial opinion and supporting actuarial memoranda, conforming to relevant ASOP. However, a state commissioner has the authority to specify methods of analysis and assumptions when, in the commissioner's judgment, these specifications are necessary for the actuary to render an acceptable opinion relative to the adequacy of reserves and related actuarial items. For purposes of this VM-30, the requirements of *Actuarial Guideline XLVIII—Actuarial Opinion and Memorandum Requirements for the Reinsurance of Policies Required to be Valued under Sections 6 and 7 of the NAIC Valuation of Life Insurance Policies Model Regulation (Model 830)* (AG 48), of the AP&P Manual, shall be applicable.

4. These AOM requirements are applicable to an annual statement with a year-ending date on or after the operative date of the *Valuation Manual*. A statement of actuarial opinion on the adequacy of the reserves and related actuarial items and a supporting actuarial memorandum is required each year.

5. The requirements for an opinion apply to each company filing an annual statement, not to the holding company or group of companies. A single opinion is required for the company.

B. Definitions

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1. The term “actuarial opinion” means the opinion of an appointed actuary regarding reserves and related actuarial items.

2. The term “Actuarial Standards Board” means the board established by the Academy to develop and promulgate ASOP.

3. The term “annual statement” means the statutory financial statements a company must file using the annual blank with a state insurance commissioner as required under state insurance law.

4. The term “asset adequacy analysis” means an analysis of the adequacy of reserves and other liabilities being tested, in light of the assets supporting such reserves and other liabilities, as specified in the opinion.

5. The term “commissioner” means the chief insurance regulator of a state, district or territory of the U.S.

6. The term “adverse opinion” means an actuarial opinion in which the appointed actuary determines that the reserves and liabilities are not adequate. (An adverse opinion does not meet Section 3.A.7.e.)

7. The term “qualified opinion” means an actuarial opinion in which the appointed actuary determines the reserves for a certain item/s are in question because they cannot be reasonably estimated or the actuary is unable to render an opinion on those items. Such qualified opinion should state whether the stated reserve amount makes adequate provision for the liabilities associated with the specified reserves, except for the item/s to which the qualification relates. The actuary is not required to issue a qualified opinion if the actuary reasonably believes that the item/s in question is not likely to be material. (A qualified opinion does not meet one or more of the statements in Section 3.A.7.a through Section 3.A.7.d.)

8. The term “inconclusive opinion” means an actuarial opinion in which the appointed actuary determines the actuary cannot reach a conclusion due to deficiencies or limitations in the data, analyses, assumptions or related information. The actuary’s ability to give an opinion is dependent upon data, analyses, assumptions and related information that are sufficient to support a conclusion. An inconclusive opinion shall include a description of the reasons why a conclusion could not be reached.

9. An appointed actuary is a qualified actuary who:

    a. Is appointed by the board of directors, or its equivalent, or by a committee of the board, by Dec. 31 of the calendar year for which the opinion is rendered.

    b. Is a member of the Academy.

    c. Is familiar with the valuation requirements applicable to life and health insurance.

    d. Has not been found by the commissioner (or if so found has subsequently been reinstated as a qualified actuary), following appropriate notice and hearing to have:

        i. Violated any provision of, or any obligation imposed by, the insurance law or other law in the course of his or her dealings as a qualified actuary.

ii. Been found guilty of fraudulent or dishonest practices.

iii. Demonstrated incompetency, lack of cooperation or untrustworthiness to act as a qualified actuary.

iv. Submitted to the commissioner during the past five years, pursuant to these AOM requirements, an actuarial opinion or memorandum that the commissioner rejected because it did not meet the provisions of this regulation including standards set by the Actuarial Standards Board.

v. Resigned or been removed as an actuary within the past five years as a result of acts or omissions indicated in any adverse report on examination or as a result of failure to adhere to generally acceptable actuarial standards.

e. Has not failed to notify the commissioner of any action taken by any commissioner of any other state similar to that under paragraph d above.

Section 2: General Requirements for Submission of Statement of a Life Actuarial Opinion

A. General

1. The statement of an appointed actuary, entitled "Statement of Actuarial Opinion," setting forth an opinion relating to reserves and related actuarial items held in support of policies and contracts, in accordance with Section 3.A must be included with an annual statement.

2. Within five business days of the appointment of an appointed actuary, the company shall notify the domiciliary commissioner of the name, title (and, in the case of a consulting actuary, the name of the firm) and manner of appointment or retention of each person appointed or retained by the company as an appointed actuary and shall state in the notice that the person meets the requirements of an appointed actuary. Once these notices are furnished, no further notice is required with respect to this person unless the actuary ceases to be appointed or retained or ceases to meet the requirements of an appointed actuary.

3. If an actuary who was the appointed actuary for the immediately preceding filed actuarial opinion is replaced by an action of the board of directors, the insurer shall within five business days notify the insurance department of the state of domicile of this event. The insurer shall also furnish the domiciliary commissioner with a separate letter within 10 business days of the above notification stating whether in the 24 months preceding such event there were any material disagreements with the former appointed actuary regarding the content of the opinion. The disagreements required to be reported in response to this paragraph include both those resolved to the former actuary's satisfaction and those not resolved to the former actuary's satisfaction. The insurer shall also in writing request such former actuary to furnish a letter addressed to the insurer stating whether the actuary agrees with the statements contained in the insurer's letter and, if not, stating the reasons for which he does not agree. Additionally, the insurer shall furnish such responsive letter from the former actuary to the domiciliary commissioner together with its own.

B. Standards for Asset Adequacy Analysis

1. The asset adequacy analysis must conform to the Standards of Practice as promulgated from time to time by the Actuarial Standards Board and to any additional standards under these AOM requirements, which standards are to form the basis of the statement of actuarial opinion in accordance with these AOM requirements.

2. The asset adequacy analysis must be based on methods of analysis as are deemed appropriate for such purposes by the Actuarial Standards Board.

C. Liabilities to Be Covered

1. The statement of actuarial opinion must apply to all in-force business on the annual statement date, whether directly issued or assumed, regardless of when or where issued.

2. If the appointed actuary determines as the result of asset adequacy analysis that a reserve should be held in addition to the aggregate reserve held by the company and calculated in accordance with the requirements set forth in the *Valuation Manual*, the company shall establish the additional reserve.

3. Additional reserves established under subparagraph 2 above and determined not to be necessary by the appointed actuary in subsequent years may be released. Any amounts released shall be disclosed in the actuarial opinion for the applicable year. The release of such reserves would not be deemed an adoption of a lower standard of valuation.

Section 3: Requirements Specific to Life Actuarial Opinions

A. Statement of Actuarial Opinion Based On an Asset Adequacy Analysis

1. The statement of actuarial opinion shall consist of:

a. A table of key indicators to alert the reader to any changes from the prescribed language (see Section 3.A.3).

b. An identification section identifying the appointed actuary and his or her qualifications (see Section 3.A.4).

c. A scope section identifying the subjects on which an opinion is to be expressed and describing the scope of the appointed actuary's work, including a tabulation delineating the reserves and related actuarial items that have been analyzed for asset adequacy and the method of analysis (see Section3.A.5), and identifying the reserves and related actuarial items covered by the opinion that have not been so analyzed.

d. A reliance section describing those areas, if any, where the appointed actuary has relied upon other experts for data, assumptions, projections or analysis (e.g., anticipated cash flows from currently owned assets, including variation in cash flows according to economic scenarios [see Section 3.A.6]), supported by a statement of each such expert in the form prescribed by Section 3.A.12.

e. An opinion section expressing the appointed actuary's opinion with respect to the adequacy of the supporting assets to mature the liabilities (see Section 3.A.7).

f. A relevant comments section.

2. Each section must be clearly designated. For each section, there is prescribed wording described in Section3.A.3 through Section 3.A.7 for that section. If the appointed actuary changes this wording or adds additional wording to clarify the prescribed wording, the appropriate box in the table of key indicators must be checked, and the appointed actuary shall provide the following information for that section in the relevant comments section of the opinion:

a. A description of the additional or revised wording in the opinion.

b. The rationale for using the additional or revised wording.

c. An explanation of the impact, if any, that the additional or revised wording has on the opinion.

The prescribed wording should be modified only if needed to meet the circumstances of a particular case, and the appointed actuary should, in any case, use language that clearly expresses the actuary's professional judgment.

3. The table of key indicators is to be at the top of the opinion and is to be completed consistent with the remainder of the opinion. The only options are those presented below:

Identification Section (Check one box only)	
Prescribed Wording Only	☐
Prescribed Wording with Additional Wording	☐
Revised Wording	☐
Scope Section (Check one box only)	
Prescribed Wording Only	☐
Prescribed Wording with Additional Wording	☐
Revised Wording	☐
Reliance Section (Check one box only)	
Prescribed Wording Only	☐
Prescribed Wording with Additional Wording	☐
Revised Wording	☐
Opinion Section (Check one box only)	
Prescribed Wording Only	☐
Prescribed Wording with Additional Wording	☐
Revised Wording	☐
Actuarial Memorandum Section (Check one box only)	
The Actuarial Memorandum includes "Deviation from Standard" wording regarding conformity with an Actuarial Standard of Practice	☐
The Actuarial Memorandum does not include "Deviation from Standard" wording regarding conformity with an Actuarial Standard of Practice	☐
Relevant Comments Section (Check one box only)	
Comments are included	☐
Comments are not included	☐
Category of Opinion	
Unqualified	☐
Adverse	☐
Qualified	☐
Inconclusive	☐

The actuarial memorandum includes "deviation from standard" wording regarding conformity with an ASOP.

4. The identification section should specifically indicate the appointed actuary's relationship to the company, qualifications for acting as appointed actuary and date of appointment, as well as specify that the appointment was made by the board of directors, or its equivalent, or by a committee of the board.

   This section should contain only one of the following:

   For a member of the Academy who is an employee of the organization, the identification section of the opinion should contain all of the following sentences if the appointed actuary is using the prescribed wording:

   "I, [name and title], am an employee of [insurance company name] and a member of the American Academy of Actuaries. I was appointed on [date of appointment] in accordance with the requirements of the *Valuation Manual*. I meet the Academy qualification standards for rendering the opinion."

   For a consultant who is a member of the Academy, the identification section of the opinion should contain all of the following sentences if the appointed actuary is using the prescribed wording:

   "I, [name and title of consultant], am associated with the firm of [name of consulting firm]. I am a member of the American Academy of Actuaries. I was appointed on [date of appointment] in accordance with the requirements of the *Valuation Manual*. I meet the Academy qualification standards for rendering the opinion."

   Guidance Note: It is not necessary for an appointed actuary to be reappointed under the *Valuation Manual*. For purposes of the identification section, appointment in accordance with the requirements of the *Actuarial Opinion and Memorandum Regulation* (#822) qualifies as being in accordance with the *Valuation Manual*.

5. The scope section should contain only the following statement (including all specified lines even if the value is zero) if the appointed actuary is using the prescribed wording:

   "I have examined the assumptions and methods used in determining reserves and related actuarial items listed below, as shown in the annual statement of the company, as prepared for filing with state regulatory officials, as of December 31, 20__. Tabulated below are those reserves and related actuarial items which have been subjected to asset adequacy analysis."

Asset Adequacy Tested Amounts—Reserves and Related Actuarial Items						
Statement Item	**Formula Reserves (1)**	**Principle-Based Reserves (2)**	**Additional Reserves (a) (3)**	**Analysis Method (b)**	**Other Amount (4)**	**Total Amount (1)+(2)+(3)+(4) (5)**
Exhibit 5 A Life Insurance						
B Annuities						
C Supplementary Contracts Involving Life Contingencies						
D Accidental Death Benefit						
E Disability—Active						
F Disability—Disabled						
G Miscellaneous						
Total						
Exhibit 6 A Active Life Reserve						
B Claim Reserve						
Total						
Exhibit 7 Premium and Other Deposit Funds						
Guaranteed Interest Contracts						
Supplemental Contracts						
Annuities Certain						

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Asset Adequacy Tested Amounts—Reserves and Related Actuarial Items						
Statement Item	**Formula Reserves (1)**	**Principle-Based Reserves (2)**	**Additional Reserves (a) (3)**	**Analysis Method (b)**	**Other Amount (4)**	**Total Amount (1)+(2)+(3)+(4) (5)**
Dividend Accumulations or Refunds						
Total Exhibit 7						
Exhibit 8 Part 1 1 Life						
2 Health						
Total Exhibit 8, Part 1						
Separate Accounts (Page 3 of the Annual Statement of the Separate Accounts, Lines 1 and 2)						
Other Reserves and Related Actuarial Items Tested <<include a description and the location of other reserves and related actuarial items						
TOTAL RESERVES						

IMR (General Account, Page____ Line____)	
(Separate Accounts, Page____ Line____)	
AVR (Page____ Line____)	
Net Deferred and Uncollected Premium	

a. The additional reserves are the reserves established under Section 2.C.2.

b. The appointed actuary should indicate the method of analysis, determined in accordance with the standards for asset adequacy analysis referred to in Section 2.B of these AOM requirements, by means of symbols that should be defined in footnotes to the table. If more than one method of analysis is used for any single annual statement line or line from the above table, an additional line for each method of analysis shall be provided with the method of analysis identified for each line.

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c. Allocated amount of AVR.

6. The reliance section should contain only one of the following if the appointed actuary is using the prescribed wording:

If the appointed actuary has not relied upon other experts for data, assumptions, projections or analysis, the reliance section should include only the following statement:

"My examination included a review of the data, assumptions, projections and analysis and of the underlying basic asset and liability data, and such tests of the assumptions, projections and analysis I considered necessary. I also reconciled the underlying basic asset and liability data to the extent applicable to [exhibits and schedules listed as applicable] of the company's current annual statement."

If the appointed actuary has relied upon other experts for data, assumptions, projections or analysis, the reliance section should include only the following statement:

"In forming my opinion on [specify types of reserves], I relied upon data, assumptions, projections or analysis prepared by [name and title each expert providing the data, assumptions, projections, or analysis] as certified in the attached statements. I evaluated that data, assumptions, projections or analysis for reasonableness and consistency. I also reconciled data to the extent applicable to [list applicable exhibits and schedules] of the company's current annual statement. In other respects, my examination included review of the assumptions projections, and analysis used and tests of the assumptions, projections and analysis I considered necessary. I have received documentation from the experts listed above that supports the data, assumptions, projections and analysis."

The appointed actuary shall attach to their opinion a statement by each expert relied upon in the form prescribed by Section 3.A.12.

7. The opinion section should include only the following statement if the actuary is using prescribed wording:

"In my opinion, the reserves and related actuarial items concerning the statement items identified above:

a. Are computed in accordance with presently accepted ASOP consistently applied and are fairly stated, in accordance with sound actuarial principles.

b. Are based on assumptions and methods that produce reserves at least as great as those called for in any contract provision as to reserve basis and method, and are in accordance with all other contract provisions.

c. Meet the requirements of the insurance laws and regulations of the state of [state of domicile]; and

(Use one of the following phrases as appropriate)

"are at least as great as the minimum aggregate amounts required by any state"

or

"are at least as great as the minimum aggregate amounts required by any state with the exception of the following states [list states]. For each listed state, a separate statement of actuarial opinion was submitted to that state that complies with the requirements of that state."

d. Are computed on the basis of assumptions and methods consistent with those used in computing the corresponding items in the annual statement of the preceding year-end (with any exceptions noted below).

e. Include provision for all reserves and related actuarial items that ought to be established.

The reserves and related actuarial items, when considered in light of the assets held by the company with respect to such reserves and related actuarial items including, but not limited to, the investment earnings on the assets, and the considerations anticipated to be received and retained under the policies and contracts, make adequate provision, according to presently accepted ASOP, for the anticipated cash flows required by the contractual obligations and related expenses of the company. (At the discretion of the commissioner, this language may be omitted for an opinion filed on behalf of a company doing business only in this state and in no other state.)

The methods, considerations and analyses used in forming my opinion conform to the appropriate ASOP as promulgated by the Actuarial Standards Board, which form the basis of this statement of opinion.

This opinion is updated annually as required by statute. To the best of my knowledge, there have been no material changes from the applicable date of the annual statement to the date of the rendering of this opinion that should be considered in reviewing this opinion.

The impact of unanticipated events subsequent to the date of this opinion is beyond the scope of this opinion. The analysis of the asset adequacy portion of this opinion should be viewed recognizing that the company's future experience may not follow all the assumptions used in the analysis."

8. The opinion may include a relevant comments section. The relevant comments section should provide a brief description of each item. A detailed analysis of each item should be included in the actuarial memorandum.

Guidance Note: An example of a relevant comment is if there has been any material change in the assumptions or methods from those previously employed, a portion of the relevant comment section can describe that change in the statement of opinion by including a description of the changes such as: "A material change in assumptions or methods was made during the past year, but such change accords with accepted actuarial standards." A brief description of the change would follow.

Other examples of items to include in the relevant comments section include topics of regulatory importance, descriptions of the reason for qualifying an opinion or explanations for an aspect of the annual statement that is not already sufficiently explained in the annual statement.

9. The opinion should conclude with the signature of the appointed actuary responsible for providing the actuarial opinion and the date when the opinion was rendered. The signature and date should appear in the following format:

_____
Signature of Appointed Actuary

_____
Printed Name of Appointed Actuary

_____
Address of Appointed Actuary

_____
Telephone Number of Appointed Actuary

_____
Email Address of Appointed Actuary

_____
Date

10. If the appointed actuary is able to form an opinion that is not qualified, adverse or inconclusive as those terms are defined in Section 1.B, the actuary should issue a statement of unqualified opinion. If the opinion is adverse, qualified or inconclusive, the appointed actuary should issue an adverse, qualified or inconclusive opinion explicitly stating the reason for such opinion. In all circumstances, the category of opinion should be accurately identified in the TABLE of KEY INDICATORS section of the opinion.

11. The adoption for new issues or new claims or other new liabilities of an assumption that differs from a corresponding assumption used for prior new issues or new claims or other new liabilities is not a change in assumptions within the meaning of this section (i.e., Section 3.A).

12. If the appointed actuary relies on other experts for data, assumptions, projections or analysis in forming the actuarial opinion, the actuarial opinion should identify the experts the actuary is relying upon and a precise identification of the information provided by the experts. In addition, the experts on whom the appointed actuary relies shall provide a certification that identifies the specific information provided; states that supporting documentation was provided; opines on the accuracy, completeness or reasonableness of the information provided; and describes their qualifications. This certification shall include the signature, name, title, company, address and telephone number of the person rendering the certification, as well as the date on which it is signed.

B. Description of the Actuarial Memorandum, Including an Asset Adequacy Analysis and Regulatory Asset Adequacy Issues Summary

1. The appointed actuary shall prepare a memorandum to the company describing the analysis done in support of his or her opinion regarding the reserves. The memorandum shall be made available for examination by a commissioner upon request but shall be returned to the company after such examination and shall not be considered a record of

the insurance department nor subject to automatic filing with a commissioner.

2. In preparing the memorandum, the appointed actuary may rely on, and include as a part of his or her own memorandum, memoranda prepared and signed by other actuaries who are qualified within the meaning of Section 3.A.2, with respect to the areas covered in such memoranda, and so state in their memoranda.

3. Any actuary engaged by the commissioner under [insert reference to Section 3 of the state's Standard Valuation Law] shall have the same status as an examiner for purposes of obtaining data from the company, and the work papers and documentation of the actuary shall be retained by the commissioner—provided, however, that any information provided by the company to the actuary and included in the work papers shall be considered as material provided by the company to the commissioner and shall be kept confidential to the same extent as is prescribed by law with respect to other material provided by the company to the commissioner pursuant to the statute governing these AOM requirements. The actuary shall not be an employee of a consulting firm involved with the preparation of any prior memorandum or opinion for the insurer pursuant to these AOM requirements for any one of the current year or the preceding three years.

4. The memorandum shall include the following statement:

   "Actuarial methods, considerations and analyses used in the preparation of this memorandum conform to the appropriate standards of practice as promulgated by the Actuarial Standards Board, which standards form the basis for this memorandum."

5. An appropriate allocation of assets in the amount of the IMR, whether positive or negative, shall be used in any asset adequacy analysis. Analysis of risks regarding asset default may include an appropriate allocation of assets supporting the asset valuation reserve; these AVR assets may not be applied for any other risks with respect to reserve adequacy. Analysis of these and other risks may include assets supporting other mandatory or voluntary reserves available to the extent not used for risk analysis and reserve support.

6. The amount of the assets used for the AVR shall be disclosed in the table of reserves and liabilities of the opinion and in the memorandum. The method used for selecting particular assets or allocated portions of assets shall be disclosed in the memorandum.

7. The appointed actuary shall retain on file, for at least seven years, sufficient documentation so that it will be possible to determine the procedures followed, the analyses performed, the bases for assumptions and the results obtained.

8. When an actuarial opinion is provided, the memorandum shall demonstrate that the analysis has been done in accordance with the standards for asset adequacy referred to in Section 2.B and any additional standards specified in these AOM requirements.

9. When an actuarial opinion is provided, the memorandum shall specify for reserves:

   a. Product descriptions, including market description, underwriting and other aspects of a risk profile and the specific risks the appointed actuary deems significant.

   b. Source of liability in force.

   c. Reserve method and basis.

d. Investment reserves.

e. Reinsurance arrangements.

f. Identification of any explicit or implied guarantees made by the general account in support of benefits provided through a separate account or under a separate account policy or contract and the methods used by the appointed actuary to provide for the guarantees in the asset adequacy analysis.

g. Documentation of assumptions used for lapse rates (both base and excess), interest crediting rate strategy, mortality, policyholder dividend strategy, competitor or market interest rate, annuitization rates, commissions and expenses, and morbidity. The documentation of the assumptions shall be such that an actuary reviewing the actuarial memorandum could form a conclusion as to the reasonableness of the assumptions.

10. When an actuarial opinion is provided, the memorandum shall specify for assets:

a. Portfolio descriptions, including a risk profile disclosing the quality, distribution and types of assets.

b. Investment and disinvestment assumptions.

c. Source of asset data.

d. Asset valuation bases.

e. Documentation of assumptions made for default costs, bond call function, mortgage prepayment function, determining market value for assets sold due to disinvestment strategy and determining yield on assets acquired through the investment strategy. The documentation of the assumptions shall be such that an actuary reviewing the actuarial memorandum could form a conclusion as to the reasonableness of the assumptions.

11. When an actuarial opinion is provided, the memorandum shall specify for the analysis basis:

a. Methodology.

b. Rationale for inclusion or exclusion of different blocks of business and how pertinent risks were analyzed.

c. Rationale for degree of rigor in analyzing different blocks of business. (Include in the rationale the level of “materiality” that was used in determining how rigorously to analyze different blocks of business.

d. Criteria for determining asset adequacy. (Include in the criteria the precise basis for determining if assets are adequate to cover reserves under “moderately adverse conditions” or other conditions as specified in relevant ASOP.

e. Whether the impact of federal income taxes was considered and the method of treating reinsurance in the asset adequacy analysis.

12. When an actuarial opinion is provided, the memorandum shall contain:

a. Summary of material changes in methods, procedures or assumptions from the prior year's asset adequacy analysis.

b. Summary of results.

c. Conclusions.

13. The appointed actuary shall prepare a regulatory asset adequacy issues summary, the contents of which are specified in Section 3.B.14. The regulatory asset adequacy issues summary will be submitted to the domiciliary commissioner no later than April 1 of the year following the year for which a statement of actuarial opinion based on asset adequacy is required, and shall be available to any other commissioners on request. A commissioner shall keep the regulatory asset adequacy issues summary confidential to the same extent and under the same conditions as the actuarial memorandum.

a. The regulatory asset adequacy issues summary shall include:

i. The following key indicator. The only options are those presented below:

This opinion is unqualified: Yes No

If the response is "No," the appointed actuary shall explain the reason(s) why the opinion is not unqualified in a manner that is satisfactory to the commissioner.

ii. Descriptions of the scenarios tested (including whether those scenarios are stochastic or deterministic) and the sensitivity testing done relative to those scenarios. If negative ending surplus results under certain tests in the aggregate, the actuary should describe those tests and the amount of additional reserve as of the valuation date, which, if held, would eliminate the negative aggregate surplus values. Ending surplus values shall be determined by either extending the projection period until the in force and associated assets and liabilities at the end of the projection period are immaterial or by adjusting the surplus amount at the end of the projection period by an amount that appropriately estimates the value that can reasonably be expected to arise from the assets and liabilities remaining in-force. The actuary shall provide a summary of the testing results, tabular or otherwise, sufficient to provide a clear understanding of the basis for the actuarial opinion. This summary shall include clarifying explanations of the results as needed.

iii. The extent to which the appointed actuary uses assumptions in the asset adequacy analysis that are materially different from the assumptions used in the previous asset adequacy analysis.

iv. The amount of reserves and the identity of the product lines that had been subjected to asset adequacy analysis in the prior opinion but were not subject to analysis for the current opinion.

v. Comments on any interim results that may be of significant concern to the appointed actuary.

vi. The methods used by the actuary to recognize the impact of reinsurance on the company's cash flows, including both assets and liabilities, under each of the scenarios tested.

vii. Whether the actuary has been satisfied that all options, whether explicit or embedded, in any asset or liability (including. but not limited to. those affecting cash flows embedded in fixed income securities) and equity-like features in any investments have been appropriately considered in the asset adequacy analysis.

b. The regulatory asset adequacy issues summary shall contain the name of the company for which the regulatory asset adequacy issues summary is being supplied and shall be signed and dated by the appointed actuary rendering the actuarial opinion.

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VM-31: PBR Actuarial Report Requirements for Business Subject to a Principle-Based Reserve Valuation

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Section 1: Purpose

These requirements establish the minimum reporting requirements for policies or contracts subject to PBR valuation under the Standard Valuation Law.

Section 2: General Requirements

A. Each year a company shall prepare, under the direction of one or more qualified actuaries, as assigned by the company under the provisions of VM-G, a PBR Actuarial Report if the company computes a deterministic or stochastic reserve as defined in VM-20 for any policy or contract. The PBR Actuarial Report shall consist of one or more sub-reports, each such sub-report covering a group of policies comprised of one or more model segments. Each such sub-report shall be prepared by the qualified actuary assigned responsibility for such group of policies under the provisions of VM-G. The PBR Actuarial Report must include documentation and disclosure sufficient for another actuary qualified in the same practice area to evaluate the work.

A company that does not compute any deterministic or stochastic reserves for a group of policies as a result of the company passing the exclusion tests as defined in VM–20 Section 6 for all policies in that group must develop a sub-report for that group that addresses the requirements of Section 3.D.10. and Section 3.D.12.c. if applicable.

B. The PBR Actuarial Report must include descriptions of all material decisions made and information used by the company in complying with the minimum reserve requirements and must comply with the minimum documentation and reporting requirements set forth in Section 3.

C. The company shall submit a PBR Actuarial Report to a commissioner upon request.

D. The company shall retain on file, for at least seven years from the date of filing, sufficient documentation so that it will be possible to determine the procedures followed, the analyses performed, the bases for assumptions and the results obtained in a principle-based valuation.

Section 3: PBR Actuarial Report Requirements

A. For purposes of this section:

1. For individual life insurance policies, “principle-based reserves” means that deterministic and/or stochastic reserves were calculated for policies under VM-20.

2. For variable annuity contracts, “principle-based reserves” means that reserves were calculated for contracts under VM-21.

B. The PBR Actuarial Report shall contain a table of contents with associated page numbers.

C. The PBR Actuarial Report shall contain an overview section at the beginning of the report. The overview section shall be submitted to the company’s domiciliary commissioner no later than April 1 of the year following the year to which the PBR Actuarial Report applies and the

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company shall provide this overview section to any other commissioner upon request. The overview section is a part of the PBR Actuarial Report and is subject to the same confidentiality provisions as the PBR Actuarial Report, even when provided separately. The overview section shall include the following:

1. An opening paragraph identifying the qualified actuary that has been assigned by the company to prepare each sub-report of the PBR Actuarial Report, the qualifications of the qualified actuary and the relationship of the qualified actuary to the company.

2. A description of the policies and/or contracts subject to VM-20 or VM-21 and, for VM-20, the groups of policies covered by each sub-report.

3. A copy of Part 1 of the VM-20 Reserve Supplement from the annual statement blank in the PBR Actuarial Report.

4. A copy of Part 2 Section 1 of the VM-20 Reserve Supplement from the annual statement blank in the PBR Actuarial Report.

Guidance Note: The VM-20 Reserve Supplement exposed on Nov. 18, 2015, labels the two reserve tables as Part 1 and Part 2 Section 1. The references here will be adjusted as needed based on any changes to labels used in the final adopted supplement.

5. For each group of policies covered in a sub-report, a description of the risks determined material by the qualified actuary assigned to that group of policies and associated with policies and/or contracts in that group of policies subject to a PBR valuation.

6. For each group of policies covered in a sub-report, a description of those areas where the qualified actuary relied on others for data, assumptions, projections or analysis in determining the PBR and a reliance statement from each individual on whom the qualified actuary relied that includes:

   a. The information provided by the individual.

   b. A statement as to the accuracy, completeness or reasonableness, as applicable, of the information provided.

7. For each group of policies covered in a sub-report, a summary of the valuation assumptions and margins for each major product line subject to a PBR valuation within that group of policies including:

   a. Description of the method used to determine anticipated experience assumptions for each material risk factor, including the degree to which the assumptions are based on experience versus actuarial judgment or other factors, and the source of the experience (e.g., company experience versus industry study).

   b. Description of any significant changes from the prior year in the method used to determine anticipated experience assumptions and the rationale for the change.

   c. List of key risk and experience reporting elements that the company is tracking in order to monitor changes in experience that will be used to update assumptions and the frequency of the tracking.

   d. Description of the method used to determine margins for each material risk factor.

e. Description of any significant changes from the prior year in the method used to determine margins and the rationale for the change.

f. Disclosure of the key valuation assumptions, other than prescribed assumptions and methods, that are materially inconsistent with the company's overall risk assessment process recognizing potential differences in financial reporting structures. The disclosure should provide a summary of those risk analyses and management techniques with which the assumptions are inconsistent and the rationale for the inconsistency.

g. Description of any considerations helpful in or necessary to understanding the rationale behind and development of assumptions and margins even if such considerations are not explicitly mentioned in the *Valuation Manual.*

Guidance Note: The requirements in C.7 above require an executive summary version of the assumptions and margins. Additional details on assumptions and margins are included in later sections of the PBR Actuarial Report.

8. For each group of policies covered in a sub-report, a summary of the approach used to model the assets supporting the group of policies subject to a PBR valuation, including:

a. Method used and rationale for allocating the total asset portfolio into multiple segments, if applicable.

b. Description of the asset portfolio, including the types of assets, duration and their associated quality ratings.

9. A description of the approach used to model risk management strategies (e.g., hedging) and other derivative programs, as well as a summary and description of any clearly defined hedging strategies.

10. A description of the rationale for determining whether a decision, information, assumption, risk or other element of a PBR calculation is material. Such rationale could include such items as a percentage of surplus, a percentage of reserve or a specific monetary value.

11. Paragraphs certifying that the PBR reserve valuation:

a. Was calculated in accordance with VM-05 and VM-20.

b. The assumptions and margins are prudent estimates.

12. A closing paragraph for each group of policies covered by a sub-report, with the signature, title, telephone number and e-mail address of the qualified actuary, the company name and address, and the date signed.

D. PBR Actuarial Report Requirements for Individual Life Insurance Policies or Contracts

The company shall include in the PBR Actuarial Report and in any sub-report thereof:

1. A summary of valuation assumptions and margins, including a listing of the final prudent estimate valuation assumptions and margins for the major risk factors and a description of any changes in anticipated experience assumptions or margins since the last PBR Actuarial Report.

2. The following information regarding the cash-flow model(s) used by the company in determining PBR:

   a. Description of the modeling system(s) used.

   b. Description and rationale for the organization of the policies and assets into model segments, consistent with the guidance from VM-20 7.A.1.b and VM-20 7.D.1.b.

   c. Description of the approach and rationale used to group assets and policies for the deterministic reserve calculation within each model segment.

      A clear indication shall be provided of how the company met the requirements of Section 2.G. of VM-20 with respect to the grouping of policies. It shall be documented that, upon request, information may be obtained that is adequate to permit the audit of any subgroup of policies to ensure that the reserve amount calculated using a seriatim (policy-by-policy) liability model produces a reserve amount not materially higher than the reserve amount calculated using the grouped liability model.

   d. Description of the approach and rationale used to group assets and policies for the stochastic reserve calculation within each model segment if different from the approach used in paragraph 2.c.

   e. Description of the approach used to validate model calculations within each model segment for both the deterministic and stochastic models, including: how the model was evaluated for appropriateness and applicability; how the model results compare with actual historical experience; what, if any, risks are not included in the model; the extent to which correlation of different risks is reflected in the margins; and any material limitations of the model.

   f. Disclosure of the length of projection period and comments addressing the conclusion that no material amount of business remains at the end of the projection period for both the deterministic and stochastic models.

   g. Description of how reinsurance cash flows are modeled.

3. The following information regarding the mortality assumptions used by the company in determining PBR:

   a. Description of each mortality segment and the rationale for selecting the policies to include in each mortality segment.

   b. If the company sub-divides aggregate company experience into various sub-classes or mortality segments to determine company experience mortality rates, documentation that when the mortality segments are weighted together, the total number of expected claims is not less than the company experience data for the aggregate class.

   c. Description, rationale and results of applying the underwriting scoring procedure to select the industry basic table/s, including the rationale for and results of applying the underwriting scoring procedure and a summary of the analysis performed to evaluate the relationship between underwriting scoring and the anticipated mortality established for mortality segments where the mortality assumption is affected by the application of the underwriting scoring procedure.

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If underwriting-based justification not involving UCS is being applied, provide similar analysis applicable to the company's methods.

d. If company experience mortality rates for any mortality segment are not based on the experience directly applicable to the mortality segment (whether or not the data source is from the company), then provide a summary containing the following:

i. The source of data, including a detailed explanation of the appropriateness of the data, and the underlying source of data, including how the company experience mortality rates were developed, graduated and smoothed.

ii. Similarities or differences noted between policies in the mortality segment and the policies from the data source (e.g., type of underwriting, marketing channel, average policy size, etc.).

iii. Adjustments made to the experience mortality rates to account for differences between the mortality segment and the data source.

iv. The number of deaths and death claim amounts by major grouping and including: age, gender, risk class, policy duration and other relevant information.

e. If the company makes adjustments to company experience mortality rates for changes in risk selection and underwriting practices:

i. Rationale for the adjustments.

ii. A description and summary of the published medical or clinical studies used to support the adjustments.

iii. Documentation of the mathematics used to adjust the mortality.

iv. Summary of any other relevant information concerning any adjustments to the experience mortality that affected the mortality assumption.

f. Description of the method to determine the level of credibility for the company's mortality exposure period, including:

i. A summary of the level of credibility for each mortality segment, along with an indication of whether the level of credibility was determined at the mortality segment level or at a higher level using aggregate mortality experience.

g. If company experience is used, a summary of company experience mortality for each mortality segment.

h. To the extent company experience is not used, a description of the industry basic table used for each mortality segment.

i. Description of and rationale for any adjustments to the mortality assumptions for historical mortality improvement up to the valuation date.

j. Description of and rationale for any adjustments to mortality assumptions for impaired lives or policyholder behavior.

k. If company experience is used, a summary of the approach used to determine the final set of anticipated experience mortality rates, including:

i. The start and ending period of time used to grade company experience to the industry basic table, including the approach used to grade company experience mortality rates to the industry table for advanced ages (attained age 95 or 15 years after policy underwriting).

ii. Description of the industry basic table used for each mortality segment.

iii. Description and results of any smoothing technique used.

iv. Description of any adjustments that were made to ensure reasonable relationships is maintained between mortality segments that reflect the underwriting class or risk class of each mortality segment.

v. Description and justification to support and demonstrate that the resulting anticipated experience assumptions are at least as great as those expected to actually emerge. The description should include the level of granularity at which the comparison is made (e.g., ordinary life, term only, preferred term, etc.)

l. Description and rationale of any adjustments made to increase margins above the prescribed margin.

m. At least once every three years, the results of an actual to expected (without margins) analysis.

4. The following information regarding each policyholder behavior assumption used by the company in determining principle-based reserves:

a. Sources and credibility of the data and an explanation of why the data are reasonable and appropriate for this purpose.

b. Explanation of how assumptions were determined for periods that were based on less than fully credible or relevant data.

c. Description of method used to develop anticipated experience assumptions.

d. At least once every three years, the results of an actual to expected analysis.

e. Margins used, methodology used to determine the margins and rationale for the particular margins used, including how the results of sensitivity tests were used to determine the margins.

f. How changes in NGE affect the policyholder behavior assumptions.

g. Description of any scenario-dependent dynamic formula.

h. Changes in anticipated experience assumptions and/or margins since last PBR Actuarial Report.

i. For policies that give policyholders flexibility in timing and amount of premium payments, disclose results of sensitivity tests related to the following premium payment patterns: minimum premium payment, no further premium payment,

pre-payment of premium assuming a single premium and pre-payment of premiums assuming level premiums.

j. Specific to lapses, provide description of and rationale regarding adjustments to lapse and mortality assumptions to account for potential anti-selection.

k. Competitor rate definition and usage.

5. The following information regarding the expense assumptions used by the company in determining PBR:

a. Methodology used to allocate expenses to the individual life insurance policies subject to a PBR valuation.

b. Methodology used to apply the allocated expenses to model segments or sub-segments within the cash-flow model.

c. Methodology used to determine margins.

6. The following information regarding the asset assumptions used by the company in determining principle-based reserves asset assumptions:

a. The amount of starting assets supporting the policies subject to a principle-based valuation, and the method and rationale for determining such amount.

b. Method used and rationale for selecting the assets and apportioning the assets between the policies subject to PBR valuation and those policies not subject to PBR valuation.

c. Method used to determine projected market value of assets (if needed for assumed asset sales).

d. Analysis of exposure to foreign currency fluctuations.

e. Summary of the results of the steps for determining the maximum net spread adjustment factor for each model segment, including the method used to determine option adjusted spreads for each existing asset.

f. A summary of the path of net asset earned rates for each model segment calculated for the deterministic reserve.

g. Investment expense assumptions.

h. Prepayment, call and put functions.

i. If for all model segments combined, the aggregate annual statement value of starting assets is less than 98% or greater than 102% of the final aggregate minimum reserve, documentation that supports the conclusion that the aggregate minimum reserve is not materially understated as a result of the estimate of the amount of starting assets.

j. With respect to modeling of derivative programs if a company assumes that residual risks and frictional costs have a value of zero, a demonstration that a value of zero is an appropriate expectation.

k. Description of how policy loans are modeled, including documentation that if the company substitutes assets that are a proxy for policy loans, the modeled reserve produces reserves that are no less than those produced by modeling existing loan balances explicitly.

l. Description of an approach and rationale used to group general account equity investments, including non-registered indexed products, including an analysis of the proxy construction process that establishes the relationship between the investment return on the proxy and the specific equity investment category.

m. Description of the approach and rationale used to group separate account funds and subaccounts, including analysis of the proxy construction process that establishes a firm relationship between the investment return on the proxy and the specific variable funds.

n. Description of method to translate stochastic economic paths into fund performance.

o. Description of the asset investment strategy used in the model, including asset reinvestment and disinvestment assumptions, and documentation supporting the appropriateness of the model investment strategy compared to the actual investment policy of the company.

p. Documentation that the model investment strategy does not produce a modeled reserve that is less than the modeled reserve that would result by assuming an alternative investment strategy in which all fixed income reinvestment assets are public non-callable bonds with gross assets spreads, asset default costs and investment expenses by projection year that are consistent with a credit quality blend of 50% PBR credit rating of 6 (“A2/A”) and 50% PBR credit rating of 9 (“Aa2/AA”).

q. Number of scenarios used for the stochastic reserves and the rationale for that number.

r. If a scenario reduction technique is used, a description of the technique and documentation of how the company determined that the technique meets the requirements of Section 2.G. of VM-20.

7. The following information regarding the revenue-sharing assumptions used by the company in determining PBR:

a. Description of revenue-sharing agreements and the nature of any guarantees underlying the revenue-sharing income included in the projections, including: the terms and limitations of the agreements; relationship between the company and the entity providing the revenue-sharing income; benefits and risk to the company and the entity providing the revenue-sharing income of continuing the arrangement; the likelihood that the company will collect the revenue-sharing income during the term of the agreement; the ability of the company to replace the services provided by the entity providing the revenue-sharing income; and the ability of the entity providing the revenue-sharing income to replace the service provided by the company.

b. The amount of revenue-sharing income and a description of the rationale for the amount of revenue-sharing income included in the projections, including any reduction for expenses.

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c. The level of margin in the prudent estimate revenue-sharing income assumptions and description of the rationale for the margin for uncertainty.

8. The following information regarding the reinsurance assumptions used by the company in determining PBR:

a. For those reinsurance agreements included in the calculation of the minimum reserve as per VM-20 Section 8.A, a description of each reinsurance agreement, including, but not limited to, the type of agreement, the counterparty, the risks reinsured, the portion of business reinsured and whether the agreement complies with the requirements of the credit for reinsurance under the terms of the AP&P Manual.

b. Description of reinsurance assumptions used to determine the cash flows included in the model.

c. To the extent that a single deterministic valuation assumption for risk factors associated with certain provisions of reinsurance agreements will not adequately capture the risk of the company, a description of the separate stochastic analysis that was used outside the cash-flow model to quantify the impact on reinsurance cash flows to and from the company. The description should include which variables are modeled stochastically.

d. If a policy is covered by more than one reinsurance agreement, description of method to allocate reinsurance cash flows from each agreement.

e. Pursuant to VM-20 Section 8.C.14, if the company concludes that modeling the assets supporting reserves held by a counterparty is not necessary, documentation of the testing and logic leading to that conclusion.

9. The following information, where applicable, regarding the NGE assumptions used by the company in determining PBR:

a. Description of the approach used to model NGEs, including a discussion of how future NGE amounts were adjusted in scenarios to reflect changes in experience and including how lag in timing of any change in NGE relative to date of recognition of change in experience was reflected in projected NGE amounts.

b. Description of the approach to establish a margin for conservatism.

c. Description of how the company's past NGE practices and established NGE policies were reflected in projected NGE amounts.

d. Description of the following: (i) whether and how projected levels of NGEs in the model are consistent with experience assumptions used in each scenario; and (ii) whether and how policyholder behavior assumptions are consistent with the NGE are assumed in the model.

e. State if and how the provision in Section 7.C.5 of VM-20 allowing conditional exclusion of a portion of an NGE is used.

i. If used, is the provision used for any purpose other than recognition of subsidies for participating business.

ii. If this provision is being used, discuss how prevention of double

counting of assets is ensured.

Guidance Note: Examples of considerations include: (1) if the subsidy is provided by a downstream company, and the carrying value of the downstream company is reported as an asset on the company's books, where is the offsetting liability reported; or (2) if the subsidy is provided by another block of business within the company, is the subsidy included in cash-flow testing of the "other block"?

f. Description of interest crediting strategy.

10. The following information regarding the deterministic and stochastic exclusion tests, if calculated:

a. Identification and description of each group of policies using the deterministic and stochastic exclusion tests, including contract type and risk profile, and rationale for each grouping of policies.

b. For each group of policies which the company elects to exclude from stochastic reserve requirements, the stochastic exclusion test used (passing the stochastic exclusion ratio test or stochastic exclusion demonstration test, or certification that the group of policies does not contain material interest, tail or asset risk).

c. For groups of policies for which the stochastic reserve exclusion ratio test is used, results of the 16 scenarios and the test ratio.

d. For groups of policies for which the stochastic reserve demonstration method is used, the rationale for using the demonstration method and a demonstration supporting the exclusion in the initial exclusion year and at least once every three calendar years subsequent to the initial exclusion that complies with the following:

i. The demonstration shall take into account whether changing conditions over the current and two subsequent calendar years would be likely to change the conclusion to exclude the group of policies from the stochastic modeling requirement. If, as of the end of any calendar year, the company determines the minimum reserve for the group of policies no longer adequately provides for all material risks, the exclusion shall be discontinued, and the policies shall be included in the stochastic modeling calculations.

ii. The demonstration may be based on analysis from a date that precedes the initial or subsequent exclusion period.

iii. The demonstration shall provide a reasonable assurance that the stochastic reserve calculated on a stand-alone basis for only those policies subject to the stochastic modeling exclusion would not be greater than the minimum reserve for such policies.

iv. The demonstration shall provide an effective evaluation of the residual risk exposure resulting from risk mitigation techniques such as derivative programs and reinsurance.

Guidance Note: Examples of acceptable methods to demonstrate that the exclusion requirements are met for a group of policies include, but are not limited to:

a) Demonstrate that the greater of the deterministic reserve and the NPR, less any associated deferred premium asset is greater than the stochastic reserve calculated on a stand-alone basis.

b) Demonstrate that the greater of (1) the NPR less any associated premium asset and (2) the deterministic reserve is greater than the scenario reserve that results from each of a sufficient number of adverse deterministic scenarios.

c) Demonstrate that the greater of (1) NPR less any associated premium asset and (2) the deterministic reserve is greater than the stochastic reserve calculated on a stand-alone basis, but using a representative sample of policies in the stochastic modeling calculations.

d) Demonstrate that any risk characteristics that would otherwise cause the stochastic reserve calculated on a stand-alone basis to exceed the greater of (1) the NPR less any associated premium asset and (2) the deterministic reserve are not present or have been substantially eliminated through actions such as hedging, investment strategy, reinsurance or passing the risk on to the policyholder by contract provision.

e. For groups of policies for which the certification method is used, support for the certification including supporting analysis and tests.

f. For groups of policies that pass the stochastic exclusion test and for which the company chooses not to calculate stochastic reserves, the results of the deterministic exclusion test for each group of policies.

11. The following additional information:

a. The impact of individual margins on the deterministic reserve for each risk factor, or group of risk factors, that has a material impact on the deterministic reserve determined for each model segment by subtracting (i) from (ii):

i. The deterministic reserve for all policies, but with the reserve calculated based on the anticipated experience assumption for the risk factor and prudent estimate assumptions for all other risk factors.

ii. The deterministic reserve as reported.

b. An estimate of the aggregate impact of all margins on the deterministic reserve for each model segment. This shall be determined for each model segment by subtracting (i) from (ii):

i. The deterministic reserve for all policies, but with the reserve calculated based on anticipated experience assumptions for all risk factors prior to the addition of any margins.

ii. The deterministic reserves for all policies as reported.

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c. For purposes of the disclosures required in 11a and 11b above:

i. If the company believes the method used to determine anticipated experience mortality assumptions includes an implicit margin, the company can adjust the anticipated experience assumptions to remove this implicit margin. For example, to the extent the company expects mortality improvement after the valuation date, any such mortality improvement is an implicit margin and, therefore, is an acceptable adjustment to the anticipated experience assumptions for this purpose. If any such adjustment is made, the company shall document the rationale and method used to determine the anticipated experience assumption.

ii. Since the company is not required to determine an anticipated experience assumption or a prudent estimate assumption for risk factors that are prescribed for the deterministic reserve (i.e., interest rates movements, equity performance, default costs and net spreads on reinvestment assets), when determining the impact of margins, the prescribed assumption shall be deemed to be the prudent estimate assumption for the risk factor, and the company can elect to determine an anticipated experience assumption for the risk factor, based on the company's anticipated experience for the risk factor. If this is elected, the company shall document the rationale and method used to determine the anticipated experience assumption. If the mortality segments do not qualify for the simplified method to determine prudent estimate mortality assumptions, the anticipated experience assumption for mortality is the credibility adjusted experience rates.

d. An explanation of how the results of sensitivity tests and varying assumptions were used or considered in developing assumptions including a description of, results of, and action taken with respect to sensitivity tests performed.

e. A description of material risks not fully reflected in the cash-flow model used to calculate the stochastic reserve, including:

i. A description of each element of the cash-flow model for which this provision has been made in the stochastic reserve (e.g., risk factors, policy benefits, asset classes, investment strategies, risk mitigation strategies, etc.).

ii. A description of the approach used by the company to provide for these risks in the stochastic reserve outside the cash-flow model, a summary of the rationale for selecting this approach and the key assumptions justifying the underlying approach.

iii. If there is more than one model element included in this provision, clarifying whether a separate provision was determined for each element, or collectively for groups of two or more elements and explaining the methodology, supporting rationale and key assumptions for how separate provisions were combined.

f. Summary of the impact of aggregation on the stochastic reserve.

g. If the company uses a date that precedes the valuation date to calculate the reserves, the company shall explain why the use of such date will not produce a material change in the results if the results were based on the valuation date.

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Such explanation shall describe the process the qualified actuary used to determine the adjustment, the amount of the adjustment and the rationale for why the adjustments are appropriate.

h. Description of any approximations and simplifications used in reserve calculations.

12. Certifications

a. A certification from a duly authorized investment officer that the modeled asset investment strategy is consistent with the company's current investment strategy and an actuarial certification by a qualified actuary, not necessarily the same qualified actuary that has been assigned responsibility for the PBR Report or this sub-report, regarding the modeling of clearly defined hedging strategies.

b. A certification from senior management certifying that the principle-based valuation complies with VM-G (Corporate Governance Guidance for Principle-Based Reserves).

c. Certification, by the qualified actuary assigned responsibility under VM-G for a group of policies that qualifies for exclusion from the requirement to calculate a stochastic reserve under the provisions of VM-20, Section 6.B.1.a.iii, that this group of policies is not subject to material interest rate risk or asset return volatility risk.

E. PBR Actuarial Report Requirements for Variable Annuity Contracts

Guidance Note: See documentation and reporting requirements in VM-21.

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VM-50: Experience Reporting Requirements

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Section 1: Overview

A. Purpose of the Experience Reporting Requirements

The purpose of this section is to define the requirements pursuant to Section 13 of the NAIC Standard Valuation Law for the submission and analysis of the insurer data. It includes consideration of the experience reporting process, the roles of the relevant parties, and the intended use of and access to the data, and the process to protect the confidentiality of the data as outlined in the Standard Valuation Law.

B. Value of Experience Data Collection

The value includes but is not limited to:

1. PBR may require development of assumptions and margins based on company experience, industry experience or a blend of the two. The collection of experience data provides a database to establish industry experience tables or factors, including valuation tables or factors as needed.

2. The collection of experience data may assist regulators, reviewing actuaries, auditors and other parties with authorized access to the PBR Actuarial Reports to perform reasonableness checks on the appropriateness of principle-based methods and assumptions, including margins, documented in those reports.

3. The collection of experience data provides an independent check on the accuracy and completeness of company experience studies, thereby encouraging companies to establish a disciplined internal process for producing experience studies. Industry aggregate or sub-industry aggregate experience studies may assist an individual company for use in setting experience-based assumptions. As long as the confidentiality of each company's submitted results is maintained, a company may obtain results of a study on companies' submitted experience for use in formulating experience assumptions.

4. The collection of experience data will provide a basis for establishing and updating the assumptions and margins prescribed by regulators in the *Valuation Manual*.

5. The collection of experience data allows regulators to identify outliers and monitor changes in company experience factors versus a common benchmark to provide a basis for exploring issues related to those differences.

6. PBR is an emerging practice and will evolve over time. Research studies other than those contemplated at inception may be useful to improvement of the PBR process, including increasing the accuracy or efficiency of models. Since the collection of experience data will facilitate these improvements, research studies of various types should be encouraged.

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7. The collection of experience data is not intended as a substitute for a robust review of companies' methodologies or assumptions, including dialogue with companies' actuaries.

C. Principle-Based Reserving and the Need for Experience Data

1. Principle-based reserving may require development of assumptions based on company experience, industry experience or a blend of the two. Collection of industry experience data provides a database to establish industry experience tables.

2. The development of industry experience tables provides not only a basis for assumptions when company data is not available or appropriate, but also provides a comparison basis that allows the regulator to perform reasonableness checks on the appropriateness of assumptions as documented in actuarial reports.

3. The reliability of assumptions based on policy experience for PBR is founded on reliable historical data from comparable policies. As with all forms of experience data analysis, larger and more consistent statistical samples have a greater probability of producing reliable analyses of historic experience than smaller ones. To improve statistical credibility, it is necessary that experience data from multiple insurers be combined into aggregate databases.

4. To carry out this collection and pooling, insurers and regulators will rely on statistical agents. The statistical agents are expected to bring the expertise of collecting and sorting data from multiple sources into a cohesive database in a secure and efficient manner.

5. Section 14(A)5 of the Standard Valuation Law defines the data to be collected to be confidential.

6. The statutes and regulations requiring data submission generally apply to all licensed life and health companies. These companies must submit statistics as directed by this *Valuation Manual*.

Section 2: Company Experience Reporting Requirements

A. Scope

The Standard Valuation Law provides authority for this *Valuation Manual* to set experience reporting requirements with respect to business and companies within the scope of the Standard Valuation Law. These requirements will specify the business and the companies for which experience is to be reported for a calendar year.

B. Calendar Year 20XX Experience to Be Reported

1. Companies are required to report experience for their life insurance business pursuant to the life instructions contained in VM-51 Experience Reporting Formats. 2. Companies licensed only in their state of domicile may be exempted from these experience reporting requirements if allowed by the domiciliary commissioner. For studies of ordinary life mortality and policyholder behavior, companies with less than $50 million direct individual life insurance premiums, as described in Section 2.B.2 of VM-50, shall be exempted from these experience reporting requirements for the calendar year in question. This threshold for exemption shall be measured based on aggregate premium volume of all affiliated companies, shall be reviewed annually and be subject to change by the NAIC. At its option, a group of nonexempt affiliated companies may exclude from these requirements affiliated companies with less than $10 million direct individual life insurance premiums, provided that the affiliated group remains nonexempt. If a company

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receives approval from its domiciliary commissioner that any of its above lines of business have immaterial volume in force, those lines shall be exempted from these experience reporting requirements for the calendar year in question. If such a company or any of its lines of business is not exempted in any subsequent calendar year, for the latter year(s), it shall be subject to the above experience reporting requirements for the latter year(s). Additional exemptions may be granted by the NAIC, based on achieving a target level of approximately 80% of industry experience for each product line in preparing an industry experience table.

2. Business exempted from the life experience reporting requirements for calendar year 20XX includes the following:

    i. Credit life insurance.

3. Experience reporting for annuity business is not prescribed for calendar year 20XX.

4. Experience reporting for health business is not prescribed for calendar year 20XX.

5. Reinsurance assumed is excluded to avoid double-counting by the original issuer and by the reinsurer. Experience reporting requirements for policies covered under such reinsurance assumed shall be the responsibility of the ceding company that is the direct writer of such business. An exception to this requirement is in case of reinsurance assumed where the assuming company is legally responsible for all benefits and administration of such policies. For such policies, the assuming company would be responsible for the experience reporting requirements for such policies.

Section 3: Roles and Responsibilities

A. Statistical Plans and the Role of Statistical Agents

1. In most situations, designated statistical agents will collect experience data based on statistical plans as defined in the *Valuation Manual*. Unless there is a compelling reason otherwise, a particular data call will use a single statistical agent on a national basis.

2. Statistical plans are detailed instructions that define the data elements, as well as the formats and time frames for company reporting. Statistical plans are included in VM-51 of the *Valuation Manual*. These statistical plans vary by both experience type (mortality, policyholder behavior and company expense) and by product type. Statistical plans are included in the *Valuation Manual* when they are ready to be implemented. Factors to be considered in determining which statistical plans should be used include: prior use in intercompany studies, review by committees/task forces involved with principle-based valuation, review by regulators/NAIC/Life Actuarial (A) Task Force and Health Actuarial (B) Task Force, and the process of implementing principle-based valuation. Reporting formats for additional data elements will be added as necessary, in subsequent revisions to the *Valuation Manual*.

3. Data must conform to common data definitions. Standard definitions provide for stable and reliable databases and are the basis of meaningful aggregated insurance data. This will be accomplished through a uniform set of suggested minimum experience reporting requirements for all insurers.

4. Based on requirements to be developed, statistical agents may design their data collection procedures to ensure that they are able to meet these regulatory requirements. The statistical agents will provide sufficient notice to reporting companies of changes,

procedures and error tolerances to enable the companies to adequately prepare for the data submission.

5. The statistical agent will aggregate the experience of insurers using a common set of classifications and definitions to develop industry experience databases

B. Role and Responsibility of an NAIC Task Force or Working Group

1. The NAIC, perhaps through creation of a task force or working group, will be responsible for the content and maintenance of the experience reporting requirements. This task force or working group will monitor the data definitions, quality standards, appendices and reports described in the experience reporting requirements to assure that they take advantage of changes in technology and provide for new regulatory and company needs.

2. To ensure that the experience reporting requirements will continue to be useful, the NAIC task force or working group will seek to review each study on a five-year basis. The task force or working group should have regular dialogue, feedback and discussion. Such an advisory group should include a broad range of data users, including regulators, consumer representatives, members of professional actuarial organizations, large and small insurers, and insurance trade organizations.

C. Role of Other Organizations

The NAIC may ask for other organizations to play a role for one or more of the following items:

1. Consult with the statistical agent (as appropriate) in the design and implementation of the experience retrieval process.

2. Become involved in the data validation process of data intended to be used by the SOA to develop industry experience tables.

3. Analyze data provided by the statistical agent and any summarized data produced by the statistical agent.

4. Create initial experience tables and any revised tables.

5. Work with the NAIC (if needed) in the development and evaluation of requests for proposal for services related to the reporting of experience requirement.

6. Create statutory valuation tables as appropriate and necessary.

7. Determine and produce additional industry experience tables or reports that might be suggested by the data collected.

8. Work with the NAIC in developing new reporting formats and modifying current experience reporting formats.

9. Support a close working relationship among all parties having an interest in the success of the experience reporting requirement. This will increase the value of the coordinated effort, improve the speed and efficiency of the process, and increase the value of the experience reporting deliverables.

Section 4: Data Quality for Insurers and Statistical Agents

A. Requirements

1. The experience reporting requirements include two intertwined sets of requirements—one for insurers and one for statistical agents. Statistical procedures used by the statistical agents cannot easily control for errors associated with underwriting. If an underwriter misjudges the proper classification for an insured, then the "statistical system" has little chance of detecting the error unless the classification is somehow implausible.

2. These requirements only refer to data required by the experience reporting requirements.

B. Intentionally Inaccurate Coding is Prohibited

Data coding and data reporting policies prohibit coding a policy, loss, transaction or other body of data as anything other than what it is known as for data routinely reported to statistical agents. This does not preclude an insurer from booking a transaction with incomplete detail or from reporting such transactions to statistical agents, but there can be nothing that is known to be inaccurate or deceptive in the reporting. An audit of an insurer's data submitted to statistical agent(s) under a statistical plan in VM-51 can include comparison of submitted data to other company files.

C. Edit Exceptions by Statistical Agents Must Be Studied for Systematic Errors

When the cause of an edit exception is noted to be a condition that could produce systematic errors, the insurer must correct the error and respond in a timely fashion, with priority given to errors that have the largest likelihood to affect a significant amount of data. When an error is found that has affected data reported to a statistical agent, the insurer shall report the nature of the error and the nature of its likely impact to the statistical agent receiving the affected data. Retrospective correction of data subject to systematic errors shall be done when the error affects a significant amount of data that is still being used for reports to the regulator and it is reasonably practical to make the correction through the application of a computer program or a procedure applied to the entire data set without the need to manually examine more than a small number of individual records.

D. Other Data Quality Standards and Requirements Applying to Insurers and Statistical Agents

1. Statistical agents are required to apply edits and checks to data received from insurers, and insurers are required to respond to the queries presented by statistical agents. The statistical agents will provide sufficient notice to reporting companies of changes, procedures and error tolerances to enable the companies to adequately prepare for the data submission.

2. Each submission of data filed by an insurer with a statistical agent shall be balanced against a set of control totals provided by the insurer with the submission. At a minimum, these control totals shall include applicable record counts, claim counts, amounts insured and claim amounts. Any submission that does not balance (with the exception of differences due to rounding errors for dollar amounts) to the control totals shall be referred to the insurer for review and resolution.

3. Each insurer submitting experience data in response to a data call shall reconcile its statistical and financial data, with an explanation of differences, within the statistical agent's tolerances as specified in the data call.

4. Validity checks are designed to catch:

   a. Incomplete coding.

   b. Codes that are not contained within the set of possible valid codes.

c. Codes that are contained within the set of possible valid codes but are not valid in conjunction with another code.

5. It is possible that there will be incomplete coding as part of an insurer's internal data processing. It is important, however that the insurer's procedures provide for proper codes to be determined in a timely fashion so that records can be completed.

6. Where quality would not appear to be significantly compromised, statistical agents may use records with missing or invalid data if the errors do not involve a field relevant to the report. For insurers with a body of data for a state, line of business and year that fails to meet these standards, statistical agents shall use their discretion (but should still inform the regulator of key decisions made) regarding the omission of the entire body of data, including records with valid entries. Completeness of reports is desirable, but not at the risk of including a body of data that appears to have an unreasonably high chance of significant errors.

7. Completeness and validity checks are straightforward and almost always, errors detected through these checks are, in fact, errors. However, if an insurer were to attribute all of a varied book of business to a single valid class code, it is quite likely that this data would pass all completeness and validity checks.

8. Errors of a consistent nature are referred to as "systematic." Incorrect coding instructions can introduce errors of a consistent nature as input. Programming errors within the data processing system of an insurer can also produce systematic miscoding as the system converts data to the formats required for experience reporting. Most systematic errors will produce data that, when reviewed using tests designed to reveal various types of systematic errors, will appear unreasonable and likely to be in error. In addition, some individual coding errors may produce erroneous results that show up when exposures and losses are compared in a systematic fashion. Such checking often cannot, however, provide a conclusive indication that data with unusual patterns is incorrect.

9. Statistical agents shall undertake reasonability checks that include the comparison of statistical agent aggregate and company experience for class and coverage data elements for the current reporting period to company and aggregate profiles from prior periods or the current period. When reporting instructions are changed, newly reported data elements shall be examined to see that they correlate reasonably with data elements reported under the old instructions. In addition, statistical agents shall compare major data elements to statistical agent aggregates in effect at the time of reporting.

10. At a minimum, reasonability checks by statistical agents shall include:

a. When an insurer has reported all or an unusually large percentage of its data under a single or very limited number of categories.

b. When there are unusual or unlikely reporting patterns in an insurer's data.

c. When the amount of claims appears unusually high or low for the corresponding exposures.

d. When claims exist without corresponding policy values and exposures, or where loss frequencies or amounts appear unreasonable in comparison to ranges of expectation that recognize statistical fluctuation.

e. When unusual shifts in the distribution of writings occur from one reporting period to the next.

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11. If an insurer's unusual pattern under D.4.9.a, D.4.9.b or D.4.9.c is verified as accurate (that is, the reason for the apparent anomaly is an unusual mix of business), then it is not necessary that a similar pattern for the same insurer be reconfirmed year after year.

12. Individual statistical agents shall keep track of their experience with these tests and shall adjust thresholds in successive years to maintain a reasonable balance between the magnitude of errors being found and the cost to insurers.

13. Results that appear to indicate a significantly higher than average chance that a body of data may contain errors shall be reported to insurers with an explanation of the unusual finding and its possible significance. When the possible or probable errors appear to be of a significant nature, the statistical agent shall indicate to the insurer that this is a "critical indication." "Critical indications" are those that if not corrected or confirmed, would leave a significant degree of doubt whether the affected data should be used in reports to the regulator and included in industry databases. It is intended that statistical agents shall have reasonable flexibility to implement this under the direction of the regulators. Also under the direction of the regulators, statistical agents may grade the severity of indications, or they may simply identify certain indications as critical. While insurers are expected to undertake a reasonable examination of all indications provided to them, they are not required to respond to every indication except for those labeled by the statistical agent as "critical."

14. Statistical agents shall use their discretion regarding the omission of data from reports owing to the failure of an insurer to respond adequately to unusual reasonability indications. Completeness of reports is desirable, but not at the risk of including data that appears to have an unreasonably high chance of containing significant errors.

15. Insurers shall acknowledge and respond to reasonability queries from statistical agents. This shall include specific responses to all critical indications provided by the statistical agent. Other indications shall be studied for apparent errors, as well as for indications of systematic errors. Corrections for critical errors shall be provided to the statistical agent or, when a correction is not feasible, the extent and nature of the error shall be reported to the statistical agent

E. Confidentiality of Experience Data

Nothing in the experience reporting requirements is intended to require any disclosures of confidential data or materials that may violate any applicable federal or state laws, rules, regulations or court orders applicable to such data or materials.

F. Treatment of Confidential Information

1. Experience data with potentially company-identifying or personally identifiable information are confidential information pursuant to Section 14, Subsection A5 of the Standard Valuation Law. Access to such confidential information is limited to those individuals and organizations specified in subsection 2 pursuant to the confidentiality provisions of Section 14B of the Standard Valuation Law. In addition, the individuals and entities other than regulators are also subject to antitrust and conflict of interest requirements established by the NAIC task force or working group charged with this task. Compilations of experience data that do not permit identification of individual company experience or personally identifiable information are subject to request by the public as subject to approval by regulators and coordinated by the NAIC.

2. Access to the confidential information of subsection 1 is limited to:

   a. Regulators.

   b. The company to reports on data it has submitted.

   c. The statistical agent responsible for data collection. The statistical agent shall use such confidential information for the purposes of fulfilling its duties under VM-50 or as otherwise approved by the NAIC Task Force or Working Group. Any consultants to or subcontractors of the statistical agent shall be subject to regulatory approval and shall be subject to the same standards as the statistical agent.

   d. An auditor of the statistical agent.

   e. Other individuals or entities assisting the statistical agent or regulators for the purposes of fulfilling duties under VM-50 or as otherwise approved by the NAIC task force or working group. These other individuals or entities may provide services related to a variety of areas of expertise, such as assisting with performing industry experience studies, developing valuation mortality tables, data editing and data quality review. All of these other individuals and entities are subject to regulatory approval through a transparent process that includes opportunity for public comment.

G. Ownership and Maintenance of Experience Data and Statistical Reports

1. Data records submitted by companies to the statistical agent are owned by the companies submitting such data records.

2. A company may provide a waiver to the statistical agent relative to disclosure of its confidential information (e.g., mortality ratio by plan of experience).

3. The statistical agent will be responsible for maintaining data, error reports, logs and other intermediate work products, and reports for use in processing, documentation, production and reproduction of reports provided to regulators in accordance with the *Valuation Manual*. The statistical agent will be responsible for demonstrating such reproducibility at the request of the NAIC in its audit capacity over the statistical agent.

H. Reports to the State from the Statistical Agent

Each statistical agent shall provide reports that comprise the entire set of companies that report data to the statistical agent:

1. A listing of companies whose data is included in the compilations.

2. A historical report listing those insurers whose data for the statistical agent was excluded from the compilation because it fell outside of the statistical agent's tolerances for missing or invalid data, or for any other reason. The report will list such excluded companies by year for the current and the two prior annual reports and will include an indication of the exposures, number of claims and amount of claims for comparable groups of policies.

I. Failure to Meet the Standards Contained in this Section May Be Violating the Data Submission Requirements of this *Valuation Manual*

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Section 5: Reports Available From Statistical Agents: Summary

A. Introduction

1. Using the data collected under statistical plans, as defined in this *Valuation Manual*, the statistical agents produce aggregate databases as defined by this *Valuation Manual*. Statistical agents and/or other organizations assisting the statistical agent use those databases to produce industry experience tables and reports as defined in the *Valuation Manual*. To ensure continued relevance of reports, each defined data collection and resulting report structure should be reviewed for usefulness with no more than five years since initial adoption or prior review.

2. Data compilations are evaluated according to four distinct, and often competing, standards: quality, completeness, timeliness and cost. In general, quality is a primary goal in developing any statistical data report. The priorities of the other three standards vary according to the purpose of the report.

3. The NAIC may modify or enlarge the requirements of this *Valuation Manual* for information to accommodate changing needs and environments. However, in most cases, changes to existing data reporting systems will be feasible only to provide information on future transactions. Requirements to submit new information may require that companies change their systems. Also, the statistical agents may need several years before they can generate meaningful data meeting the new requirements with matching claims and insured amounts. The exact time frames for implementing new data requirements and producing reports will vary depending on the type of reports.

4. This section summarizes, generally, the data that statistical agents must maintain and produce. Subsequent sections provide the specific detailed requirements for reporting on the various lines of insurance.

B. Design of Reports Linked to Purpose

Fundamental to the design of each report is an evaluation of its purpose and use. The NAIC task force or working group should specify model reports responding to general regulatory needs. These model reports will serve the basic informational needs of state regulators. To address a particular issue or problem, a regulator may have to request to the working group that additional reports be developed.

C. Basic Report Designs

1. The NAIC task force or working group needs to designate basic types of reports to meet differing needs and time frames. Sections of VM-51 experience reporting formats provide more detailed descriptions of these reports for each specific line of insurance. Annual statistical compilations are anticipated to be the primary reports.

2. Annual statistical compilations are aggregate reports that generally match appropriate insurance amounts and claims to evaluate the historic experience for various lines of insurance, detailed by coverage and class. Although termed “annual statistical compilations,” the timing of these reports depends on the specific line of insurance. The annual statistical compilations can be either industry-wide or vary by state of domicile.

3. In addition to annual statistical compilations, regulators can specify additional reports based on elements in the statistical plans in VM-51. Regulators also can use annual statistical compilations and additional reports to evaluate non-formulaic assumptions.

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4. The NAIC task force or working group will specify the reports to be provided to the professional actuarial associations to fulfill their roles as specified in C.3. In general, the reports are expected to include the industry-wide annual statistical compilations. The number and types of reports can vary from year to year. The NAIC task force or working group will specify the data periodically obtained from the statistical plans to be provided to the SOA to fulfill its role as specified in 3.C.

D. Annual Statistical Compilations

1. Annual statistical compilations are detailed annual reports that generally match appropriate insurance amounts and claims to evaluate the historic experience of various lines of insurance. Regulators can use annual compilations to evaluate non-formulaic assumptions.

2. The timing of annual reports depends upon the basis on which data are compiled, which in turn depends on the line of insurance. Sections of VM-51 discuss specific time frames for annual reports for each line of insurance.

3. Regulators can use the annual reports to review the experience for broad categories and for individual coverages. Regulators can compare the policy experience elements and insurance payouts appearing on the reports for different coverages. Annual reports also allow regulators to review long-term trends. Aggregate results may indicate areas warranting additional investigation.

E. Supplemental Reports

1. For specific lines of business and coverages, regulators may request additional reports from statistical agents. Regulators also may request custom reports, which may contain specific data or experience not regularly produced in other reports.

2. The regulator and the statistical agents must negotiate time schedules for producing supplemental reports. The information in these reports is limited by the amount of data actually available and the manner in which they have been reported.

F. Reports to Actuarial Professional Organizations

1. The NAIC Task Force or Working Group needs to designate basic types of reports to the actuarial professional organizations to meet differing needs and time frames. These reports will be comparable to reports provided to regulators as described in C.4. Annual statistical compilations are anticipated to be the primary reports. Other reports may be requested on an as-needed basis and will be referred to as special reports.

2. Annual statistical compilations are aggregate reports that generally match appropriate insurance amounts and claims to evaluate the historic experience for various lines of insurance, detailed by coverage and class. Although termed “annual statistical compilations,” the timing of these reports depends on the specific line of insurance. The annual statistical compilations can be either industry-wide or vary by state of domicile.

3. In addition to annual statistical compilations, regulators can specify additional reports based on elements in the statistical plans in VM-51. Regulators can use both annual statistical compilations and additional reports to evaluate non-formulaic assumptions.

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VM-51: Experience Reporting Formats

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Section 1: Introduction

A. The experience reporting requirements are limited to the experience data available from statistical agents serving the primary life and health insurance industry for the following lines of insurance:

1. Life

2. Annuity

3. LTC

4. Health

B. In the first year that the *Valuation Manual* is used, the data reporting formats included in this section are in the first year of implementation.

C. New data reporting formats included in this *Valuation Manual* by July 1 of YYYY are in their first year of implementation in year YYYY+1.

D. Revisions to data reporting formats included in this Appendix by July 1 of YYYY have the revised data elements in their first year of implementation in year YYYY+1.

E. Data shall be reported gross of reinsurance ceded. Reinsurance assumed is exempt from experience reporting requirements and is not to be included.

Section 2: Individual Life insurance

A. Introduction

Individual life insurance is one of the first lines of insurance to be covered under PBR.

There are three sub-sections: mortality, policyholder behavior and expenses. The first of the subsections to be implemented is mortality.

B. Mortality

1. Company Level Information

a. The Preferred Class Structure Questionnaire is in Appendix 1.

b. The Mortality Claims Questionnaire is in Appendix 2.

c. The Additional Plan Code Form is in Appendix 3.

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2. Statistical Plan for Mortality

a. Data Instructions

Data submissions will be made annually on ordinary business issued in the U.S. The data submission is to be direct written business, and values should be prior to reinsurance ceded. The data submission should include policies issued as standard, substandard (optional) or sold within a preferred class structure. Preferred class structure means that, depending on the underwriting results, a policy could be issued in classes ranging from a best preferred class to a residual standard class. Policies issued as part of a preferred class structure are not to be classified as substandard.

Ordinary business does not include separate lines of business such as simplified issue/guaranteed issue, worksite, individually solicited group life, direct response, final expense, pre-need, home service and corporate-owned life insurance (COLI)/bank-owned life insurance (BOLI)/charity-owned life insurance (CHOLI). Policies issued as conversions from term or group policies should be included. For these converted policies, the issue date should be the issue date of the converted policy, and the underwriting field will identify them as issues resulting from conversion.

Each policy number represents a policy issued as a result of ordinary underwriting. If a single life policy, the base policy on a single life has the policy number and a segment number of 1. On a joint life policy, each life has separate records with the same policy number. The base policy on the first life has a segment number of 1, and the base policy on the second life has a segment number of 2. Policies that cover more than two lives are not to be submitted.

Term/paid up riders or additional amounts of insurance purchased through dividend options on a policy issued as a result of ordinary underwriting are to be submitted. Each rider is on a separate record with the same policy number as the base policy and a unique segment number. The details on the rider record may differ from the corresponding details on the base policy record. If underwriting in addition to the base policy underwriting is done, the coverage is given its own policy number.

Terminations (both death and non-death) are to be submitted. Terminations are to include those that occurred in the observation year and were reported by June 30 of the year after the observation year.

Plans of insurance should be carefully matched with the three-digit codes in item 19, plan. These plans of insurance are important because they will be used for not only mortality studies, but also for policyholder behavior studies such as lapse. It is expected that most policies will be matched to three-digit codes that specify a particular policy type rather than select a code that indicates a general plan type.

The statistical agent will send to companies as part of the data call detail data instructions for company level forms in Appendix 1, Appendix 2 and Appendix 3, as well as for the data format for mortality in Appendix 4.

b. Data Format

The data format for mortality on ordinary business is in Appendix 4.

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c. Data Testing and Correction

The statistical agent will provide details on checks and reports for completeness, validity and reasonability within 30 days following submission of the data. The checks will be applied to each data submission, and the company will be sent the reports on that data submission which will indicate possible errors for correction. The statistical agent(s) will provide specifications for syntax and logic checks to be performed on submitted data to insurers by Jan. 1, 20XX.

3. Data Call and Time Frame for Life Insurance Mortality

a. Each company required to submit ordinary mortality data is to submit data using the data format in Appendix 4. Each company is to submit data for all in-force individual life insurance policies except for:

i. For policies issued before Jan. 1, 1990, companies may certify that submitting data presents a hardship due to fields not readily available in their systems/databases or legacy computer systems that continue to be used for older issued policies and differ from computer systems for newer issued policies.

ii. For policies issued on or after Jan. 1, 1990, companies must: a) document the percentage that the face amount of policies excluded are relative to the face amount of submitted policies issued on or after Jan. 1, 1990; and b) certify that this requirement presents a hardship due to fields not readily available in their systems/databases or legacy computer systems that continue to be used for older issued policies and differ from computer systems for newer issued policies.

b. Ordinary life mortality data calls are anticipated to be on an annual basis. An annual data call made in a given year such as 20XX + 1 will be complied with using a calendar year method.

The calendar year method includes:

i. Policies in force during or issued during year 20XX.

ii. Terminations that were incurred in year 20XX and reported before July 1, 20XX+1.

c. Requirements for statistical plans for life insurance mortality required in this section as of the previous year:

i. Data call occurs in the second quarter.

ii. Except for the initial data call, data reporting formats or revised data elements that are in their first year of implementation, each company will provide either the data or determine how to make the data available in its systems/databases.

iii. For data reporting formats or revised data elements that are in their second or later year of implementation, each company will provide the data.

d. Company’s data submission to comply with the data call

i. Either data submissions or notification of when data submission will be made are to be given within three months after the data call.

ii. Data submissions will be given no later than Sept. 30 of the year of the data call.

iii. Corrections of data submissions will be given no later than Dec. 31 of the year of the data call.

e. Reporting of industry experience to regulators by a statistical agent

i. A list of NAIC company codes of companies whose data can be used for the aggregate reporting of industry experience will be given to regulators by Dec. 31 of the year of the data call.

ii. Reports of industry average experience will be given to regulators by March 31 of the year following the data call.

iii. If the regulator requires individual company data or reports submitted to the statistical agent, the statistical agent will send such data and/or reports to the individual company to forward to the regulator.

4. Statistical Report for Life Insurance Mortality

a. Using the data collected for the data format in Appendix 4, a statistical report will be developed that will aggregate the experience of all companies.

b. The statistical reports from the data collected under the data format should include the report in Appendix 5.

c. As long as it does not identify individual companies, an additional report will be given to states upon request that contains the business of companies domiciled in that state.

d. From time to time, it is anticipated that additional reports will be developed based on the data collected in Section 2.

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Appendix 1: Preferred Class Structure Questionnaire

PREFERRED CLASS STRUCTURE QUESTIONNAIRE

Fill out this preferred class structure questionnaire based on company-wide summaries such as underwriting guideline manuals, compilations of issue instructions or other documentation.

The purpose of this preferred class structure questionnaire is to gather information on different preferred class structures. This questionnaire varies between nonsmoker/non-tobacco and smoker/tobacco users and provides for variations by issue year, face amount and plan. If the company has the UCS information available, the company should map its set of preferred class structure to sets of UCS. ***Except for new preferred class structures or new sets of UCS applied to existing preferred class structure(s), the response to the questionnaire should remain the same from year to year.***

If a company has determined sets of UCS for its preferred class structures, it should provide separate preferred class structure responses for each set of UCS applied to a preferred class structure. If a company has not determined sets of UCS for its preferred class structures, it should fill out this questionnaire with its preferred class structures and update the preferred class structure questionnaire at such future time that sets of UCS for the preferred class structures are determined. When sets of UCS are used, there is to be a one-to-one correspondence between a preferred class structure and a set of UCS.

The information given in this questionnaire will be used both to map a set of UCS to policy level data and as a check on the policy level data submission. Submit this questionnaire along with the initial data submission to the statistical agent.

Each preferred class structure must include at least two classes (e.g., one preferred class and one standard class). Make as many copies of this preferred class structure questionnaire as necessary for your individual life business and submit in addition to policy level detail information.

Company	NAIC Company Code
Name	Date

PREFERRED CLASS STRUCTURE – Part 1 Nonsmokers/Non-Tobacco Users

Preferred class structure must have at least one preferred and one standard class. Use multiple copies of this page if needed for nonsmokers/non-tobacco users

Number of Nonsmoker/Non-Tobacco User Risk Classes

a) Issue Date Range $_{\text{Date}}$ through $_{\text{Date}}$
b) Issue Age Range $_{\text{Date}}$ through $_{\text{Date}}$
c) Face Amount Range $_{\text{Date}}$ through $_{\text{Date}}$
d) Plan Types (use three-digit codes from item 19, Plan)

Number of Nonsmoker/Non-Tobacco User Risk Classes

a) Issue Date Range $_{\text{Date}}$ through $_{\text{Date}}$
b) Issue Age Range $_{\text{Date}}$ through $_{\text{Date}}$
c) Face Amount Range $_{\text{Date}}$ through $_{\text{Date}}$
d) Plan Types (use three-digit codes from item 19, Plan)

Number of Nonsmoker/Non-Tobacco User Risk Classes

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a) Issue Date Range $_{Date}$ through $_{Date}$
b) Issue Age Range $_{Date}$ through $_{Date}$
c) Face Amount Range $_{Date}$ through $_{Date}$
d) Plan Types (use three-digit codes from item 19, Plan)

Number of Nonsmoker/Non-Tobacco User Risk Classes

a) Issue Date Range $_{Date}$ through $_{Date}$
b) Issue Age Range $_{Date}$ through $_{Date}$
c) Face Amount Range $_{Date}$ through $_{Date}$
d) Plan Types (use three-digit codes from item 19, Plan)

Number of Nonsmoker/Non-Tobacco User Risk Classes

a) Issue Date Range $_{Date}$ through $_{Date}$
b) Issue Age Range $_{Date}$ through $_{Date}$
c) Face Amount Range $_{Date}$ through $_{Date}$
d) Plan Types (use three-digit codes from item 19, Plan)

PREFERRED CLASS STRUCTURE – Part 2 Smokers/Tobacco Users

Preferred class structure must have at least one preferred and one standard class. Use multiple copies of this page if needed for smokers/tobacco users

Number of Smoker/Tobacco User Risk Classes

a) Issue Date Range $_{Date}$ through $_{Date}$
b) Issue Age Range $_{Date}$ through $_{Date}$
c) Face Amount Range $_{Date}$ through $_{Date}$
d) Plan Types (use three-digit codes from item 19, Plan)

Number of Smoker/Tobacco User Risk Classes

a) Issue Date Range $_{Date}$ through $_{Date}$
b) Issue Age Range $_{Date}$ through $_{Date}$
c) Face Amount Range $_{Date}$ through $_{Date}$
d) Plan Types (use three-digit codes from item 19, Plan)

Number of Smoker/Tobacco User Risk Classes

a) Issue Date Range $_{Date}$ through $_{Date}$
b) Issue Age Range $_{Date}$ through $_{Date}$
c) Face Amount Range $_{Date}$ through $_{Date}$
d) Plan Types (use three-digit codes from item 19, Plan)

Number of Smoker/Tobacco User Risk Classes

a) Issue Date Range $_{Date}$ through $_{Date}$
b) Issue Age Range $_{Date}$ through $_{Date}$
c) Face Amount Range $_{Date}$ through $_{Date}$
d) Plan Types (use three-digit codes from item 19, Plan)

Number of Smoker/Tobacco User Risk Classes

a) Issue Date Range $_{Date}$ through $_{Date}$
b) Issue Age Range $_{Date}$ through $_{Date}$

c) Face Amount Range $_{Date}$ through $_{Date}$
d) Plan Types (use three-digit codes from item 19, Plan)

Number of Smoker/Tobacco User Risk Classes

a) Issue Date Range $_{Date}$ through $_{Date}$
b) Issue Age Range $_{Date}$ through $_{Date}$
c) Face Amount Range $_{Date}$ through $_{Date}$
d) Plan Types (use three-digit codes from item 19, Plan)

Appendix 2: Mortality Claims Questionnaire

MORTALITY CLAIMS QUESTIONNAIRE

The purpose of this mortality claims questionnaire is for a company to respond to the questions whether or not it is submitting death clam data as specified. If the company is not submitting death claim data as specified, provide the additional detail requested.

Fill out this questionnaire for your individual life business and submit in addition to policy level information.

Company	NAIC Company Code
Name	Date

MORTALITY CLAIMS

1. If the data is provided using a reporting run-out that is other than six months, what run-out period was used? mm/dd/yyyy

2. The death claim amounts are to be for the total face amount and on a gross basis (before reinsurance). The data is based on:

   a. Total face amount (for policies that include the cash value in addition to the face amount as a death benefit, use only the face amount) as specified OR

      Other (describe):

      If not as specified, indicate time period for which this occurred _____ - _____

   b. Gross basis (before reinsurance) as specified OR □ Other (describe):

      If not as specified, indicate time period for which this occurred: _____ - _____

      Is this the same basis used for face amounts included in the study data? □ Yes □ No

3. The date that the termination is reported is to be used for the termination reported date. The date that the termination actually occurred is to be used for the actual termination date. What dates are used for death claims in the study data with respect to?

   a) Termination reported date
      If not reported date, indicate basis for dates provided — □ Reported date □ Other (describe):

   b) Actual termination date for death claims: □ Date of death □ Other (describe):

      If not date of death, indicate basis for dates provided

4. Death claims pending at the end of the observation period but paid during the subsequent six months following the observation year are to be included in the data submission. Claims that are still pending at the end of the six month run out are to be included.

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Are such pending claims included in the study data? □ Yes □ No:

If no indicate time period for which this occurred: _____

5. The face amounts and death claim amounts are to be included without capping by amount. Are the face amounts and death claims/exposures included without capping by amount?

□ Yes No

If No, describe how face amounts and death claims are capped and at what amount the capping is being done.

6. For death claims on policies issued before 1990:

Are death claims matched up to a corresponding in-force policy? □ Yes □ No

If no, indicate approach used:

7. Please briefly describe any other unique aspects of the death claims data that are not covered above.

Appendix 3: Additional Plan Code Form

If you need an additional plan code(s) for a product(s) in addition to those plan codes in Item 19, Plan, of the statistical plan for life insurance mortality, fill in this form using plan codes in the range 200 to 999. Your data submission should reflect the plan codes in this form. Make as many copies as necessary for your individual life business and submit in addition to policy level information. When this form is used, it must be sent to the statistical agent at the time that data is submitted.

Completed by: _____ Title: _____

Company:_____ NAIC Company Code: _____ Date: _____

Phone Number: _____ Email:_____

Add comments or attachments where necessary.

Enter unique three-digit plan codes for each product.

Plan Code For Product I	Plan Code for Product II	Plan Code for Product III

Enter specific plan names for each product.

A. General Product Information

	Product I	Product II	Product III
1. In what year was each product introduced?			
2. Briefly describe the product.	_____ _____	_____ _____	_____ _____
3. Enter three-digit plan code in the range 200 to 999.			

B. For the products listed, please fit each product into one of the categories below.

Categories for Product I		Categories for Product II		Categories for Product III	
1	Traditional Whole Life Plans	1	Traditional Whole Life Plans	1	Traditional Whole Life Plans
2	Term Insurance Plans	2	Term Insurance Plans	2	Term Insurance Plans
3	Universal Life Plans	3	Universal Life Plans	3	Universal Life Plans
4	Universal Life Plans with Secondary Guarantees	4	Universal Life Plans with Secondary Guarantees	4	Universal Life Plans with Secondary Guarantees
5	Variable Life Plans	5	Variable Life Plans	5	Variable Life Plans
6	Variable Life Plans with Secondary Guarantees	6	Variable Life Plans with Secondary Guarantees	6	Variable Life Plans with Secondary Guarantees
7	Nonforfeiture	7	Nonforfeiture	7	Nonforfeiture
8	Other	8	Other	8	Other

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Appendix 4: Mortality Data Format

ITEM	COLUMN	L	DATA ELEMENT	DESCRIPTION
1	1–5	5	NAIC Company Code	Your NAIC Company Code
2	6–9	4	Observation Year	Enter calendar year of observation
3	10–29	20	Policy Number	Enter policy number. For policy numbers with length less than 20, left justify the number, and blank fill the empty columns. Any other unique identifying number can be used instead of a policy number for privacy reasons.
4	30–32	3	Segment Number	If only one policy segment exists, enter segment number '1.' For a single life policy, the base policy is to be put in the record with segment number '1.' Subsequent policy segments are in separate records with information about that coverage and differing segment numbers. For joint life policies, the base policy of the first life is to be put in a record with segment number '1,' and the base policy of the second life is to be put in a separate record with segment number '2.' Joint life policies with more than two lives are not to be submitted. Subsequent policy segments are in separate record with information about that coverage and differing segment numbers. If they have the same underwriting evaluation, policy segments with the same policy number are to be submitted for: c) Single life policies. d) Joint life policies. e) Term/paid up riders. f) Purchase of additional amounts of insurance through dividend options.
5	33–34	2	State of Issue	Use standard, two-letter state abbreviation codes (e.g., NY for New York)
6	35	1	Gender	0 = Unknown or unable to subdivide 1 = Male 2 = Female 3 = Unisex – Unknown or unable to identify 4 = Unisex – Male 5 = Unisex – Female
7	36–43	8	Date of Birth	Enter the numeric data of birth in YYYYMMDD format
8	44	1	Age Basis	0 = Age Nearest Birthday 1 = Age Last Birthday 2 = Age Next birthday
9	45–47	3	Issue Age	Enter the insurance issue age
10	48–55	8	Issue Date	Enter the numeric calendar year in YYYYMMDD format. If a converted policy, use the issue date of the converted policy.

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ITEM	COLUMN	L	DATA ELEMENT	DESCRIPTION
11	56	1	Smoker Status (at issue)	Smoker status should be submitted where reliable. 0 = Unknown 1 = No tobacco usage 2 = Nonsmoker 3 = Cigarette smoker 4 = Tobacco user
12	57	1	Preferred Indicator	0 = If no reliable information on multiple preferred and standard classes is available or if the policy segment was issued substandard or if there were no multiple preferred and standard classes available for this policy segment. 1 = If this policy was issued in one of the available multiple preferred and standard classes for this policy segment. Note: If preferred indicator is 0, leave next four items blank.
13	58	1	Number of Classes in Nonsmoker Preferred Class Structure	If preferred indicator is 0 or if smoker status is 0, 3 or 4, leave blank. For nonsmoker or no tobacco usage policies that could have been issued as one of multiple preferred and standard classes, enter the number of nonsmoker preferred and standard classes at time of issue.
14	59	1	Nonsmoker Preferred Class	If preferred indicator is 0 or if smoker status is 0, 3 or 4, leave blank. For nonsmoker policy segments that could have been issued as one of multiple preferred and standard classes: 0 = Unknown preferred or standard class 1 = Best preferred class 2 = Next Best preferred class after 1 3 = Next Best preferred class after 2 4 = Next Best preferred class after 3 5 = Next Best preferred class after 4 6 = Next Best preferred class after 5 7 = Next Best preferred class after 6 8 = Next Best preferred class after 7 9 = Next Best preferred class after 8 Note: The policy segment with the highest nonsmoker preferred class number should have that number equal to the number of classes in nonsmoker preferred class structure.
15	60	1	Number of Classes in Smoker Preferred Class Structure	If preferred indicator is 0 or if smoker status is 0, 1 or 2, leave blank. For smoker or tobacco user policies that could have been issued as one of multiple preferred and standard classes, enter the number of smoker preferred and standard classes available at time of issue.

ITEM	COLUMN	L	DATA ELEMENT	DESCRIPTION
16	61	1	Smoker Preferred Class	If preferred indicator is 0 or if smoker status is 0, 1 or 2, leave blank. For smoker policy segments that could have been issued as one of multiple preferred and standard classes: 0 = Unknown preferred or standard class 1 = Best preferred class 2 = Next Best preferred class after 1 3 = Next Best preferred class after 2 4 = Next Best preferred class after 3 5 = Next Best preferred class after 4 6 = Next Best preferred class after 5 7 = Next Best preferred class after 6 8 = Next Best preferred class after 7 9 = Next Best preferred class after 8 Note: The policy segment with the highest smoker preferred class number should have that number equal to the number of classes in smoker preferred class structure.
17	62–63	2	Type of Underwriting Requirements	If underwriting requirement of ordinary business is reliably known, use code other than "99." Ordinary business does not include separate lines of business such as simplified issue/guaranteed issue, worksite, individually solicited group life, direct response, final expense, pre-need, home service and COLI/BOLI/CHOLI. 01 = Underwritten 06 = Term Conversion 07 = Group Conversion 09 = Not Underwritten 99 = For issues where underwriting requirement unknown or unable to subdivide
18	64	1	Substandard Indicator	0 = Policy segment is not substandard 1 = Policy segment is substandard 2 = Policy segment is uninsurable Note: a. All policies that are not substandard need to be identified. b. Submission of substandard policies is optional. c. If feasible, identify substandard policy segments where temporary flat extra has ceased to be substandard.

ITEM	COLUMN	L	DATA ELEMENT	DESCRIPTION
19	65–67	3	Plan	Exclude from contribution: spouse and children under family policies or riders. If form for additional plan codes was submitted for this policy, enter unique three-digit plan number (s) that differ from the plan numbers below: 000 = If unable to distinguish among plan types listed below: **Traditional Whole Life Plans:** 010 = Traditional fixed premium fixed benefit permanent plan 011 = Permanent life (traditional) with term 012 = Single premium whole life 013 = Econolife (permanent life with lower premiums in the earlier durations) 015 = First to die whole life plan (submit separate records for each life) 016 = Second to die whole life plan (submit separate records for each life) 017 = Joint whole life plan unknown whether 015 or 016 (submit separate records for each life) 018 = Permanent products with non-level death benefits 019 = Permanent plans 010, 011, 012, 013, 015, 016, 017, 018 combined (i.e. unable to separate) **Term Insurance Plans** 020 = Term (traditional level benefit and attained age premium) 021 = Term (level death benefit with guaranteed level premium for five years) 022 = Term (level death benefit with guaranteed level premium for 10 years) 023 = Term (level death benefit with guaranteed level premium for 15 years) 024 = Term (level death benefit with guaranteed level premium for 20 years) 025 = Term (level death benefit with guaranteed level premium for 25 years) 026 = Term (level death benefit with guaranteed level premium for 30 years) 027 = Term (level death benefit with guaranteed level premium for period other than five, 10, 15, 20, 25 or 30 years) 028 = Term (decreasing benefit) 040 = Select ultimate term (premium depends on issue age and duration) 041 = Return of premium term (level death benefit with guaranteed level premium for 15 years) 042 = Return of premium term (level death benefit with guaranteed level premium for 20 years) 043 = Return of premium term (level death benefit with guaranteed level premium for 25 years) 044 = Return of premium term (level death benefit with guaranteed level premium for 30 years) 045 = Return of premium term (level death benefit with guaranteed level premium for period other than 15, 20, 25 or 30 years) 046 = Economatic term

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				059 = Term plans, unable to classify **Universal Life Plans:** 061 = Single premium universal life 062 = Universal life (decreasing risk amount) 063 = Universal life (level risk amount) 064 = Universal life (unknown whether code 062 or 063) 065 = First to die universal life plan (submit separate records for each life) 066 = Second to die universal life plan (submit separate records for each life) 067 = Joint life universal life plan unknown whether code 065 or 066 (submit separate records for each life) **Universal Life Plans with Secondary Guarantees:** 071 = Single premium universal life with secondary guarantees 072 = Universal life with secondary guarantees (decreasing risk amount) 073 = Universal life with secondary guarantees (level risk amount) 074 = Universal life with secondary guarantees (unknown whether code 072 or 073) 075 = First to die universal life plan with secondary guarantees (submit separate records for each life) 076 = Second to die universal life plan with secondary guarantees (submit separate records for each life) 077 = Joint life universal life plan with secondary guarantees unknown whether code 075 or 076 (submit separate records for each life) **Variable Life Plans** 080 = Variable life 081 = Variable universal life (decreasing risk amount) 082 = Variable universal life (level risk amount) 083 = Variable universal life (unknown whether code 081 or 082) 084 = First to die variable universal life plan (submit separate records for each life) 085 = Second to die variable universal life plan (submit separate records for each life) 086 = Joint life variable universal life plan unknown whether code 084 or 085 (submit separate records for each life) **Variable Life Plans with Secondary Guarantees** 090 = Variable life with secondary guarantees 091 = Variable universal life with secondary guarantees (decreasing risk amount) 092 Variable universal life with secondary guarantees (level risk amount) 093 = Variable universal life with secondary guarantees (unknown whether code 091 or 092) 094 = First to die variable universal life plan with secondary guarantees (submit separate records for each life) 095 = Second to die variable universal life plan with secondary guarantees (submit separate records for each life)

				096 = Joint life variable universal life plan with secondary guarantees unknown whether code 094 or 095 (submit separate records for each life) **Nonforfeiture** 098 = Extended term 099 = Reduced paid-up
20	68	1	In-force Indicator	0 = If the policy segment was not in force at the end of the calendar year of observation 1 = If the policy segment was in force at the end of the calendar year observation
21	69–80	12	Face Amount of Insurance at Issue	Face amount of the policy segment at its issue date rounded to nearest dollar. If policy provides payment of cash value in addition to face amount, include face amount, and do not include cash value.
22	81–92	12	Face Amount of Insurance at the Beginning of the Observation Year	Face amount of the policy segment at the beginning of the calendar year of observation rounded to nearest dollar. If policy provides payment of cash value in addition to face amount, include face amount, and do not include cash value.
23	93–104	12	Face Amount of Insurance at the End of the Observation Year	Face amount of the policy segment at the end of the calendar year of observation rounded to nearest dollar. If policy provides payment of cash value in addition to face amount, include face amount, and do not include cash value. If in-force indicator is 0, enter face amount of the policy segment at the time of termination, if available: otherwise, enter 0.
24	105–116	12	Death Claim Amount	If in-force indicator is 1, leave blank. Death claim amount rounded to the nearest dollar. If in-force indicator is 0 and cause of termination is ‘04,’ then face amount. If in-force indicator is 0 and cause of termination is not ’04,’ then 0 (zero). If the policy provides payment of cash value in addition to face amount, include face amount, and do not include cash value.
25	117–124	8	Termination Reported Date	If the in-force indicator is 1, leave blank. Enter in the format YYYYMMDD the eight-digit calendar date that termination was reported.
26	125–132	8	Actual Termination Date	If in-force indicator is 1, leave blank. Enter in the format YYYYMMDD the eight-digit calendar date when the termination occurred. If termination due to death (cause of termination is 04), enter actual date of death. If termination is lapse due to non-payment of premium (cause of termination is 14), enter the last day the premium was paid to.
27	133–134	2	Cause of Termination	If in-force indicator is 1, leave blank.

				00 = Termination type unknown or unable to subdivide 01 = Reduced Paid-Up 02 = Extended term 03 = Voluntary unable to subdivide among 01, 02, 07, 09, 10, 11 or 13 04 = Death 07 = 1035 exchange 09 = Term conversion (unknown whether attained age or original age) 10 = Attained age term conversion 11 = Original age term conversion 12 = Coverage expired or contract reached end of the mortality table 13 = Surrendered for full cash value 14 = Lapse

Appendix 5: Mortality Statistical Report will be published when available

Appendix 6: Policyholder Behavior Data Format

28	135–144	10	Level Term Annualized Premium at Issue	For each segment of level term insurance plans with plan codes 021 through 045 or 211 through 271 of Item 19, Plan, of VM-51 Appendix 4 – Mortality Format, enter the annualized premium set at issue. 30If unknown, leave this field blank.
29	145–154	10	Term Annualized Premium at the Beginning of Observation Year	For segments with plan codes 021 through 045 or 211 through 271 of Item 19, Plan, of VM-51 Appendix 4 – Mortality Format, enter the annualized premium for the policy year that includes the beginning of the observation year. Round to the nearest dollar. If there is no premium, leave this field blank.
30	155–164	10	Term Annualized Premium at the End of Observation Year/Actual Termination Date	For segments with plan codes 021 through 045 or 211 through 271 of Item 19, Plan, of VM-51 Appendix 4 – Mortality Format, enter the annualized premium for the policy year that includes either: 1) the end of the observation year; or 2) the actual termination date. Round to the nearest dollar. If there is no premium, leave this field blank.
31	165–166	2	Premium Mode	01 = Annual 02 = Semiannual 03 = Quarterly 04 = Monthly Bill Sent 05 = Monthly Automatic Payment 06 = Semimonthly 07 = Biweekly 08 = Weekly 09 = Single Premium 10 = Other / Unknown

Note: For Appendix 6 – Policyholder Behavior Format, all of the other items that had been in the exposed version of Appendix 6 – Policyholder Behavior Format have been deleted.

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VM-A: Appendix A – Requirements

Unless otherwise noted, this appendix references the following reserve requirements from Appendix A of the *Accounting Practices and Procedures Manual* which are to be used for policies issued on and after the *Valuation Manual* operative date unless otherwise provided for in the *Valuation Manual*.

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Reference	TITLE
A-200	Separate Accounts Funding Guaranteed Minimum Benefits Under Group Contracts
A-235	Interest-Indexed Annuity Contracts
A-250	Variable Annuities
A-255	Modified Guaranteed Annuities
A-270	Variable Life Insurance
A-585	Universal Life Insurance
A-588	Modified Guaranteed Life Insurance
A-620	Accelerated Benefits
A-641	Long-Term Care Insurance
A-695	Synthetic Guaranteed Investment Contracts
A-785	Credit for Reinsurance
A-791	Life and Health Reinsurance Agreements
A-812	Smoker/Nonsmoker Mortality Tables for Use in Determining Minimum Reserve Liabilities
VM-A-814	*Recognition of the 2001 CSO Mortality Table for Use in Determining Minimum Reserve Liabilities and Nonforfeiture Benefits Model Regulation* (Model #814, NAIC adoption 2002)
A-815	Model Regulation Permitting the Recognition of Preferred Mortality Tables for Use in Determining Minimum Reserve Liabilities
A-817	Preneed Life Insurance Minimum Standards
A-820	Minimum Life and Annuities Reserve Standards
A-821	Annuity Mortality Table for Use in Determining Reserve Liabilities for Annuities
A-830	Valuation of Life Insurance Policies (Including the Introduction and Use of New Select Mortality Factors)

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VM-C: Appendix C – Actuarial Guidelines

Guidance Note: This appendix references the following reserve requirements from Appendix C of the AP&P Manual, which are to be used for policies issued on and after the *Valuation Manual* operative date unless otherwise provided for in Section II, *Reserve Requirements*.

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II	Reserve Requirements With Respect to Interest Rate Guidelines on Active Life Funds Held Relative to Group Annuity Contracts
IV	Actuarial Interpretation Regarding Minimum Reserves for Certain Forms of Term Life Insurance
V	Interpretation Regarding Acceptable Approximations for Continuous Functions
VI	Interpretation Regarding Use of Single Life or Joint Life Mortality Tables Draft 20 June 1983
VII	Interpretation Regarding Calculations of Equivalent Level Amounts
VIII	The Valuation of Individual Single Premium Deferred Annuities
IX	Form Classification of Individual Single Premium Immediate Annuities for Application of the Valuation and Nonforfeiture Laws
IX-A	Use of Substandard Annuity Mortality Tables in Valuing Impaired Lives Under Structured Settlements
IX-B	Clarification of Methods Under Standard Valuation Law for Individual Single Premium Immediate Annuities, Any Deferred Payments Associated Therewith, Some Deferred Annuities and Structured Settlements Contracts
IX-C	Use of Substandard Annuity Mortality Tables in Valuing Impaired Lives Under Individual Single Premium Immediate Annuities
XIII	Guideline Concerning the Commissioners' Annuity Reserve Valuation Method
XIV	Surveillance Procedure for Review of the Actuarial Opinion for Life and Health Insurers
XVI	Calculation of CRVM Reserves on Select Mortality and/or Split Interest
XVII	Calculation of CRVM Reserves When Death Benefits are not Level
XVIII	Calculation of CRVM Reserves on Semi-Continuous, Fully Continuous or Discounted Continuous Basis
XIX	1980 CSO Mortality Table With Ten-Year Select Mortality Factors
XX	Joint Life Functions for 1980 CSO Mortality Table
XXI	Calculation of CRVM Reserves When (B) is Greater Than (a) and Some Rules for Determination of (a)
XXIII	Guideline Concerning Variable Life Insurance Separate Account Investments
XXV	Calculation of Minimum Reserves and Minimum Nonforfeiture Values for Policies With Guaranteed Increasing Death Benefits Based on an Index
XXVI	Election of Operative Dates Under Standard Valuation Law and Standard Nonforfeiture Law
XXVII	Accelerated Benefits
XXVIII	Statutory Claim Reserves For Group Long-Term Disability Contracts With a Survivor Income Benefit Provision
XXIX	Guideline Concerning Reserves of Companies in Rehabilitation
XXX	Guideline for the Application of Plan Type to Guaranteed Interest Contracts (GICS) With Benefit Responsive Payment Provisions Used to Fund Employee Benefit Plans
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Guideline No.	TITLE
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XLI	Projection of Guaranteed Nonforfeiture Benefits under CARVM
XLII	The Application of the Model Regulation Permitting the Recognition of Preferred Mortality Tables for Use in Determining Minimum Reserve Liabilities
XLIV	Group Term Life Waiver of Premium Disabled Life Reserves
XLVI	Interpretation of the Calculation of the Segment Length With Respect to the Life Insurance Policies Model Regulation upon a Change in the Valuation Mortality Rates Subsequent to Issue
AG App	Appendix to Guidelines – New York State Insurance Department – Maximum Reserve Valuation and Maximum Life Policy Nonforfeiture Interest Rates

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VM-G: Appendix G – Corporate Governance Guidance for Principle-Based Reserves

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Section 2: Guidance for the Board G-2
Section 3: Guidance for Senior Management G-2
Section 4: Responsibilities of Qualified Actuaries G-4

Section 1: Introduction, Definition and Scope

A. A principle-based approach to the calculation of reserves places the responsibility for actuarial and financial assumptions with respect to the determination of sufficient reserves on individual companies, as compared with reserves determined strictly according to formulas prescribed by regulators. This responsibility requires that sufficient measures are established for oversight of the function related to principle-based reserves.

The corporate governance guidance provided in VM-G is applicable only to a PBR valuation calculated according to methods defined in VM-20 and VM-21.

Guidance Note: Given requirements in AG 43 are intended to be the same as those in VM-21, if a company chooses to aggregate business subject to AG 43 with business subject to VM-21 in calculating the reserve, then the provisions in VM-G apply to this aggregate PBR valuation.

B. In carrying out the responsibility described in subsection A above for each group of policies and contracts subject to

Section 12 of VM-05, NAIC Model Standard Valuation Law, the company shall assign to one or more qualified actuaries the responsibilities indicated in Sections 4.A.

C. For the purposes of VM-G:

1. The term “group of insurance companies” means a set of insurance companies in a holding company system (for purposes of applicable insurance holding company system acts) that is designated as a group of insurance companies by the senior management of any holding company that is a holding company of all the insurance companies in such set of insurance companies.

2. The terms “board” and “board of directors” mean: (a) the board of an insurance company that has not been designated to be part of a group of insurance companies; or (b) the board of a single company within a group of insurance companies that is designated by the senior management of any holding company of all the insurance companies in such group of insurance companies, or a committee of such board, consisting of members of such board, duly appointed by such board and authorized by such board to perform functions substantially similar to those described in this section.

Guidance Note: The group of companies is a group of life insurers designated by senior management for purposes of managing the PBR process, and the board is the appropriate board responsible for those companies.

3. The term “senior management” includes the highest ranking officers of an insurance company or group of insurance companies with responsibilities for operating results, risk assessment and financial reporting (e.g., the chief executive officer [CEO], chief financial officer [CFO], chief actuary and chief risk officer [CRO]) and such other senior officers as may be designated by the insurance company or group of insurance companies.

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D. Section 2 and section 3 below, while not expanding the existing legal duties of a company's board of directors and senior management, provides guidance that focuses on their roles in the context of PBR valuations.

While existing governance standards encompass adequate and appropriate standards for oversight of PBR, section 2 and section 3 below describe guidance for the roles of the board of directors and senior management, in light of their existing duties as applied in the context of PBR. It is not intended to create new duties but rather to emphasize and clarify how their duties apply to the PBR actuarial valuation function of an insurance company or group of insurance companies. To the extent that any law or regulation conflicts with the guidance described herein, such other law or regulation shall prevail, and the conflicting parts of this section VM-G shall not apply.

Section 2: Guidance for the Board

A. Commensurate with the materiality of PBR in relationship to the overall risks borne by the insurance company and consistent with its oversight role, the board is responsible for:

1. Overseeing the process undertaken by senior management to identify, and correct where needed, any material weakness in the internal controls of the insurance company or group of insurance companies with respect to a PBR valuation.

2. Overseeing the infrastructure (consisting of policies, procedures, controls and resources) in place to implement PBR valuation processes.

3. Receiving and reviewing the reports and certifications referenced in Section 3.A.6.

4. Interacting with senior management to resolve questions and collect additional information as the board requests.

5. Documenting the review and actions undertaken by the board, relating to the PBR valuation function, in the minutes of all board meetings where such function is discussed.

Section 3: Guidance for Senior Management

A. Senior management is responsible for directing the implementation and ongoing operation of the principle-based valuation function. This includes:

1. Ensuring that an adequate infrastructure (consisting of the policies, procedures, controls, and resources) has been established to implement the PBR valuation function.

2. Reviewing the elements of the PBR valuation (consisting of the assumptions, methods and models used to determine PBR of the insurance company or group of insurance companies) that have been put in place, and whether these elements of the PBR valuation appear to be consistent with, but not necessarily identical to, those for other company risk assessment processes, while recognizing potential differences in financial reporting structures and any prescribed assumptions or methods.

3. Reviewing and addressing any significant and unusual issues and/or findings in light of the results of the PBR valuation processes and applicable sensitivity tests of the insurance company or group of insurance companies.

4. Ensuring the adoption of internal controls with respect to the PBR valuations of the insurance company or group of insurance companies that are designed to provide reasonable assurance that all material risks inherent in the liabilities and assets subject to such valuations are included, and that such valuations are made in accordance with the

Valuation Manual and regulatory requirements and actuarial standards. Senior management is responsible for ensuring that an annual evaluation is made of such internal controls and for communicating the results of that evaluation to the board of directors.

5. Determining that:

   a. Resources are adequate to carry out the modeling function with skill and competence.

   b. A process exists that ensures that models and procedures produce the intended results relative to the principle-based valuation objectives as outlined in Section 12.A of the Standard Valuation Law.

   c. A process exists that validates data for determination of model input assumptions, other than input assumptions that are prescribed in law, regulation or the *Valuation Manual* for use in determining PBR.

   d. A process exists that is appropriately designed to ensure that model input is appropriate given the experience of the insurance company or group of insurance companies, other than model inputs that are prescribed in law, regulation or the *Valuation Manual* for use in determining PBR.

   e. A process exists that reviews PBR valuations to find and limit material errors and material weaknesses (such process (a) to provide a credible ongoing effort to improve model performance where material errors and weaknesses exist, and (b) to include a regular cycle of model validation that includes monitoring of model performance and stability, review of model relationships and testing of model outputs against outcomes).

   f. A review procedure and basis for reliance on PBR valuation processes has been established that includes consideration of reporting on the adequacy of PBR, the implementation of policies, reporting and internal controls, and the work of the appointed actuary.

6. Facilitating the board's oversight role by reporting to the board, no less frequently than annually, regarding such matters as:

   a. The infrastructure (consisting of the policies, procedures, controls and resources) that senior management has established to support the PBR actuarial valuation function.

   b. The critical risk elements of the valuation as applicable—related to the assumptions, methods and models—and their relationship to those for other risk assessment processes, noting differences in financial reporting structures and any prescribed assumptions or methods.

   c. The level of knowledge and experience of senior management personnel responsible for monitoring, controlling and auditing PBR.

   d. Reports related to governance of PBR, including:

      i. The certification of the effectiveness of internal controls with respect to the PBR, as provided in section 12.B.(2) of the Standard Valuation Law.

ii. The certification from a duly authorized investment officer that the modeled asset investment strategy is consistent with the company's current investment strategy and the actuarial certification regarding the modeling of clearly defined hedging strategies, as provided in section 3.E.(13) of VM-31.

Section 4: Responsibilities of Qualified Actuaries

A. The responsibilities assigned by the company to one or more qualified actuaries with respect to a group of policies or contracts under section 1.B are:

1. The responsibility for overseeing the calculation of principle-based reserves for that group of policies or contracts;

2. The responsibility for verifying that:

a. The assumptions, methods and models that are used in determining PBR; and

b. The company's documented internal standards used in the PBR valuation processes, the company's documented internal controls and documentation used for such reserves,

appropriately reflect the requirements of the *Valuation Manual* for that group of policies or contracts. In particular, the qualified actuaries are required to certify that the assumptions used in the PBR valuation, other than assumptions that are prescribed in the *Valuation Manual* or by law or regulation, or that pertain to risk factors that are modeled stochastically, are prudent estimates, as defined in VM-01, with appropriate margins. The qualified actuaries are not required to verify the appropriateness of any prescribed assumptions, methods or models but are required to verify that they are being used as required.

3. The responsibility for providing a summary report to the board and to senior management on the valuation processes used to determine and test PBR, the PBR valuation results, the general level of conservatism incorporated into the company's PBR, the materiality of PBR in relationship to the overall liabilities of the company, and significant and unusual issues and/or findings.

4. The responsibility for preparing the PBR Actuarial Report with respect to that group of policies or contracts, as described in VM-31.

5. The responsibility for disclosing to the company's external auditors and regulators any significant unresolved issues regarding the company's PBR held with respect to that group of policies or contracts.

B. A qualified actuary assigned responsibilities under Section 1.B with respect to a group of policies or contracts may be required to make any certification required by the *Valuation Manual*, but is not required, except in regards to any responsibilities he or she may have as the appointed actuary under VM-30, to opine upon or certify the adequacy of the aggregate reserve for that group of policies or contracts, the company's surplus or the company's future financial condition.

C. The responsibilities of the appointed actuary are described in VM-30.

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VM-M: APPENDIX M MORTALITY TABLES

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Section 1: Valuation Mortality Tables M-1
Section 2: Industry Experience Valuation Basic Tables M-3

Definitions

A. "Composite mortality table" means a mortality table with rates of mortality that do not distinguish between smokers and nonsmokers.

B. "Smoker and nonsmoker mortality table" means a mortality table with separate rates of mortality for smokers and nonsmokers.

Section 1: Valuation Mortality Tables

A. 1959 Accidental Death Benefits Table

B. 1961 Commissioners Standard Industrial Mortality Table
Composite Table (1961 CSI)
Proceedings of the NAIC, 1961 Volume II: pages 538–540

C. 1961 Commissioners Industrial Extended Term Insurance Table
Composite Table (1961 CIET)
Proceedings of the NAIC, 1961 Volume II: pages 541–543

D. 1980 CSO Mortality Tables

1. Composite tables (with optional 10-Year Select Mortality Factors) (1980 CSO)
Proceedings of the NAIC, 1980 Volume I: page 598

2. Smoker/Nonsmoker tables (1980 CSO NS and 1980 CSO SM)
Proceedings of the NAIC, 1984: pages 406–413

3. Blended tables (1980 CSO B, 1980 CSO C, 1980 CSO D, 1980 CSO E, 1980 CSO F)
Proceedings of the NAIC, 1984: pages 396–400

E. 1980 Commissioners Extended Term Insurance Tables

1. Composite Tables (1980 CET)
Proceedings of the NAIC, 1980 Volume I: page 619

2. Smoker/Nonsmoker tables (1980 CET NS and 1980 CET SM)
Proceedings of the NAIC, 1984: pages 406–413

3. Blended tables (1980 CET B, 1980 CET C, 1980 CET D, 1980 CET E, 1980 CET F)
Proceedings of the NAIC, 1984: pages 396–400

F. 1983 Group Annuity Mortality Table Without Projection

G. 2001 Commissioners Standard Ordinary Mortality Tables (2001 CSO)

1. "2001 CSO Mortality Table" means that mortality table, consisting of separate rates of mortality for male and female lives, developed by the Academy CSO Task Force from the Valuation Basic Mortality Table developed by the SOA Individual Life Insurance

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Valuation Mortality Task Force, and adopted by the NAIC in December 2002. The 2001 CSO Mortality Table is included in the *Proceedings of the NAIC* (2nd Quarter 2002). Unless the context indicates otherwise, the "2001 CSO Mortality Table" includes both the ultimate form of that table and the select and ultimate form of that table and includes both the smoker and nonsmoker mortality tables and the composite mortality tables. It also includes both the age-nearest-birthday and age-last-birthday bases of the mortality tables.

2. "2001 CSO (F)" means that mortality table consisting of the rates of mortality for female lives from the 2001 CSO Mortality Table.

3. "2001 CSO (M)" means that mortality table consisting of the rates of mortality for male lives from the 2001 CSO Mortality Table.

4. "2001 CSO Preferred Class Structure Mortality Table" means mortality tables with separate rates of mortality for super preferred nonsmokers, preferred nonsmokers, residual standard nonsmokers, preferred smokers and residual standard smoker splits of the 2001 CSO Nonsmoker and Smoker Tables, as adopted by the NAIC at the September, 2006 national meeting and published in the NAIC *Proceedings* (third-quarter 2006). Unless the context indicates otherwise, the "2001 CSO Preferred Class Structure Mortality Table" includes both the ultimate form of that table and the select and ultimate form of that table. It includes both the smoker and nonsmoker mortality tables. It includes both the male and female mortality tables and the gender composite mortality tables. It also includes both the age-nearest-birthday and age-last-birthday bases of the mortality table.

H. 2017 CSO Mortality Tables

1. "2017 CSO Mortality Table" means that mortality table, consisting of separate rates of mortality for male and female lives, developed by the CSO Subgroup of the Joint Academy Life Experience Committee and SOA Preferred Mortality Oversight Group from the 2015 Valuation Basic Mortality Table developed by the joint group's Valuation Basic Mortality Subgroup, and adopted by the NAIC in April 2016. The 2017 CSO Mortality Table is included in the Proceedings of the NAIC (1st Quarter 2016). Unless the context indicates otherwise, the "2017 CSO Mortality Table" includes both the ultimate form of that table and the select and ultimate form of that table and includes both the smoker and nonsmoker mortality tables and the composite mortality tables. It also includes both the age-nearest-birthday and age-last-birthday bases of the mortality tables.

2. "2017 CSO (F)" means that the mortality table consisting of the rates of mortality for female lives from the 2017 CSO Mortality Table.

3. "2017 CSO (M)" means that the mortality table consisting of the rates of mortality for male lives from the 2017 CSO Mortality Table.

4. "2017 CSO Preferred Class Structure Mortality Table" means those mortality tables with separate rates of mortality for super preferred nonsmokers, preferred nonsmokers, residual standard nonsmokers, preferred smokers and residual standard smoker splits of the 2017 CSO Nonsmoker and Smoker Tables as adopted by the NAIC at the 2016 Spring National Meeting and published in the NAIC *Proceedings* (first-quarter 2016). Unless the context indicates otherwise, the "2017 CSO Preferred Class Structure Mortality Table" includes both the ultimate form of that table and the select and ultimate form of that table. It includes both the smoker and nonsmoker mortality tables. It includes both the male and female mortality tables. It also includes both the age-nearest-birthday and age-last-birthday bases of the mortality table.

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I. 2012 Individual Annuity Reserve Valuation Table

1. Definitions

a. "2012 IAR Table" means that generational mortality table developed by the Joint Academy /SOA Payout Annuity Table Team and containing rates, q_x^{2012+n}, derived from a combination of the 2012 IAM Period Table and Projection Scale G2, using the methodology stated in the "Application of the 2012 IAR Mortality Table" paragraph of Appendix A-821 of the AP&P Manual.

b. "2012 Individual Annuity Mortality Period Life (2012 IAM Period) Table" means the Period Table containing loaded mortality rates for calendar year 2012. This table contains rates, q_x^{2012}, developed by the Joint Academy /SOA Payout Annuity Table Team and is shown in Appendices 1–2 of Appendix A-821 of the AP&P Manual.

c. "Projection Scale G2 (Scale G2)" is a table of annual rates, $G2_x$, of mortality improvement by age for projecting future mortality rates beyond calendar year 2012. This table was developed by the Joint Academy/SOA Payout Annuity Table Team and is shown in Appendices 3–4 of Appendix A-821 of the AP&P Manual.

2. Application of the 2012 IAR Mortality Table

In using the 2012 IAR Mortality Table, the mortality rate for a person age x in year (2012 + n) is calculated as follows:

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

The resulting q_x^{2012+n} shall be rounded to three decimal places per 1,000, e.g., 0.741 deaths per 1,000. Also, the rounding shall occur according to the formula above, starting at the 2012 period table rate.

For example, for a male age 30, q_x^{2012}= 0.741.

q_x^{2013}= 0.741 * (1 – 0.010) ^ 1 = 0.73359, which is rounded to 0.734.

q_x^{2014}= 0.741 * (1 – 0.010) ^ 2 = 0.7262541, which is rounded to 0.726.

A method leading to incorrect rounding would be to calculate q_x^{2014} as q_x^{2013} * (1 – 0.010), or 0.734 * 0.99 = 0.727. It is incorrect to use the already rounded q_x^{2013} to calculate q_x^{2014}.

Section 2: Industry Experience Valuation Basic Tables

A. 2008 Valuation Basic Table (2008 VBT)

B. 2015 Valuation Basic Table (2015 VBT)

The 2015 Valuation Basic Table is a valuation table without loads jointly developed by the Academy and SOA for use in determining a company's prudent estimate mortality assumption for valuations of Dec. 31, 2015, and later. The table consists of the Primary table (Male, Female, Smoker, Non-smoker and Composite), 10 Relative Risk tables for nonsmokers (male and female) and four Relative Risk tables for smokers (male and female). Rates for juvenile ages are included in the composite tables. The tables are on a select and ultimate and ultimate only basis, and are available on an age nearest and an age last birthday basis.

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