ACTUARIAL STANDARDS BOARD

Actuarial Standard
of Practice
No. 50

Determining Minimum Value and Actuarial Value under the Affordable Care Act

Developed by the
Actuarial Value/Minimum Value Task Force of the
Health Committee of the
Actuarial Standards Board

Adopted by the
Actuarial Standards Board
September 2015

Doc. No. 182

T A B L E O F C O N T E N T S

September 2015

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Determining Minimum Value and Actuarial Value under the Affordable Care Act

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 50

This document is the final version of ASOP No. 50, *Determining Minimum Value and Actuarial Value under the Affordable Care Act.*

Background

Section 1302 of the Affordable Care Act (ACA) establishes the use of an actuarial value to categorize health insurance plans into bronze, silver, gold, and platinum tiers, specify a minimum level of coverage, and help consumers compare different plan designs and cost-sharing provisions. Similarly, Section 1401 of the ACA added Section 36B to the Internal Revenue Code of 1986, which creates a minimum value requirement for employer-sponsored plans (defined in terms of the health insurance plan's share of total costs). Although a practice note provides information on the subject of determining minimum value and actuarial value under the ACA, no guidance for actuaries on the subject exists other than the regulation. Therefore, the ASB requested that the ASB Health Committee explore a potential ASOP to provide guidance to actuaries performing these tasks. As a result, the ASB Health Committee issued a discussion draft in April 2014 to gather feedback on such a potential ASOP.

A question regarding whether an ASOP was necessary for this subject was posed in the discussion draft. This question generated comments on both sides of the issue. Following discussions among the reviewers—which included the task force, Health Committee, and ASB—the decision was made to issue an exposure draft.

Exposure Draft

The exposure draft of this ASOP was approved in December 2014 with a comment deadline of May 1, 2015. Fourteen comment letters were received and considered in making clarifications that were reflected in this final ASOP. For a summary of the issues contained in the comment letters, please see appendix 2. In general, the suggestions helped improve the clarity of the standard but did not result in substantive changes to the standard.

The ASB thanks everyone who took the time to contribute comments and suggestions on both the discussion draft and the exposure draft of this ASOP.

The ASB voted in September 2015 to adopt this standard.

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The ASB establishes and improves standards of actuarial practice. These ASOPs identify what the actuary should consider, document, and disclose when performing an actuarial assignment. The ASB's goal is to set standards for appropriate practice for the U.S.

ASOP No. 50—September 2015

DETERMINING MINIMUM VALUE AND ACTUARIAL VALUE UNDER THE AFFORDABLE CARE ACT

STANDARD OF PRACTICE

Section 1. Purpose, Scope, Cross References, and Effective Date

1.1 Purpose—This actuarial standard of practice (ASOP) provides guidance to actuaries performing professional services with respect to determining the **actuarial value** (**AV**) of a **health insurance plan** and testing whether the **minimum value (MV) requirement** is met in accordance with the Affordable Care Act (ACA).

1.2 Scope—This standard applies to actuaries performing professional services with respect to calculating **actuarial values** and testing **minimum value requirements** in accordance with the ACA and related regulations, specifically for purposes of (1) categorizing individual and small group **health insurance plans** into metal levels; (2) testing whether employer-sponsored **health insurance plans** meet the federal **minimum value requirements**; or (3) making any required certifications.

This ASOP does not apply to actuaries performing calculations of actuarial values for other purposes. For example, the calculation of an **actuarial value** used for converting allowed costs to plan-incurred costs when calculating plan-level premiums is not covered by the standard.

If the actuary departs from the guidance set forth in this standard in order to comply with applicable law (statutes, regulations, and other legally binding authority), or for any other reason the actuary deems appropriate, the actuary should refer to section 4.

1.3 Cross References—When this standard refers to the provisions of other documents, the reference includes the referenced documents as they may be amended or restated in the future, and any successor to them, by whatever name called. If any amended or restated document differs materially from the originally referenced document, the actuary should consider the guidance in this standard to the extent it is applicable and appropriate.

1.4 Effective Date—This standard will be effective for any actuarial work product covered by this standard's scope issued on or after January 31, 2016.

Section 2. Definitions

The terms below are defined for use in this actuarial standard of practice.

2.1 Actuarial Value (AV)—A measure of the proportion of total allowed medical costs for a specified population that the **health insurance plan** is contractually obligated to pay.

2.2 AV Calculator (AVC)—Data and methodology released or approved by Health and Human Services (HHS) that is used to determine the **AV** of a **health insurance plan**.

2.3 AVC-AV—The **AV** calculated using the **AVC**, including any adjustments for **non-standard plan designs**.

2.4 Essential Health Benefits (EHBs)—The specific items and services that the ACA requires issuers to cover in benefit plans offered in the individual and small group markets. EHBs must include any benefit defined by the Secretary of Health and Human Services. In addition, some EHBs may be defined by individual states.

2.5 Health Insurance Plan—A contract or other financial arrangement providing hospital, medical, prescription drug, dental, or vision benefits, including a self-insured employer plan.

2.6 Minimum Value (MV) Requirement—The minimum required **AV** for certain employer-sponsored **health insurance plans**, as defined by regulations issued pursuant to the ACA.

2.7 MV Calculator (MVC)—Data and methodology released by HHS that is used to determine whether the **MV requirement** is met.

2.8 MVC-AV—The **AV** calculated using the **MVC**, including any adjustments for **non-standard plan designs**.

2.9 Non-Standard Plan Designs—Plan designs that include benefits not reflected in the **AVC** or **MVC**.

Section 3. Analysis of Issues and Recommended Practices

3.1 Use of AVC or MVC—The actuary should use the appropriate calculator when calculating the actuarial value.

HHS requires use of an **AVC** for certain **health insurance plans** offered in the individual and small group markets for the purpose of determining metal levels of coverage.

HHS and the Internal Revenue Service (IRS) require use of the **MVC** to determine whether an employer-sponsored **health insurance plan** meets minimum coverage requirements, unless it is determined that the safe harbor requirements established by HHS or the IRS are met.

3.2 Exceptions to the AVC—If a **health insurance plan's** design is a **non-standard plan design**, the actuary should determine the plan's **AVC-AV** using one of the following options:

a. adjust the inputs to the **AVC** in such a way that the results are consistent with the actual coverage being provided (i.e. estimating a fit of the plan design into the **AVC**); or

b. use the **AVC** to determine the **AVC-AV** for the plan provisions that are consistent with the calculator's parameters and then make appropriate adjustments.

3.3 Exceptions to the MVC—If a **health insurance plan's** design is a **non-standard plan design** and the safe harbor test is not met, then the actuary should determine the plan's **MVC-AV** using one of the following options:

a. adjust the inputs to the **MVC** in such a way that the results are consistent with the actual coverage being provided (i.e. estimating a fit of the plan design into the **MVC**); or

b. use the **MVC** to determine the **MVC-AV** for the plan provisions that are consistent with the calculator's parameters and then make appropriate adjustments.

3.4 Evaluating Non-Standard Plan Designs—The **AVC** and **MVC** do not accommodate all plan designs. In situations of a non-standard plan design, the ACA requires the actuary to evaluate the plan and to certify the value of the plan. When evaluating **non-standard plan designs**, the actuary should confirm that the data, methods, and assumptions used are consistent with those underlying the applicable **AVC** or **MVC**, as required by regulations. For example, the actuary should use a model that is based on data for a population that is consistent with the population underlying the applicable **AVC** or **MVC**, where possible.

3.5 Reasonableness of Assumptions for Non-Standard Plan Designs—The actuary should review the assumptions used for making adjustments for **non-standard plan designs**. These assumptions should be reasonable in the aggregate and for each of these assumptions individually. The actuary should determine whether these assumptions are reasonable based on the actuary's professional judgment, using relevant information available to the actuary.

3.6 Unreasonable Results—In some circumstances, the **AVC** or **MVC** may, in the actuary's professional judgment, produce unreasonable results. The actuary may use unreasonable results from the **AVC** or **MVC** if required to do so by regulators. In such cases, the actuary should document within the actuarial memorandum the nature of the unreasonable results.

When the **AVC** or **MVC** produces an unreasonable result for either a standard plan design or a **non-standard plan design**, the actuary should document the value of the unreasonable result, the plan design used to produce the **AV** before adjustments for non-

standard plan design, why the actuary considered the result unreasonable, and by what authority the actuary was required to use the unreasonable result.

If the unreasonable result was after adjustment for a **non-standard plan design**, the actuary should document the approach used to develop the adjusted **AV**.

3.7 Documentation—The actuary should prepare and retain documentation in compliance with the requirements of ASOP No. 41, *Actuarial Communications*. The actuary should also prepare and retain documentation to demonstrate compliance with the disclosure requirements of section 4.1 of this ASOP.

The actuary should document results from the **AVC** or **MVC** and the plan design used to produce the **AV** before adjustments for non-standard plan design.

In addition, for a **non-standard plan design**, the actuary should document the approach used to develop the adjusted **AVC-AV** or **MVC-AV**. The actuary should indicate the data that was used and its source, the rationale for using that data, and how it was used to calculate the adjustments;

Section 4. Communications and Disclosures

4.1 Actuarial Certifications—When issuing an actuarial certification, the actuary should include the following information:

a. a statement that the actuary is a member of the American Academy of Actuaries, meets the Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States promulgated by the American Academy of Actuaries, and has the education and experience necessary to perform the work;

b. a statement describing the actuary's relationship to the issuer or the employer;

c. the purpose of the certification, including whether the certification is for an employer-sponsored **health insurance plan(s)** or for a plan(s) offered in the individual and small group markets;

d. the plan year for which the **AVC-AV** or **MVC-AV** certification applies;

e. a statement that the **AVC-AV** or **MVC-AV** was determined in accordance with the ASOPs established by the ASB and with applicable laws and regulations; and

f. a certification that the plan meets the minimum requirement for the **MVC-AV** determination in the case of an employer-sponsored health insurance plan; or a certification that the metal levels were appropriately assigned based on

applicable law, in the case of plans offered in the individual and small group markets.

When issuing actuarial certifications related to work subject to this standard, the actuary should also produce an actuarial memorandum.

4.2 Other Communications and Disclosures—When issuing other actuarial communications related to work subject to this standard, including the actuarial report accompanying a certification, the actuary should refer to and follow ASOP Nos. 23, *Data Quality*, and 41. In addition to the disclosures required by ASOP Nos. 23 and 41, the actuary should include the following, as applicable:

a. for a **non-standard plan design**, the approach and assumptions used to develop the adjusted **AVC-AV** or **MVC-AV**. The actuary should indicate the data that was used and its source, the rationale for using that data, and how it was used to calculate the adjustments;

b. a statement that the **AVC-AV** or **MVC-AV** is based on prescribed methodology and, therefore, may not reasonably reflect the actuary's estimate of the portion of allowed costs covered by the **health insurance plan**;

c. the disclosure in ASOP No. 41, section 4.2, if any material assumption or method was prescribed by applicable law (statutes, regulations, and other legally binding authority);

d. the disclosure in ASOP No. 41, section 4.3, if the actuary states reliance on other sources and thereby disclaims responsibility for any material assumption or method selected by a party other than the actuary; and

e. the disclosure in ASOP No. 41, section 4.4, if, in the actuary's professional judgment, the actuary has otherwise deviated materially from the guidance of this ASOP.

Appendix 1

Background and Current Practices

Note: This appendix is provided for informational purposes only and is not part of the standard of practice.

Background

Section 1302 of the Affordable Care Act (ACA) establishes the use of actuarial value to categorize health insurance plans into bronze, silver, gold, and platinum metal levels. Section 1401 of the ACA adds Section 36B to the Internal Revenue Code of 1986, which creates a minimum value requirement for employer-sponsored health insurance plans.

In certain circumstances, ACA regulations require an actuary who is a member of the American Academy of Actuaries to certify that the actuarial value calculation is in accordance with generally accepted actuarial principles and methodologies.

Section 1302 of the ACA establishes the use of actuarial value (AV) to help consumers compare different plan designs and cost-sharing provisions. Similarly, Section 1401 of the ACA added Section 36B to the Internal Revenue Code of 1986, which creates a minimum value (MV) requirement for employer-sponsored health insurance plans. The AV of a health insurance plan is a measure of the percentage of health care costs, on average, that the plan is expected to cover. AV is a measure of the level of a plan's cost sharing provisions, whereas MV is the minimum AV that certain employer-sponsored health insurance plans must provide.

In the individual and small group markets, the AV is defined as the ratio of (i) total expected payments by the plan for essential health benefits (EHBs) computed in accordance with the plan's cost-sharing provisions for a standard population over (ii) the total allowed costs for the EHB that the standard population is expected to incur. Benefits that are not considered part of EHB are not included in the AV calculation.

AV is a key concept in the ACA. AV is used to categorize health insurance plans sold in the individual and small group markets into coverage tiers. These tiers are referred to as "metal levels"—bronze, silver, gold, and platinum—with AVs of 60 percent, 70 percent, 80 percent, and 90 percent, respectively. Federal tax credits for certain individuals and families with qualifying incomes are tied to the cost of a silver plan. Federal cost-sharing reductions for certain individuals and families with qualifying incomes are also defined in terms of AV.

The benefits offered by applicable large employers will be assessed to see whether or not they can be considered to meet the "minimum value" requirement, currently set at 60 percent. In the employer market, the MV requirement is a component of the determination of whether an employer is subject to a penalty.

Current Practices

The AV Calculator (AVC) and Minimum Value Calculator (MVC) were developed using standardized populations that are applied across all geographic locations. The calculators take into account cost-sharing parameters; the AVC accounts for induced demand in the underlying assumptions while the MVC does not. Beginning in 2015, a state may elect to utilize state-specific tables in the AVC, with HHS pre-approval.

The AV calculated with the AVC and MVC may differ from AVs that may be used in pricing, and several items are reflected in health insurance plan premiums that are not considered in the Federal AVC/MVC. These items include, but are not limited to, provider negotiated payments, administrative costs, and the impact of care management and utilization management programs. In addition, the calculators use a standard population with a prescribed nationwide data set and specific assumptions on price and utilization, which may differ significantly from a specific health insurance plan's population, price and utilization assumptions, and other assumptions used to develop premium.

The AVC and MVC are not intended to be used as pricing tools. As a result, two plan designs with the same Federal AV/MV may not have the same premium for the reasons stated above. The intent of the AV and MV calculation process is to apply a standardized population and cost structure.

Additional Resources

The following resources may assist in furthering actuaries' understanding of AV and MV.

- The Patient Protection and Affordable Care Act
http://www.gpo.gov/fdsys/pkg/PLAW-111publ148/pdf/PLAW-111publ148.pdf

- The Center for Consumer Information & Insurance Oversight, Regulations and Guidance
http://www.cms.gov/CCIIO/Resources/Regulations-and-Guidance/

- American Academy of Actuaries, Health Council Practice Note, *Minimum Value and AV Determinations Under the Affordable Care Act*, April 2014
http://www.actuary.org/files/MVPN_042314.pdf

- Final HHS Rule for Standards Related to Essential Health Benefits, AV, and Accreditation
http://www.gpo.gov/fdsys/pkg/FR-2013-02-25/pdf/2013-04084.pdf

- Minimum Value of an Employer-Sponsored Health Plan, IRS Notice 2012-31
http://www.irs.gov/pub/irs-drop/n-12-31.pdf

Appendix 2

Comments on the Exposure Draft and Responses

The exposure draft of proposed ASOP, *Determining Minimum Value and Actuarial Value under the Affordable Care Act*, was issued in December 2014 with a comment deadline of May 1, 2015. Fourteen comment letters were received, some of which were submitted on behalf of multiple commentators, such as by firms or committees. For purposes of this appendix, the term "commentator" may refer to more than one person associated with a particular comment letter. The Task Force on Actuarial Value/Minimum Value under the Affordable Care Act and the Health Committee of the Actuarial Standards Board carefully considered all comments received, and the Health Committee and ASB reviewed (and modified, where appropriate) the changes proposed by the task force.

Summarized below are the significant issues and questions contained in the comment letters and the responses.

The term "reviewers" in appendix 2 includes the Task Force, the Health Committee, and the ASB. Also, unless otherwise noted, the section numbers and titles used in appendix 2 refer to those in the exposure draft.

GENERAL COMMENTS	
Comment	One commentator suggested providing a "crosswalk map" that would allow the MV calculator (MVC) to become significantly more useful for the detailed benefits of each acceptable EHB standard into the row categories of the MVC.
Response	The reviewers believe this is beyond the scope of the standard and made no change.
Comment	One commentator suggested that the ASOP should add a discussion regarding how regulators define the term "substantial" when referring to inpatient hospitalization and physician services.
Response	The reviewers believe interpreting the regulations is beyond the scope of the standard. Therefore, no change was made.
Comment	One commentator suggested separate ASOPs for AV and MV be considered.
Response	The reviewers believe that the coverage of these related topics in a single ASOP is appropriate and made no change.
Comment	Several commentators believed in-network cost sharing and tiered networks should be specifically discussed in this ASOP.
Response	The reviewers believe that specific non-standard benefits are beyond the scope of the ASOP and made no change.
Comment	Several commentators suggested the ASOP should provide guidance about the MV calculation by describing the responsibilities of the actuary to include awareness of and compliance with all applicable regulations associated with the required covered services.
Response	The reviewers note that the *Code of Professional Conduct* (the Code) requires that "an actuary must be familiar with, and keep current with, not only the Code but also applicable law and rules of professional conduct for the jurisdictions in which the actuary renders actuarial services." Therefore, no change was made.

Comment	One commentator suggested that health insurance plans use an alternative method under 45 CFR 156.135(b) that requires certification by an actuary only in specific cases where the health insurance plan's design isn't compatible with the AV calculator (AVC). The commentator also suggested the ASB consider the guidance the CMS has issued and reference all such sources of guidance and instructions in the final draft of the ASOP.
Response	The reviewers believe the standard contains appropriate references to the requirements and made no change.
TRANSMITTAL MEMORANDUM	
1. Does this ASOP provide appropriate guidance to actuaries who are determining actuarial values for purposes of meeting the various ACA AV and MV requirements?	
Comment	One commentator indicated that there were some clarity issues associated with the use of the term "specific population" in section 2.1 and with the definition of health insurance plan in section 2.5.
Response	The reviewers believe the ASOP is clear and made no change.
Comment	Another commentator suggested adding the specification that a plan with an aggregate family deductible is a non-standard plan design and that the actuary should consider this fact in determining whether a plan meets the MV standard and requirement.
Response	The reviewers believe the ASOP provides guidance for handling non-standard plan design, in general, which actuaries can apply to specific situations and, therefore, made no change.
Comment	One commentator suggested consideration of whether the ASOP should address an actuary's obligations for ensuring that each plan is administered exactly how the plan was evaluated.
Response	The reviewers believe that validating the administration of plan design was outside the scope of this ASOP and made no change.
Comment	One commentator suggested guidance be provided regarding evaluation of certain plans that are substantially missing coverage categories.
Response	The reviewers believe the ASOP provides guidance for handling non-standard plan design, in general, which actuaries can apply to specific situations and, therefore, made no change.
2. Is the ASOP clear that it applies only to the calculation of actuarial value as required by the ACA, and not to other uses and determinations of actuarial value?	
Comment	Citing section 1.1, Purpose, section 1.2, Scope, and the draft as a whole, all commentators believed the purpose of the ASOP to be clear.
Response	The reviewers agree.
3. Do the descriptors AVC-AV and MVC-AV in sections [2.3] and [2.8] add clarity to the ASOP? We note that the American Academy of Actuaries' practice note uses the terms "Metal AV" and "MV" for these two values.	
Comment	The majority of commentators believed that the descriptors AVC-AV and MVC-AV are clear and add clarity to the ASOP.
Response	The reviewers agree.
Comment	One commentator stated that the definitions for AVC-AV and MVC-AV consider future changes and broadened functionality.
Response	The reviewers believe the language is sufficiently broad to account for future changes and made no change.

4. Is the guidance of the ASOP sufficient for situations where the actuary does not agree with the determination of the AV made by the AV or MV calculator?	
Comment	The majority of the commentators agreed that the guidance of the ASOP is sufficient for situations of disagreement with the determination of the AV made by the calculators
Response	The reviewers agree.
Comment	Commentators suggested that alternative language be used in section 3.6 where the exposure draft states that "the actuary should consider documenting…." The commentators suggested that this be written as follows: "the actuary should document…"
Response	The reviewers agree and made the suggested change.
Comment	One commentator stated that in circumstances where an actuary does not agree with another actuary's work in regards to metal level compliance (AVC-AV), or the pass/fail opinion for AVC-MV evaluations, timely notification is desirable.
Response	The reviewers believe ASOP No. 41, *Actuarial Communications*, and the Code adequately address issues of communication and professional courtesy, and made no change.
5. Should the title of this proposed ASOP be changed to be more specific regarding testing of minimum values? If so, what change should be made?	
Comment	Nearly all commentators believed no change was needed in regards to the title of the ASOP. One commentator suggested the title be changed to "Determining Actuarial Value and Testing Minimum Value Requirements of the Affordable Care Act."
Response	The reviewers agree that the suggested alternative title would also be appropriate but opted not to make a change.
6. Is the detail proposed for a certification in section 4 appropriate? Should additional items be added?	
Comment	Most commentators believed the detail for certification in section 4 is appropriate. Several commentators also desired the certification be accompanied by documentation in the plan filing, along with a summary of the plan design.
Response	The reviewers believe the current language, when considered in concert with ASOP No. 41 provides appropriate guidance. Therefore, no change was made.
Comment	One commentator suggested that the ASOP should require an actuarial certification of both the AVC and the MVC, with such certification including appropriate disclosures as required by ASOP No. 23, *Data Quality*, as well as specific disclosures on the testing of any specific implementations such as the Excel spreadsheet provided by HHS currently.
Response	The reviewers believe development and testing of the AVC and MVC is outside of the scope of this ASOP and made no change.
Comment	One commentator believed that the ASOP should make it clear when either an AV or MV calculation is necessary.
Response	The reviewers believe the ASOP is clear, and note that Federal and State regulations will determine when an MV or AV calculation is necessary. Therefore, no change was made.
Comment	One commentator requested consideration of all plan design elements, not only those captured within the MVC and AVC.
Response	The reviewers believe the ASOP provides guidance for handling non-standard plan design, in general, which actuaries can apply to specific situations and, therefore, made no change.

SECTION 1. PURPOSE, SCOPE, CROSS REFERENCES, AND EFFECTIVE DATE	
Section 1.2, Scope	
Comment	Several commentators suggested that the adjective "large" when referring to employer size was not necessary. In addition, one commentator recommended more inclusive language and clarity towards listing self-insured health insurance plans without reference to "size."
Response	The reviewers agree and made the change.
Comment	One commentator requested additional guidance for self-insured small group cases and clarification of whether the MVC or AVC should be used for groups that self-insure.
Response	The reviewers believe the ASOP is clear, and note that Federal and State regulations will determine when an AV or MV calculation is necessary. Therefore, no change was made.
Comment	Several commentators recommended that the scope be expanded to include the development and documentation of the actuarial calculators.
Response	The reviewers believe the development, documentation, and testing of the AVC and MVC is outside of the scope of this ASOP and made no change.
SECTION 2. DEFINITIONS	
Section 2.1, Actuarial Value (AV)	
Comment	Two commentators noted that the AV is required to be computed for a standard population and not the population of a specific plan. The use of "specified population" in this section may imply that the AV may change based on the population of a plan which is not the intent of the statute.
Response	The reviewers disagree and made no change. Section 2.1 is meant to be a general definition of "actuarial value."
Section 2.2, AV Calculator (AVC)	
Comment	Due to possible change in the future, one commentator believed that the AVC should be defined as the data and methodology released by HHS to determine the AV of a plan, as required by current regulation.
Response	The reviewers agree and made the change.
Section 2.3, AVC-AV	
Comment	Several commentators suggested the modification that "actuarial value" be capitalized in this section.
Response	The reviewers agree but substituted the acronym "AV" that was established in section 2.1.
Section 2.5, Health Insurance Plan	
Comment	One commentator believed that the definition of "health insurance plan" is too broad and its application would include specific excepted benefits plans under Federal Regulations even though they are not subject to AV or MV calculations.
Response	The reviewers believe section 1.2, Scope, addresses this issue and made no change.
Section 2.7, MV Calculator (MVC)	
Comment	One commentator suggested that the definition be limited to data and methodology released by HHS rather than the specific Excel implementation.
Response	The reviewers agree and made the change.

Section 2.8, MVC-AV	
Comment	Similarly to section 2.3, several commentators suggested that "actuarial value" be capitalized.
Response	The reviewers agree but substituted the acronym "AV."
SECTION 3. ANALYSIS OF ISSUES AND RECOMMENDED PRACTICES	
Comment	Several commentators requested an additional item in section 3 referencing materiality, such as stating that the setting of assumptions or evaluation of plan design attributes should consider their materiality in light of the purpose of the assignment.
Response	The reviewers note that ASOP No. 1, *Introductory Actuarial Standard of Practice*, section 2.6, states that "when evaluating materiality, the actuary should consider the purposes of the actuary's work and how the actuary anticipates it will be used by intended users…The guidance in ASOPs need not be applied to immaterial items." The reviewers believe this guidance appropriately covers "materiality," and therefore made no change.
Section 3.1, Use of AV or MV Calculator	
Comment	One commentator suggested that the ASOP should make clear that, in the event safe harbor requirements were met for an MV determination, an actuary is not required to be involved with the determination and calculation of the MV.
Response	The reviewers agree and added clarifying language.
Comment	Several commentators believed that the term "affordable insurance exchanges" isn't widely used and suggested alternate language.
Response	The reviewers deleted the "affordable insurance exchanges" language from this section, as it was not needed.
Comment	Several commentators suggested that "Except as noted in 3.2" and "Except as noted in 3.3" be added to the section.
Response	The reviewers believe that because sections 3.2 and 3.3 are titled "Exceptions to the AVC" and "Exceptions to the MVC," respectively, that it is clear that there are exceptions. Therefore, no change was made.
Comment	One commentator recommended that the ASOP provide more guidance on what approaches might be appropriate to normalize data to a consistent population for use in making adjustments to either the input or output from the calculators.
Response	The reviewers believe that providing specific guidance for normalizing the data is beyond the scope of this ASOP and made no change.
Comment	One commentator suggested that the sentence "The actuary should use the appropriate calculator when calculating the actuarial value" be modified to "The actuary should use the appropriate calculator for the appropriate plan year when calculating the actuarial value."
Response	The reviewers believe the language is clear regarding the choice of appropriate calculator and made no change.
Section 3.4, Evaluating Non-Standard Plan Designs	
Comment	Several commentators observed that the AVC and MVC don't anticipate all plan designs.
Response	The reviewers agree but believe the standard provides appropriate guidance regarding the evaluation of non-standard plan designs.

Section 3.5, Reasonableness of Assumptions for Non-Standard Plan Designs	
Comment	One commentator suggested adding a comment regarding materiality to the section. The commentator specifically suggested altering the second sentence to read "These assumptions should be reasonable in relation to the materiality of the assumption on the plan's AV or MV."
Response	The reviewers believe the current language is appropriate and made no change. For additional information on materiality, see ASOP No. 1, section 2.6.
Section 3.6, Unreasonable Results	
Comment	Several commentators stated that the use of the term "AV" in this section is confusing and suggested that AV be spelled out as "actuarial value" in order to avoid association with AV and MV calculations.
Response	The reviewers believe the current language is appropriate since AVC-AV and MVC-MV are defined, and made no change.
Comment	One commentator recommended that in order to strengthen the guidance in this section, the words "considering documenting" should be replaced with "document" in both cases it arises.
Response	The reviewers agree and made the change.
Comment	One commentator suggested modifying the paragraph to read "In some circumstances, the AVC or MVC may, in the actuary's professional judgment, produce unreasonable results. In such cases, the actuary may make adjustments in addition to the stated options in section 3.2 and 3.3 for plan design attributes. The actuary may use what they have deemed unreasonable results if required to do so by regulators." The commentator also stated that the last two paragraphs of section 3.6 were redundant.
Response	The reviewers believe the current language is appropriate in light of the regulatory requirements. Sections 3.2 and 3.3 already cover allowable adjustments for non-standard plan designs. The reviewers note that the last two paragraphs in section 3.6 address unreasonable results before and after applying such allowable adjustments, respectively. Therefore, no changes were made.
Comment	One commentator recommended modifying the sentence "The actuary may use unreasonable results if required to do so by regulators" to "The actuary should make adjustments to inputs/outputs if the results are unreasonable unless required not to do so by regulators."
Response	The reviewers note that sections 3.2 and 3.3 cover allowable adjustments for non-standard plan designs and made no change.
Section 3.7, Documentation	
Comment	One commentator suggested that the ASB consider whether section 3.7 applies also to actuaries involved with the development of the AV and MV calculators.
Response	The reviewers believe that the development of the AVC and MVC by regulators is outside the scope of this ASOP, and made no change.
SECTION 4. COMMUNICATIONS AND DISCLOSURES	
Section 4.1, Actuarial Certifications	
Comment	One commentator suggested including a sentence in this section that reflects that separate actuarial reports need not be created, if such documentation is included in another report.
Response	The reviewers believe that the definition of "actuarial report" in ASOP No. 41 is sufficiently broad to allow for a scenario where a separate report is not needed. Therefore, no change was made.

Comment	One commentator stated that based upon requirements by law for actuaries to use the AVC/MVC, an actuarial certification should indicate a reliance on a regulatory tool. The commentator recommended the use of language that clarifies that the actuary is certifying the numbers based on the calculator and not the calculator itself.
Response	The reviewers believe that given that the law requires the use of the calculators and the narrow scope of this ASOP, that such a reliance statement should not be required. The reviewers also note that the guidance does not preclude making such a reliance statement. Therefore, no change was made.
Section 4.2, Other Communications and Disclosures	
Comment	Several commentators suggested that this section should contain the following statement, "The actuary should indicate the data that was used and its source (for example, HHS or state data) to calculate adjustments to the calculator results, the rationale for using the data, and how it was used to calculate the adjustments."
Response	The reviewers broadened the language to provide guidance that the actuary should identify the data used and its source.
APPENDIX	
Comment	One commentator recommended that language in the "Current Practices" section be strengthened to read, "The actuarial value calculated with the AVC and MVC is likely to differ from actuarial values that may be used in pricing…"
Response	The reviewers believe the current language indicating the AVC and MVC may differ from pricing AVs is appropriate. The reviewers note that the "Current Practices" section identifies reasons why the actuarial values calculated with the AVC and MVC could differ from an actuarial value used for pricing. Therefore, no change was made.

ACTUARIAL STANDARDS BOARD

Actuarial Standard
of Practice
No. 51

Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions

Developed by the
Pension Committee of the
Actuarial Standards Board

Adopted by the
Actuarial Standards Board
September 2017

Doc. No. 188

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ASOP No. 51—September 2017

September 2017

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in the Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 51

Background

This document is the final version of ASOP No. 51, *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions*.

The Pension Committee has been reviewing all of the pension-related standards and has developed this standard to provide guidance regarding the assessment and disclosure of pension risk as part of the larger review project. Section 3.16 of ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*, revised December 2013, provides guidance to an actuary whose assignment includes an analysis of the potential range of future pension obligations, periodic costs, actuarially determined contributions, or funded status. Section 4.1(r) of ASOP No. 4 requires disclosure that future pension measurements may differ significantly from the current measurement. This section also requires the actuary to provide results of the analysis of the potential range of future measurements if the scope of the actuary's assignment included such analysis, or a statement indicating that because of the limited scope of the assignment, such an analysis was not performed.

Section 3.4.1 of ASOP No. 41, *Actuarial Communications*, indicates that "the actuary should consider what cautions regarding uncertainty or risk in any results should be included in the actuarial report." Section 3.3.2 of ASOP No. 4 says, "In conjunction with the related guidance in ASOP No. 41, the actuary should consider the uncertainty or risk inherent in the measurement assumptions and methods and how the actuary's measurement treats such uncertainty or risk."

The Pension Committee believes that the additional guidance in this new standard expands on section 3.4.1 of ASOP No. 41 and sections 3.3.2, 3.16, 4.1(r) of ASOP No. 4. Additionally, the Pension Committee believes that the additional disclosures required by this standard will help the intended users of the actuarial findings gain a better understanding of risks inherent in the measurements of pension obligations and actuarially determined pension plan contributions.

First Exposure Draft

In December 2014, the ASB approved a first exposure draft with a comment deadline of May 29, 2015. Fourteen comment letters were received and considered in making changes that were reflected in the second exposure draft.

In July 2014, the ASB issued a Request for Comments on ASOPs and Public Pension Plan Funding and Accounting. After comments were received, the ASB appointed a Pension Task Force to review this and other input and to develop recommendations for consideration by the ASB. In July 2015, the ASB held a public hearing on public plan issues that had arisen during this process. In its announcement of the public hearing, the ASB specifically requested that comments related to the first exposure draft on the assessment and disclosure of risk be submitted in writing prior to the comment deadline. As such, the aforementioned fourteen comment letters constituted the comments considered by the Pension Committee.

Second Exposure Draft

The second exposure draft of this ASOP was issued in June 2016 with a comment deadline of October 31, 2016. The Pension Committee carefully considered the seventeen comment letters received. For a summary of issues contained in these comment letters, please see the appendix. Key changes made to the final standard in response to comment letters received on the second exposure draft include the following:

1. In section 2 of this standard, various definitions were copied from ASOP Nos. 4 and 41 for such terms that were used in this standard.

2. Contribution Risk was made a defined term and the definition was expanded.

3. The definition of a Funding Valuation in section 2.7 was clarified.

4. The guidance in section 3.2, Identification of Risks to be Assessed, was clarified to indicate that the actuary is not required "to evaluate the ability or willingness of the plan sponsor or other contributing entity to make contributions to the plan when due," and is not required "to assess the likelihood or consequences of potential future changes in applicable law."

5. Guidance was added in section 3.3, Assessment of Risk, to address a funding valuation or pricing valuation that includes multiple measurements.

6. The language in section 3.6, Additional Assessment of Risk, was modified, replacing "beneficial" with "significantly beneficial."

7. The guidance in section 3.9, Reliance on a Separate Report, was clarified.

8. The disclosure requirements regarding the risks identified and the results of the risk assessment were clarified.

9. Section 4.1(f) was added, requiring the actuary to disclose "any limitations or constraints on the comprehensiveness of the risk assessment."

ASOP No. 51—September 2017

The Pension Committee thanks former committee chairperson Mita D. Drazilov and former committee members Fiona E. Liston, Mitchell I. Serota, Judy K. Stromback, and Virginia C. Wentz for their assistance with drafting this ASOP.

The ASB voted in September 2017 to adopt this standard.

ASOP No. 51—September 2017

Pension Committee of the ASB

Christopher F. Noble, Chairperson

Margaret S. Berger
Lawrence Deutsch
Tammy F. Dixon
Howard A. Freidin
David T. Kausch
Stephen T. McElhaney
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Actuarial Standards Board

Maryellen J. Coggins, Chairperson

Christopher S. Carlson
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Darrell D. Knapp
Cande J. Olsen
Kathleen A. Riley
Barbara L. Snyder
Frank Todisco
Ross A. Winkelman

The Actuarial Standards Board (ASB) sets standards for appropriate actuarial practice in the United States through the development and promulgation of Actuarial Standards of Practice (ASOPs). These ASOPs describe the procedures an actuary should follow when performing actuarial services and identify what the actuary should disclose when communicating the results of those services.

ASOP No. 51—September 2017

ACTUARIAL STANDARD OF PRACTICE NO. 51

ASSESSMENT AND DISCLOSURE OF RISK ASSOCIATED WITH MEASURING PENSION OBLIGATIONS AND DETERMINING PENSION PLAN CONTRIBUTIONS

STANDARD OF PRACTICE

Section 1. Purpose, Scope, Cross References, and Effective Date

1.1 Purpose—This actuarial standard of practice (ASOP) provides guidance to actuaries when performing certain actuarial services with respect to measuring obligations under a defined benefit pension plan (hereafter referred to as "plan" or "pension plan") and calculating **actuarially determined contributions** for such plans, with regard to the assessment and disclosure of the **risk** that actual future measurements may differ significantly from expected future measurements. Examples of future measurements include pension obligations, **actuarially determined contributions**, and **funded status**.

This standard supplements the guidance in actuarial standards of practice No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*; ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*; ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*; and ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations* addressing measuring pension obligations, calculating plan costs or contributions, selecting actuarial assumptions for measuring pension obligations, and selecting and using asset valuation methods for pension valuations.

1.2 Scope—This standard applies to actuaries when performing a **funding valuation** of a pension plan. This standard also applies to actuaries when performing a **pricing valuation** of a proposed pension plan change that would, in the actuary's professional judgment, significantly change the types or levels of **risks** of the pension plan. This standard also applies to actuaries when performing a **risk** assessment that is not part of a **funding valuation** or **pricing valuation**.

This standard does not apply to actuaries performing services in connection with applications for plan partitions or benefit suspensions under the Multiemployer Pension Relief Act of 2014. This standard also does not apply to actuaries performing services in connection with other post-employment benefits, such as medical benefits. In addition, this standard does not apply to actuaries performing **funding valuations** or **pricing valuations** for social insurance programs as described in section 1.2, Scope, of ASOP No. 32, *Social Insurance* (unless an ASOP on social insurance explicitly calls for application of this standard).

In some circumstances, the actuary's assignment might include advising the plan sponsor on the management or reduction of **risk**. This standard does not provide guidance on such **risk** management.

If the actuary departs from the guidance set forth in this standard in order to comply with applicable law (statutes, regulations, and other legally binding authority), or for any other reason the actuary deems appropriate, the actuary should refer to section 4.

1.3 Cross References—When this standard refers to the provisions of other documents, the reference includes the referenced documents as they may be amended or restated in the future, and any successor to them, by whatever name called. If any amended or restated document differs materially from the originally referenced document, the actuary should consider the guidance in this standard to the extent it is applicable and appropriate.

1.4 Effective Date—This standard will be effective for any actuarial work product with a **measurement date** on or after November 1, 2018.

Section 2. Definitions

The terms below are defined for use in this actuarial standard of practice. Certain terms embedded within these definitions, and not used elsewhere in this ASOP, are defined in ASOP No. 4.

2.1 Actuarial Accrued Liability—The portion of the **actuarial present value** of projected benefits (and expenses, if applicable), as determined under a particular actuarial cost method that is not provided for by future **normal costs**. Under certain actuarial cost method**s**, the **actuarial accrued liability** is dependent upon the actuarial value of assets.

2.2 Actuarial Present Value—The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of actuarial assumptions with regard to future events, observations of market or other valuation data, or a combination of assumptions and observations.

2.3 Actuarially Determined Contribution—A potential payment to the plan as determined by the actuary using a **contribution allocation procedure**. It may or may not be the amount actually paid by the plan sponsor or other contributing entity.

2.4 Contribution Allocation Procedure—A procedure that uses an actuarial cost method, and may include an asset valuation method, an amortization method, and an output smoothing method, to determine the **actuarially determined contribution** for a plan. The procedure may produce a single value, such as **normal cost** plus an amortization payment of the unfunded **actuarial accrued liability**, or a range of values, such as the range from the ERISA minimum required contribution to the maximum tax-deductible amount.

2.5 Contribution Risk—The potential of actual future contributions deviating from expected future contributions, for example, that actual contributions are not made in accordance with the plan's funding policy, that withdrawal liability assessments or other anticipated payments to the plan are not made, or that material changes occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base.

2.6 Funded Status—Any comparison of a particular measure of plan assets to a particular measure of plan obligations.

2.7 Funding Valuation—A measurement of pension obligations or projection of cash flows performed by the actuary intended to be used by the **principal** to determine plan contributions or to evaluate the adequacy of specified contribution levels to support benefit provisions.

2.8 Intended User—Any person the actuary identifies as able to rely on the actuarial findings.

2.9 Measurement Date—The date as of which the values of the pension obligations and, if applicable, assets are determined.

2.10 Normal Cost—The portion of the **actuarial present value** of projected benefits (and expenses, if applicable) that is allocated to a period, typically twelve months, under the actuarial cost method. Under certain actuarial cost method**s**, the **normal cost** is dependent upon the actuarial value of assets.

2.11 Participant—An individual who satisfies the requirements for participation in the plan.

2.12 Prescribed Assumption or Method Set by Another Party—A specific assumption or method that is selected by another party, to the extent that law, regulation, or accounting standards gives the other party responsibility for selecting such an assumption or method. For this purpose, an assumption or method set by a governmental entity for a plan that such governmental entity or a political subdivision of that entity directly or indirectly sponsors is deemed to be a **prescribed assumption or method set by another party**.

2.13 Pricing Valuation—A measurement of pension obligations or projection of cash flows performed by the actuary to estimate the impact of proposed changes to plan benefit provisions on the plan contributions or to determine whether the proposed benefit provisions are supportable by specified contribution levels.

2.14 Principal—A client or employer of the actuary.

2.15 Risk—The potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience. For purposes of this ASOP, **risk** includes **contribution risk**.

2.16 Scenario Test—A process for assessing the impact of one possible event, or several

simultaneously or sequentially occurring possible events, on a plan's financial condition.

2.17 Sensitivity Test—A process for assessing the impact of a change in an actuarial assumption on an actuarial measurement.

2.18 Stochastic Modeling—A process for generating numerous potential outcomes by allowing for random variations in one or more inputs over time for the purpose of assessing the distribution of those outcomes.

2.19 Stress Test—A process for assessing the impact of adverse changes in one or relatively few factors affecting a plan's financial condition.

Section 3. Analysis of Issues and Recommended Practices

3.1 Overview—Measuring pension obligations and calculating **actuarially determined contributions** requires the use of assumptions regarding future economic and demographic experience. However, an **intended user** of such measurement may not understand the effects of future experience differing from the assumptions used in the **funding valuation** or **pricing valuation**, or the potential volatility of future measurements resulting from such differences.

Guidance regarding methods and assumptions for measuring and determining pension costs, contributions, obligations, and **funded status** is provided in ASOP Nos. 4, 27, 35, and 44. In the event of a conflict between the guidance provided in this ASOP and the ASOPs listed above, this ASOP would govern.

3.2 Identification of Risks to be Assessed—The actuary should identify **risks** that, in the actuary's professional judgment, may reasonably be anticipated to significantly affect the plan's future financial condition. Examples of **risks** include the following:

a. investment **risk** (i.e., the potential that investment returns will be different than expected);

b. asset/liability mismatch **risk** (i.e., the potential that changes in asset values are not matched by changes in the value of liabilities);

c. interest rate **risk** (i.e., the potential that interest rates will be different than expected);

d. longevity and other demographic **risks** (i.e., the potential that mortality or other demographic experience will be different than expected); and

e. **contribution risk**.

This standard does not require the actuary to evaluate the ability or willingness of the plan sponsor or other contributing entity to make contributions to the plan when due. This standard does not require the actuary to assess the likelihood or consequences of potential future changes in applicable law. In addition, the actuary is not expected to provide investment advice.

3.3 Assessment of Risk—The actuary should assess the **risks** identified by the actuary in accordance with section 3.2, including the potential effects of the identified **risks** on the plan's future financial condition. The assessment should take into account circumstances specific to the plan (for example, funding policy, investment policy, **funded status**, or plan demographics). This standard does not require the assessment to be based on numerical calculations.

A **funding valuation** or **pricing valuation** as of a particular **measurement date** may include multiple measurements that may be prepared at the same time or at different times. The actuary may perform a single **risk** assessment for such **funding valuation** or **pricing valuation** if, in the actuary's professional judgment, that **risk** assessment is appropriate for all measurements in the **funding valuation** or **pricing valuation**.

3.4 Methods for Assessment of Risk—If the nature of the actuary's assessment of **risk** requires the selection of methods, the actuary should use professional judgment in selecting these methods. Methods may include, but are not limited to **scenario tests**, **sensitivity tests**, **stochastic modeling**, **stress tests**, and a comparison of an **actuarial present value** using a discount rate derived from minimal-risk investments to a corresponding **actuarial present value** from the **funding valuation** or **pricing valuation**.

The actuary should take into account the degree to which the methods and models reflect the nature, scale, and complexity of the plan. In using professional judgment, the actuary may take into account practical considerations such as usefulness, reliability, timeliness, and cost efficiency.

3.5 Assumptions for Assessment of Risk—If the nature of the actuary's assessment of **risk** requires the selection of assumptions, the actuary should use professional judgment in selecting these assumptions. One or more assumptions selected for the assessment of **risk** should differ from the assumptions used to determine expected future measurements and should result in one or more plausible outcomes.

The assumptions used for assessment of **risk** may be based on economic and demographic data and analyses. This information is available from a variety of sources, including representatives of the plan sponsor and administrator, investment advisors, demographers, economists, and other professionals. Views of experts or **principals** may be considered but the selection of assumptions for the assessment of **risk** should reflect the actuary's professional judgment.

3.6 Additional Assessment of Risk—If, in the actuary's professional judgment, a more detailed assessment would be significantly beneficial for the **intended user** to understand the **risks** identified by the actuary, the actuary should recommend to the **intended user** that such an assessment be performed. In making this judgment, the actuary should take into consideration factors including, but not limited to, the following:

a. findings of the **risk** assessment that the actuary has performed;

b. the size of the plan;

c. the size of the plan relative to the size of the plan sponsor;

d. the maturity of the plan;

e. the **funded status** of the plan;

f. the plan's asset allocation;

g. any relevant characteristics of the **contribution allocation procedure** or other method for determining contributions, such as a significantly backloaded **contribution allocation procedure**;

h. to the extent known by the actuary, indications that the plan sponsor or other contributing entity may not make current or future recommended contributions to the plan, whether based on recent history, new developments, external analyses, or other known factors;

i. the length of time since the last such assessment; and

j. any significant changes in circumstances since the last such assessment.

3.7 Plan Maturity Measures—In addition to the requirements of section 3.3, the actuary should calculate and disclose plan maturity measures that, in the actuary's professional judgment, are significant to understanding the **risks** associated with the plan. Examples include the following:

a. the ratio of market value of assets to active **participant** payroll;

b. the ratio of retired life **actuarial accrued liability** to total **actuarial accrued liability**;

c. the ratio of a cash flow measure (such as benefit payments, or contributions less benefit payments) to market value of assets;

d. the ratio of benefit payments to contributions; and

e. the duration of the **actuarial accrued liability**.

The actuary also should provide commentary to help the **intended user** understand the significance of the disclosed plan maturity measures when assessing **risk**.

Since various plan maturity measures may convey similar information about **risk**, the actuary should use professional judgment in selecting the plan maturity measures, if any, to calculate and disclose.

3.8 Historical Information—If historical values of the plan's actuarial measurements are reasonably available, the actuary should identify and disclose relevant historical values of the plan's actuarial measurements that, in the actuary's professional judgment, are significant to understanding the **risks** identified in accordance with section 3.2. Examples of such actuarial measurements include the following, expressed as dollar amounts, percentages, or in some other form, as appropriate:

a. plan maturity measures;

b. **funded status**;

c. **actuarially determined contribution**;

d. actuarial gains and losses (investment and non-investment);

e. **normal cost**; and

f. plan settlement liability.

Since various plan historical actuarial measurements may convey similar information about **risk**, the actuary should use professional judgment in selecting the historical actuarial measurements and historical period to disclose.

If other historical information relevant to the actuarial measurements is reasonably available, the actuary should consider identifying and disclosing such historical information that the actuary believes is significant to understanding the **risks** associated with the plan. Examples include a comparison of actual contributions to **actuarially determined contributions**, plan **participant** count, and covered payroll.

The actuary also should provide commentary to help the **intended user** understand the significance of the disclosed historical actuarial measurements and the disclosed other historical information when assessing **risk**.

3.9 Reliance on a Separate Report—One or more **risks** identified by the actuary in accordance with section 3.2 may have been assessed by another party (for example, by

another actuary or by an investment advisor). In these situations, the actuary may rely on the assessment of **risk** prepared by another party to partly or fully satisfy the requirements of this standard if, in the actuary's professional judgment, such assessment is consistent with applicable requirements of this standard.

Section 4. Communications and Disclosures

4.1 Disclosures—Any actuarial communication prepared to communicate the results of work subject to this standard should comply with the requirements of ASOP Nos. 4; 23, *Data Quality*; 27; 35; 41, *Actuarial Communications*; and 44. In addition, such communication should contain the following disclosures when relevant and material:

a. the **risks** identified in accordance with section 3.2 and the results of the **risk** assessment performed in accordance with section 3.3, including plan-specific commentary on the potential effects of the identified **risks** on the plan's future financial condition and the specific circumstances applicable to the plan that were taken into account;

b. if applicable, a description of each significant method or assumption upon which the actuary's **risk** assessment depends, in accordance with sections 3.4 and 3.5;

c. if applicable, a recommendation to the **intended user** that a more detailed assessment be performed, in accordance with section 3.6;

d. the values of any plan maturity measures selected in accordance with section 3.7, including related commentary to help the **intended user** understand the significance of the plan maturity measures when assessing **risk**. Examples of these plan maturity measures and related commentary include the following:

i. if the actuary discloses the ratio of market value of assets to active **participant** payroll, the actuary could describe the significance of this ratio with respect to contribution volatility;

ii. if the actuary discloses the ratio of retired life **actuarial accrued liability** to total **actuarial accrued liability**, the actuary could describe the significance of this ratio with respect to the plan's asset/liability mismatch;

iii. if the actuary discloses the ratio of a cash flow measure to market value of assets, the actuary could describe how negative cash flow may amplify investment **risk**;

iv. if the actuary discloses the ratio of benefit payments to contributions, where contribution rates are fixed, the actuary could describe the

dependence upon stable investment returns to continue to provide benefits; and

v. if the actuary discloses the duration of the **actuarial accrued liability**, the actuary could describe the sensitivity of the liability to changes in interest rates.

e. the historical values of any actuarial measurements and any other historical information relevant to the actuarial measurements selected in accordance with section 3.8, including related commentary to help the **intended user** understand the significance of this information when assessing **risk**; and

f. any limitations or constraints on the comprehensiveness of the **risk** assessment.

An actuarial communication can comply with some or all of the specific requirements of this section by making reference to a separate report that the actuary has relied on (in accordance with section 3.9) or to information contained in another actuarial communication. As discussed in ASOP No. 41, any referenced actuarial communication or separate report should be available to the **intended users**.

4.2 Disclosure about Prescribed Assumptions or Methods—The actuary's communication should state the source of any prescribed assumptions or methods used in the assessment of **risk**.

With respect to **prescribed assumptions or methods set by another party**, the actuary's communication should identify the following, if applicable:

a. any **prescribed assumption or method set by another party** that significantly conflicts with what, in the actuary's professional judgment, would be reasonable for the purpose of the measurement; or

b. any **prescribed assumption or method set by another party** that the actuary is unable to evaluate for reasonableness for the purpose of the measurement.

4.3 Additional Disclosures—The actuary should also include the following, as applicable, in an actuarial communication:

a. the disclosure in ASOP No. 41, section 4.3, if the actuary states reliance on other sources and thereby disclaims responsibility for any material assumption or method set by a party other than the actuary; and

b. the disclosure in ASOP No. 41, section 4.4, if, in the actuary's professional judgment, the actuary has otherwise deviated materially from the guidance of this ASOP.

4.4 Confidential Information—Nothing in this standard is intended to require the actuary to disclose confidential information.

Appendix

Comments on the Second Exposure Draft and Responses

The second exposure draft of the ASOP, *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions,* was issued in June 2016 with a comment deadline of October 31, 2016. Seventeen comment letters were received, some of which were submitted on behalf of multiple commentators, such as by firms or committees. For purposes of this appendix, the term "commentator" may refer to more than one person associated with a particular comment letter. The Pension Committee carefully considered all comments received, and the ASB reviewed (and modified, where appropriate) the changes proposed by the Pension Committee.

Summarized below are the significant issues and questions contained in the comment letters and the responses to each.

The term "reviewers" in the appendix includes the Pension Committee and the ASB. Also, unless otherwise noted, the section numbers and titles used in the appendix refer to those in the second exposure draft.

GENERAL COMMENTS	
Comment	Two commentators stated that the standard requires work that is either not sufficiently useful or too difficult to be appropriate practice.
Response	The reviewers disagree and believe that the requirements of the standard strike an appropriate balance between practical considerations and detailed analyses. Therefore, the reviewers made no change in response to these comments.
Comment	Two commentators suggested that the standard should require more detailed and numerical assessment of risks.
Response	The reviewers disagree and believe that the standard strikes an appropriate balance between the costs and the benefits of the assessment and disclosure of risks. Therefore, the reviewers made no change in response to these comments.
Comment	Two commentators suggested that the requirements of the standard will result in boilerplate language that provides no benefit to intended users.
Response	The reviewers believe that the requirements of the standard will result in the provision of useful information and made no change in response to these comments.
Comment	One commentator suggested that the standard will increase the actuary's potential exposure in litigation.
Response	The reviewers believe that the requirements of the standard are appropriate and made no change in response to this comment.

Comment	Several commentators noted that the balance between practical considerations and detailed analyses in this standard is improved from the first exposure, that aspects of this standard strike an appropriate balance, or that portions of the standard provide useful guidance.
Response	The reviewers agree and left these aspects of the guidance substantively unchanged.
Comment	One commentator suggested that the standard acknowledge how risk varies for smaller plans.
Response	The reviewers acknowledge that risks may vary depending on multiple factors including plan size, but believe that the standard provides appropriate guidance for practice relating to all sizes of pension plans and made no changes in response to this comment.
Comment	One commentator suggested that the scope of the standard should include actuarial valuations prepared exclusively for financial reporting.
Response	The reviewers believe that the limitation of the scope to funding valuations and pricing valuations strikes an appropriate balance between the costs and the benefits of the assessment and disclosure of risks. The reviewers note that accounting valuations were included in the scope in the first exposure draft and were removed in response to comments.
Comment	Two commentators requested that the definition of "intended user" be expanded for the purpose of this standard.
Response	The reviewers believe that the meaning of "intended user" in ASOP No. 41, *Actuarial Communications*, is appropriate for this standard and incorporated that definition into this standard.
Comment	One commentator requested examples of assessment and disclosure of risk.
Response	The reviewers believe that codification of examples of compliance is beyond the intended purpose of this standard and made no change in response to this comment.
Comment	One commentator suggested development of a similar standard for OPEB plans.
Response	The reviewers note that future standards may address the assessment of risk for OPEB plans.
SECTION 1. PURPOSE, SCOPE, CROSS REFERENCES, AND EFFECTIVE DATE	
Section 1.1, Purpose	
Comment	One commentator suggested adding language clarifying whether the ASOP applies to public plans, private plans, or both, and suggested adding a definitive statement that the ASOP does not apply to OPEB valuations.
Response	The reviewers note that the ASOP applies to "defined benefit pension plans," and that section 1.2 states that the standard "does not apply to actuaries performing services in connection with other post-employment benefits such as medical benefits." Accordingly, the reviewers made no changes in response to this comment.
Section 1.2, Scope	
Comment	Several commentators requested clarification that the ASOP does not apply to valuations for the purposes of accounting for the plan under the appropriate accounting standards.
Response	The reviewers agree and deleted the reference to "periodic cost" in the definition of pricing valuation.

Comment	One commentator suggested that an evaluation of the ability of the plan sponsor or other contributing entity to make contributions to the plan when due is a credit risk, and the actuary should receive a reliance letter stating that the party responsible for making contributions agrees with the contribution assumptions included in the funding or pricing valuation.
Response	The reviewers disagree and made no change.
Comment	One commentator suggested changing the guidance from "This standard does not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make contributions to the plan when due" to "This standard does not require the actuary to evaluate the ability or willingness of the plan sponsor or other contributing entity to make contributions to the plan when due."
Response	The reviewers agree and made the change in section 3.2 of this standard, Identification of Risks to be Assessed.
Comment	One commentator noted that the standard excludes services in connection with benefit suspension applications under the Multiemployer Pension Relief Act of 2014 (MPRA), and suggested that the consulting work prior to the preparation of such an application would greatly benefit from risk assessments and disclosures. The commentator went on to suggest that if the rationale for the exclusion is that the format of the application itself is prescribed, then it would be appropriate to exclude all funding valuations and pricing valuation where the format is prescribed by law.
Response	The reviewers note that the benefit suspension submission under MPRA already requires a risk assessment and made no change to the ASOP.
Comment	Two commentators suggested that the purpose and scope of the ASOP should make it clear that a risk assessment is not required when an actuary communicates results that are solely intended to satisfy a government filing requirement.
Response	The reviewers agree and clarified the definition of a funding valuation in section 2.1, Funding Valuation (now section 2.7).
Comment	One commentator suggested alternative language to resolve any ambiguity regarding the required risk assessments and prevent unnecessary repetition of disclosures and analyses when a valuation consists of multiple calculations and certifications that occur during a year.
Response	In response to this comment, the reviewers modified section 3.3 of this standard, Assessment of Risk, by adding "A funding valuation or pricing valuation as of a particular measurement date may include multiple measurements that may be prepared at the same time or at different times. The actuary may perform a single risk assessment for such funding valuation or pricing valuation if, in the actuary's professional judgment, that risk assessment is appropriate for all measurements in the funding valuation or pricing valuation."
Comment	One commentator requested an explicit statement in section 1.2, Scope that excludes withdrawal liability valuations from the scope of the standard so as to remove any ambiguity on this issue.
Response	The reviewers disagree that withdrawal liability measurements should be explicitly excluded from the scope of the ASOP and did not make a change in response to this comment. However, the reviewers modified language in section 3.3, Assessment of Risk, to read "A funding valuation or pricing valuation as of a particular measurement date may include multiple measurements that may be prepared at the same time or at different times. The actuary may perform a single risk assessment for such funding valuation or pricing valuation if, in the actuary's professional judgment, that risk assessment is appropriate for all measurements in the funding valuation or pricing valuation."

SECTION 2. DEFINITIONS	
Comment	Two commentators suggested that for terms used in this standard that are defined in ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*, the definitions from ASOP No. 4 be incorporated in this standard.
Response	The reviewers agree and included additional definitions in the standard.
Section 2.1, Funding Valuation (now section 2.7)	
Comment	One commentator suggested that if multiple funding valuations are delivered to the plan sponsor as part of the same report, an actuary should generally not be required to perform risk assessments on each funding valuation and any required risk assessment should be performed on the funding valuation that the plan sponsor relies on the most to determine the employer contribution.
Response	The reviewers agree and modified section 3.3, Assessment of Risk, to read "A funding valuation or pricing valuation as of a particular measurement date may include multiple measurements that may be prepared at the same time or at different times. The actuary may perform a single risk assessment for such funding valuation or pricing valuation if, in the actuary's professional judgment, that risk assessment is appropriate for all measurements in the funding valuation or pricing valuation."
Comment	Two commentators suggested that the definition should make it clear that the scope of the ASOP includes a report that is a periodic review of a fixed-rate contribution level (e.g., where the contribution is fixed by law and the effective amortization period is calculated).
Response	The reviewers agree and modified the definition to include evaluation of "the adequacy of specified contribution levels to support benefit provisions."
Comment	Several commentators suggested clarifying the definition of funding valuation to include cash flow projections used to determine contributions or the solvency of the plan.
Response	The reviewers agree and modified the definition.
Comment	Several commentators suggested that the reference to determination of minimum required contributions under ERISA should be clarified or deleted to avoid limiting the scope to such valuations.
Response	The reviewers agree that the reference to ERISA did not improve the guidance and deleted that reference.
Section 2.2, Pricing Valuation (now section 2.13)	
Comment	Several commentators requested clarification on whether the ASOP applies to valuations for the purposes of accounting for the plan under the appropriate accounting standards, noting that the definition included the term "periodic cost."
Response	The reviewers clarified the language by deleting the reference to "periodic cost."
Comment	One commentator suggested a clarification that cash flow projections may be considered a pricing valuation.
Response	The reviewers agree and modified the definition.
Section 2.3, Risk (now section 2.15)	
Comment	One commentator made extensive suggestions regarding the definition of risk, proposing multiple specific types of risk.
Response	The reviewers believe that the current structure is appropriate and did not incorporate the proposed changes. The reviewers note that a separate definition of contribution risk is now included in the ASOP.

Comment	One commentator suggested that the definition of risk should include the risk that contribution increases may be large and difficult for the plan sponsor and that a plan sponsor's contribution behavior may be different than expectations.
Response	The reviewers believe that the definition of contribution risk is sufficiently broad, and made no change in response to this comment.
Section 2.6, Stochastic Modeling (now section 2.18)	
Comment	One commentator suggested replacing "estimating distributions" with "assessing the range and probabilities" to make the section parallel to the definitions of scenario test, sensitivity test, and stress test.
Response	The reviewers considered the language in this section in response to this comment but did not believe it needed to be made parallel. However, the reviewers modified the definition to read "A process for generating numerous potential outcomes by allowing for random variations in one or more inputs over time for the purpose of assessing the distribution of those outcomes."
Section 2.7, Stress Test (now section 2.19)	
Comment	Several commentators suggested replacing "measuring" with "assessing" to make the section consistent with the definitions of scenario test, sensitivity test, and stochastic modeling.
Response	The reviews agree and made the change.
Comment	Two commentators noted that the definition in the exposure draft is the only one that focuses only on adverse changes instead of both favorable and unfavorable outcomes. One of these commentators suggested changing "adverse" to "significant" accordingly.
Response	The reviewers agree that stress test is the only method discussed in the standard that focuses on adverse outcomes, but believe the definition is appropriate, and made no change.
SECTION 3. ANALYSIS OF ISSUES AND RECOMMENDED PRACTICES	
Section 3.2, Assessment of Risk (now section 3.3)	
Comment	One commentator suggested that this section should include additional commentary regarding quantitative versus qualitative assessments.
Response	The reviewers note that the ASOP does not require the assessment to be based on numerical calculations, leaves the methods for assessing risk to the actuary's professional judgment, and makes no distinction between qualitative and quantitative assessments. Such distinctions were removed in response to comments on the first exposure draft. Therefore, the reviewers made no change in response to this comment.
Comment	One commentator suggested that risks should be prioritized as to their impact on the balance sheet.
Response	The reviewers believe that the guidance is appropriate, and made no change.
Comment	One commentator suggested that the requirement that the "assessment should take into account circumstances applicable to the plan" required consideration of each of the circumstances that followed in the parenthetical list.
Response	The reviewers note that the parenthetical list contains examples, not requirements, and made no change.

Comment	Two commentators suggested that the order of section 3.2 and 3.3 be reversed so that the actuary is directed to identify the risks before being directed to assess them. One commentator also suggested that the first sentence be revised to require the actuary to assess the risks (rather than "include an assessment") so that this section is not a disclosure requirement.
Response	The reviewers agree and made the changes.
Section 3.3, Identification of Risks to be Assessed (now section 3.2)	
Comment	One commentator suggested removing from the definition of contribution risk the potential that the funding policy is not consistent with an actuarially determined contribution and noted that ASOP No. 4 already requires the actuary to qualitatively assess the implications of the funding policy.
Response	The reviewers agree that the ASOP No. 4 requirement is sufficient, and removed the phrase from the definition of contribution risk.
Comment	Several commentators suggested that contribution risk be separately defined in section 2, and that the definition of risk in section 2.3 (now section 2.15) should be expanded to explicitly cover contribution risk.
Response	The reviewers agree with the suggestions, and made the changes.
Comment	One commentator suggested that the definition of risk should be expanded to include unpaid withdrawal liability.
Response	The reviewers agree and included withdrawal liability assessments in new section 2.5, Contribution Risk.
Comment	One commentator suggested that the definition of risk should be clarified to indicate whether or not model risk is included, given that there is an exposure draft on modeling and the possibility that the two standards could conflict.
Response	The reviewers believe that the actuary should use professional judgment in selecting the risks to be assessed and made no change in response to this comment. The reviewers note that the proposed Modeling ASOP (if adopted by the ASB) may provide additional guidance concerning assessment and disclosure of model risk.
Comment	Several commentators suggested that the language "this standard does not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make contributions to the plan when due" be revised so that the actuary is not required to assess "the ability or willingness" to make a contribution when due or the "likelihood that contributions will be made."
Response	The reviewers agree and modified the language accordingly.
Comment	One commentator suggested that the list of examples in this section be moved outside the body of the standard or deleted entirely to avoid limiting actuaries' considerations to the risks included in the list.
Response	The reviewers believe that the inclusion of examples in the standard is appropriate and clarified the language.
Comment	One commentator suggested replacing contribution risk with legislative risk in the list of examples.
Response	The reviewers disagree. In addition, the reviewers modified the language in new section 3.2, Identification of Risks to be Assessed, to include the following: "This standard does not require the actuary to assess the likelihood or consequences of potential future changes in applicable law."

Comment	One commentator noted that another ASOP already requires the actuary to disclose if the contribution allocation procedure is inconsistent with accumulating sufficient assets to make benefit payments when due and requested clarification about the distinction between that requirement and the assessment of contribution risk.
Response	As the commentator notes, ASOP No. 4 requires the actuary to disclose if the "contribution allocation procedure is significantly inconsistent with the plan accumulating adequate assets to make benefit payments when due." Section 2.5, Contribution Risk, of this ASOP, defines contribution risk to include the potential "that actual contributions are not made in accordance with the plan's funding policy." The reviewers believe the distinction between the two is clear and made no change in response to this comment.
Comment	One commentator suggested that the only way to determine whether risks are material is to perform a robust stochastic analysis.
Response	The reviewers disagree and made no change in response to this comment.
Comment	One commentator suggested that the ASOP specify that each assumption used in the valuation should be reviewed to determine whether variance in that assumption could affect the plan's funded status in an important way. The commentator also proposed adding a list of factors the actuary might consider in determining the relevance of a risk.
Response	The reviewers believe the use of professional judgment in identifying significant risks is appropriate, and made no change in response to this comment.
Comment	One commentator noted that ASOP No. 1, *Introductory Actuarial Standard of Practice*, indicates "significance can have different meanings" and suggested that "significance" should be clarified to emphasize relevance instead of size.
Response	The reviewers believe that the identification of risks that "may reasonably be anticipated to significantly affect the plan's future financial condition" should be based on the actuary's professional judgment, and made no change.
Comment	One commentator suggested that it may be appropriate for the actuary to specifically identify assumptions the actuary believes to be insignificant.
Response	The reviewers believe the guidance requiring actuaries to identify significant risks is appropriate and made no change.
Comment	One commentator suggested that the last sentence in the first paragraph be clarified to indicate that the listed risks are only examples.
Response	The reviewers agree and revised the language.
Comment	Several commentators suggested adding demographic risk to the list of examples.
Response	The reviewers agree and made the change.
Comment	One commentator suggested that it would be appropriate to disclose that multiple individual risks may combine to produce an extreme result or that leveraging might result in a small change in one measurement leading to a large change in contributions or other measurements.
Response	The reviewers note that nothing in the standard precludes the actuary from identifying the impact of risks in combination. In regards to leveraging, the reviewers note that section 3.2 reads "The actuary should identify risks that, in the actuary's professional judgment, may reasonably be anticipated to significantly affect the plan's future financial condition." The reviewers added section 4.1(f), which states that the actuary disclose "any limitations or constraints on the comprehensiveness of the risk assessment."

Section 3.4, Assumptions for Assessment of Risk (now section 3.5)	
Comment	One commentator suggested that empirical data be used to select assumptions rather than using professional judgment.
Response	The reviewers note that the section Assumptions for Assessment of Risk reads "The assumptions used for assessment of risk may be based on economic and demographic data and analyses," but believe "the actuary should use professional judgment in selecting [these] assumptions" and made no change in response to this comment.
Comment	Two commentators suggested the term "plausible" is not clear and also that implausible outcomes should be considered.
Response	The reviewers believe the term "plausible," combined with the requirement for the actuary to use professional judgment, is appropriate for this standard and made no change in response to this comment.
Comment	Two commentators suggested the order of sections 3.4 and 3.5 be reversed.
Response	The reviewers agree and made the change.
Comment	One commentator suggested removing the sentence "The actuary may benefit from becoming familiar with a range of views on the factors underlying each assumption."
Response	The reviewers agree and made the change.
Section 3.6, Additional Assessment of Risk	
Comment	Several commentators agreed with the proposed guidance on additional assessment of risk.
Response	The reviewers left section 3.6 substantially the same as in the second exposure draft but made edits to reflect specific suggestions from other commentators, as described in the remainder of these responses.
Comment	One commentator opposed the requirements of this section and believed that the recommendations for additional assessments will have little effect on whether more detailed risk assessments are performed.
Response	The reviewers disagree and made no change in response to this comment.
Comment	One commentator suggested the term "intended user" should not extend beyond the plan sponsor.
Response	The reviewers clarified the term by adding the definition of "intended user" from ASOP No. 41.
Comment	Several commentators suggested softening the requirement to state that the actuary should recommend "consideration" of a more detailed assessment instead of recommending the assessment.
Response	The reviewers believe the current language is appropriate and made no change.
Comment	Several commentators suggested changing "beneficial" to something that would reduce the frequency of such recommendations.
Response	The reviewers changed "beneficial" to "significantly beneficial" in response to these comments.

Comment	One commentator suggested that the absolute "size of the plan" is not an appropriate factor to consider, one commentator suggested that "size of the plan" should be replaced with "size of the plan relative to the plan sponsor," and a third commentator requested clarification of how size should be determined.
Response	The reviewers believe that plan size is an appropriate factor for the actuary to consider in determining whether a more detailed assessment would be significantly beneficial to the intended user and that the measurement of plan size should be left to the professional judgment of the actuary. Therefore, the reviewers did not alter or remove plan size from the factors to be given consideration. The reviewers added "size of the plan relative to the size of the plan sponsor" to the list of considerations.
Comment	One commentator suggested expanding the reference to contribution allocation procedure to include "any other method for determining actual contributions, such as a significantly backloaded contribution allocation procedure."
Response	The reviewers agree and modified the language.
Section 3.7, Plan Maturity Measures	
Comment	Several commentators suggested prioritizing certain plan maturity measures, providing flexibility regarding the selection of plan maturity measures to be disclosed, or additions to, deletions from, or reordering of the list of examples.
Response	The reviewers note that the listed measures are labeled "examples," clarified some, and modified the language in the standard to "Since various plan maturity measures may convey similar information about risk, the actuary should use professional judgment in selecting the plan maturity measures, if any, to calculate and disclose." The reviewers believe this language provides appropriate flexibility.
Comment	One commentator suggested "plan maturity" be defined.
Response	The reviewers believe the examples provide sufficient guidance and made no change.
Comment	One commentator suggested "payroll" be clarified.
Response	The reviewers agree and clarified the example.
Comment	One commentator suggested "net cash flow" be clarified.
Response	The reviewers agree, changed "net cash flow" to "a cash flow measure," and provided examples.
Comment	One commentator asked if plan maturity measures can be provided orally and whether commentary is required if the actuary believes that no plan maturity measures are relevant to understanding the risks in the plan.
Response	The reviewers believe that ASOP No. 41 provides sufficient guidance on oral communications. The reviewers added "if any" to encompass the possibility that no plan maturity measures are relevant to understanding the risks associated with the plan.
Comment	One commentator believed that the requirement to disclose plan maturity measures provides a reasonable balance between highlighting the inherent variability of actuarial measurements and imposing unnecessary costs on plan sponsors and risks on the actuary.
Response	The reviewers agree and retained the requirement.

Section 3.8, Historical Information	
Comment	Several commentators indicated that disclosure of the historical information in section 3.8 is appropriate to assist intended users in understanding the risks associated with the plan. One commentator indicated that the requirement to disclose historical information provides a reasonable balance between highlighting the inherent variability of actuarial measurements and imposing unnecessary costs on plan sponsors and risks on the actuary.
Response	The reviewers agree and retained the requirement.
Comment	One commentator suggested that there should be commentary relating to the investment returns of the assets supporting the plan.
Response	The reviewers agree that investment returns may be relevant historical information and added the parenthetical phrase "(investment and non-investment)" following "actuarial gains and losses" in the list of examples.
Comment	One commentator disagreed that professional judgment should be used to select which historical measures to disclose.
Response	The reviewers disagree and made no change in response to this comment.
Comment	Several commentators suggested that maturity measures should be included among the examples of historical information that might be disclosed.
Response	The reviewers agree and added maturity measures to the examples.
Comment	One commentator felt that the disclosure of historical values should only be required if such disclosure was significant to understanding material risks associated with the plan.
Response	In response to this comment, the reviewers clarified the language to refer to historical values that, "in the actuary's professional judgment, are significant to understanding the risks identified in accordance with section 3.2 [Identification of Risks to be Assessed]," which refers to "risks that, in the actuary's professional judgment, may reasonably be anticipated to significantly affect the plan's future financial condition."
Comment	One commentator believed that the term "normal cost" should be expanded to include service cost and target normal cost.
Response	The reviewers note that the list in this section is of examples and that other examples not included may also be appropriate. Therefore, the reviewers made no change in response to this comment.
Comment	One commentator believed that a requirement to include commentary about the significance of the disclosed information may lead to burdensome research and voluminous commentary, and the actuary should only be required to consider providing such commentary.
Response	The reviewers disagree and made no change in response to this comment.
Comment	Two commentators requested guidance on determining the length of the historical period to be disclosed. One of them suggested that professional judgment should be used.
Response	The reviewers agree and clarified the guidance to indicate that the actuary should use professional judgment in selecting the historical period to disclose.
Comment	One commentator requested guidance on reliance on historical information that was not prepared by the actuary.
Response	The reviewers note that ASOP No. 41 provides guidance if the actuary relies on other sources and made no change in response to this comment.

Comment	One commentator suggested that other historical information should be limited to quantitative and not behavioral information and should relate specifically to the plan.
Response	The reviewers believe the guidance is appropriate and made no change in response to this comment.
Section 3.9, Reliance on a Separate Report	
Comment	Two commentators asked for clarification that an actuary can also rely on a previous or separate report prepared by the actuary.
Response	The reviewers did not change section 3.9 in response to this request for clarification because section 3.9 addresses a separate report in which risks "may have been assessed by another party." The reviewers believe the guidance in section 3.2, Actuarial Report, of ASOP No.41 is sufficiently clear. However, the reviewers clarified the language in section 4.1, Disclosures, by moving the reference to "information contained in another actuarial communication" to follow the reference to "a separate report that the actuary has relied on (in accordance with section 3.9)."
Comment	Several commentators stated that it was not clear what type of report would meet this requirement, how the actuary would determine what would be consistent with what the actuary would have produced for a given risk, and whether the actuary could rely on a separate report.
Response	In response to these comments, the reviewers revised the language in this section to read "One or more risks identified by the actuary in accordance with section 3.2 may have been assessed by another party (for example, by another actuary or by an investment advisor). In these situations, the actuary may rely on the assessment of risk prepared by another party to partly or fully satisfy the requirements of this standard if, in the actuary's professional judgment, such assessment is consistent with applicable requirements of this standard."
SECTION 4. COMMUNICATIONS AND DISCLOSURES	
Section 4.1, Disclosures	
Comment	One commentator suggested that the disclosures required were unduly burdensome and appear to implicitly require quantification of risks.
Response	The reviewers note that the disclosures are required only when relevant and material, and that the standard does not require that the assessment be based on numerical calculations. Therefore, the reviewers made no change in response to this comment.
Comment	Several commentators believed that the requirement to provide a rationale for selecting each risk is not useful or that that the requirement to disclose the actuary's view of the significance of each identified risk is unclear.
Response	The reviewers agree and removed the language referring to the rationale for selecting a risk and the actuary's view of the significance of each identified risk. The reviewers added a statement to section 4.1(a) that reads "including plan-specific commentary on the potential effects of the identified risks on the plan's future financial condition and the specific circumstances applicable to the plan that were taken into account."
Comment	One commentator suggested that an additional disclosure be added to make it clear that the actuary will not know in advance which assumptions will have the largest effect on future measurements and that the descriptions of risks are not intended to be exhaustive or precise.
Response	In response to this comment, the reviewers added a requirement that the actuary disclose "any limitations or constraints on the comprehensiveness of the risk assessment."

Comment	One commentator suggested that the examples of plan maturity measures in section 4.1(d) be deleted due to the cost of maintaining all of these measures.
Response	The reviewers note that the measures and related commentary are examples. The reviewers also note that section 3.7, Plan Maturity Measures reads "Since various plan maturity measures may convey similar information about risk, the actuary should use professional judgment in selecting the plan maturity measures, if any, to calculate and disclose." Therefore, the reviewers retained examples.
Comment	One commentator suggested that the standard include commentary about who computed the maturity measures if they were provided by another party.
Response	The reviewers added language at the end of section 4.1, Disclosures, to clarify references to other reports or communications. The reviewers also note that ASOP No. 41 provides guidance when an actuary relies upon the work of another party.
Section 4.2, Deviation from Guidance in the Standard (now Disclosure about Prescribed Assumptions or Methods)	
Comment	Several commentators suggested that the distinction in ASOP No. 4 between "prescribed assumption or method set by law" and "prescribed assumption or method set by another party" should be carried over to this standard.
Response	The reviewers agree and made the suggested changes.
Comment	One commentator requested clarification of the treatment of prescribed assumptions and methods.
Response	The reviewers modified the language regarding prescribed assumptions or methods to be consistent with ASOP No. 4.

ACTUARIAL STANDARDS BOARD

Actuarial Standard
of Practice
No. 52

Principle-Based Reserves for Life Products under the NAIC *Valuation Manual*

Developed by the
Task Force on Principle-Based Reserves of the
Life Committee of the
Actuarial Standards Board

Adopted by the
Actuarial Standards Board
September 2017

(Doc. No. 189)

T A B L E O F C O N T E N T S

APPENDIXES

September 2017

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Principle-Based Reserves for Life Products

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 52

This document is the final version of ASOP No. 52, *Principle-Based Reserves for Life Products under the NAIC Valuation Manual*.

Background

The forces that led to the consideration of principle-based approaches to reserving for life insurance are discussed in appendix 1 of this document. As changes to laws and regulations that would incorporate such approaches started to develop several years ago, the ASB decided to explore the need for a standard of practice and formed a task force to produce a discussion draft of the standard. That task force created a discussion draft containing actuarial guidance for carrying out a principle-based valuation that was consistent with "VM-20: Requirements for Principle-Based Reserves for Life Products" of the *Valuation Manual*. The discussion draft was reviewed by a large group of interested parties as the draft of VM-20 itself changed over time.

First Exposure Draft

In June 2013, the ASB approved a first exposure draft of this proposed standard, with a comment deadline of December 16, 2013. Seven comment letters were received and considered in making changes that were reflected in the second exposure draft.

Second Exposure Draft

In June 2014, the ASB approved a second exposure draft, with a comment deadline of December 15, 2014. Eight comment letters were received and considered in making changes that were reflected in a "pending draft."

Pending Draft

In June 2015, the ASB approved changes to the second exposure draft. However, since the draft involved compliance with a regulation that had not yet taken effect, the ASB issued a "pending draft," to be updated when the *Standard Valuation Law* and the *Valuation Manual* describing the principle-based reserves for life products took effect. At that point, the standard would be considered for adoption or, possibly, modified and re-exposed. Comments were not requested on the pending draft.

Exposure Draft

The *Valuation Manual* has been modified by numerous amendments since the pending draft was issued. In light of these amendments, a new task force was created to update the pending draft as needed. The task force found that many of the amendments were for clarification or were related to the new Commissioner's Standard Ordinary (CSO) table. A number of amendments prescribed specific methodology, such as requirements related to post-level period profits for term insurance or to disallow aggregation of reserves across product lines. Certain amendments required the application of actuarial professional judgment. The task force found the pending draft ASOP to provide sufficient guidance for all but a few of those amendments and therefore made updates. The task force also made minor clarifications and provided additional guidance in a few sections of the exposure draft.

In March 2017, the ASB approved the exposure draft with a comment deadline of May 31, 2017. Fourteen comment letters were received and considered in making changes that are reflected in this final ASOP. For a summary of issues contained in these comment letters, please see appendix 2. In general, the revisions provided clarification of the intent of the standard and did not result in substantive change to the standard.

Because VM-20 is a new method for statutory valuation, the ASB expects numerous amendments to the *Valuation Manual* over the next few years. The following language has been included in section 1.2 of this ASOP to address this: "In the event of a conflict between the provisions of the *Valuation Manual* in effect at the time the actuarial services are provided and the provisions of the ASOP, the provisions of the *Valuation Manual* shall govern."

The ASB wishes to thank everyone who took the time to contribute comments and suggestions to the exposure drafts, and in particular offers special thanks to the previous iteration of the Task Force on Principle-Based Reserves, who drafted this standard from concept through two exposure drafts and a "pending draft." Chaired by Frank Irish, the task force comprised Jeremy Brown, Arnold A. Dicke, Jacqueline M. Keating, Larry H. Rubin, Allan W. Ryan, and Robert W. Stein.

The ASB voted in September 2017 to adopt this standard.

Task Force on Principle-Based Reserves

Linda M. Lankowski, Chairperson
Erik A. Anderson
Arnold A. Dicke
Jacqueline M. Keating
Michael C. Ward

Life Committee of the ASB

David A. Brentlinger, Chairperson
Janica A. Duff
Linda M. Lankowski
John A. MacBain
Henry W. Siegel
Anthony J. Tokarz
Matthew J. Wininger

Actuarial Standards Board

Maryellen J. Coggins, Chairperson
Christopher S. Carlson
Beth E. Fitzgerald
Darrell D. Knapp
Cande J. Olsen
Kathleen A. Riley
Barbara L. Snyder
Frank Todisco
Ross A. Winkelman

The Actuarial Standards Board (ASB) sets standards for appropriate actuarial practice in the United States through the development and promulgation of Actuarial Standards of Practice (ASOPs). These ASOPs describe the procedures an actuary should follow when performing actuarial services and identify what the actuary should disclose when communicating the results of those services.

ACTUARIAL STANDARD OF PRACTICE

PRINCIPLE-BASED RESERVES FOR LIFE PRODUCTS UNDER THE NAIC VALUATION MANUAL

STANDARD OF PRACTICE

Section 1. Purpose, Scope, Cross References, and Effective Date

1.1 Purpose—This actuarial standard of practice (ASOP) provides guidance to actuaries when performing actuarial services with respect to developing or opining on **principle-based reserves** (PBR) for life insurance that are reported by companies in compliance with applicable law based upon the National Association of Insurance Commissioners (NAIC) *Standard Valuation Law* (referred to herein as the *Standard Valuation Law*) and the NAIC *Valuation Manual* (*Valuation Manual*) as adopted in December 2012 with subsequent amendments.

1.2 Scope—This standard applies to actuaries when performing actuarial services on behalf of life insurance companies, including fraternal benefit societies, in connection with the calculation or review of reserves for life insurance policies subject to "VM-20: Requirements for Principle-Based Reserves for Life Products" in the *Valuation Manual* (VM-20).

To the extent an actuary participates in the application of principle-based methods in the preparation of life insurance reserves under VM-20, whether assigned by the company under VM-G or not, that actuary should follow the applicable guidance in this standard. In the event of a conflict between the provisions of the *Valuation Manual* in effect at the time the actuarial services are provided and the provisions of the ASOP, the provisions of the *Valuation Manual* shall govern.

If the actuary departs from the guidance set forth in this standard in order to comply with the *Valuation Manual* or applicable law (statutes, regulations, and other legally binding authority), or for any other reason the actuary deems appropriate, the actuary should refer to section 4.

1.3 Cross References—When this standard refers to the provisions of other documents, the reference includes the referenced documents as they may be amended or restated in the future, and any successor to them, by whatever name called. If any amended or restated document differs materially from the original referenced document, the actuary should consider the guidance in this standard to the extent it is applicable and appropriate.

1.4 Effective Date—This standard will be effective for **valuation dates** on or after December 31, 2017.

Section 2. Definitions

The terms below are defined for use in this actuarial standard of practice. Definitions 2.1, 2.2, 2.4, 2.6, 2.8, 2.11, 2.13, 2.14, 2.16, 2.17, 2.20, and 2.21 are intended to conform to those in the *Valuation Manual*.

2.1 Anticipated Experience Assumption—An expectation of future experience for a **risk factor** given available, relevant information pertaining to the assumption being estimated.

2.2 Cash Flow Model—A model designed to simulate asset and liability cash flows.

2.3 Credibility—A measure of the predictive value in a given application that the actuary attaches to a particular set of data (*predictive* is used here in the statistical sense and not in the sense of predicting the future.)

2.4 Deterministic Reserve—A reserve amount calculated under a defined **scenario** and a single set of assumptions.

2.5 Granularity—The level of detail built into model components, such as time intervals, cell structure, or assumptions that vary by cell.

2.6 Margin—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.

2.7 Minimum Reserve—The reserve described in section 2 of VM-20 that is based on one or more of the following calculations: **net premium reserve**, **stochastic reserve**, and **deterministic reserve**.

2.8 Model Segment—A group of policies and associated assets that are modeled together to determine the path of net asset earned rates.

2.9 Modeling Cell—A group of policies or assets that are treated in a model as being completely alike with regard to relevant **risk factors** and contractual provisions and that may, therefore, be represented by a single composite policy or asset.

2.10 Net Premium Reserve—The amount determined in section 3 of VM-20.

2.11 PBR Actuarial Report— The supporting information prepared by the company as required by VM-31.

2.12 Principle-Based Reserve—A reserve amount that results from a principle-based valuation, which is defined in the NAIC's model *Standard Valuation Law*.

2.13 Prudent Estimate Assumption—A **risk factor** assumption developed by applying a **margin** to the **anticipated experience assumption** for that **risk factor**.

2.14 Qualified Actuary—An individual who is qualified to sign the applicable statement of actuarial opinion in accordance with the American Academy of Actuaries qualification standards for actuaries signing such statements and who meets the requirements specified in the *Valuation Manual*.

2.15 Relevant Experience—Experience that exhibits characteristics that are sufficiently similar to the characteristics of the liabilities, assets, and environments being simulated to make the experience appropriate, in the actuary's professional judgment, as a basis for determining the **anticipated experience assumptions**.

2.16 Risk Factor—An aspect of future experience that is not fully predictable on the **valuation date**.

2.17 Scenario—A projected sequence of events used in the **cash flow model**, such as future interest rates, equity performance, or mortality.

2.18 Sensitivity Testing—The process of calculating the effect of varying one or more assumptions.

2.19 Starting Assets—A portfolio of assets that will be used to fund projected policy cash flows arising from the policies funded by those assets.

2.20 Stochastic Reserve—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.

2.21 Valuation Date—The date when the reserve is to be valued as required by the *Standard Valuation Law*.

Section 3. Analysis of Issues and Recommended Practices

3.1 Regulatory Requirements—An actuary performing actuarial services within the scope of this standard should be familiar with applicable law and regulation including the *Standard Valuation Law* and the *Valuation Manual*, with a focus on the sections (or parts of sections) of the *Valuation Manual* that govern life insurance coverages.

Under the *Standard Valuation Law* and the *Valuation Manual*, compliance is the responsibility of the company. Section VM-G of the *Valuation Manual* requires the company to assign certain responsibilities to one or more **qualified actuaries**, including the responsibility for overseeing the calculation of **principle-based reserves** and the responsibility for verifying that the assumptions, methods, and models used in such

calculations, as well as internal standards and controls, appropriately reflect the requirements of the *Valuation Manual*.

3.2 Exclusion Tests—Section 6 of VM-20 provides for certain exclusion tests that, if satisfied, allow the insurer to dispense with the calculation of the **stochastic reserves** or **deterministic reserves** for a group of policies.

3.2.1 Grouping—In constructing groups of contracts for the purposes of applying the stochastic exclusion ratio test and the deterministic exclusion test, the actuary may not group together contract types with significantly different risk profiles.

In evaluating the risk profiles of policy groupings, the actuary should consider the following:

a. the risk profile indicated by the contractual provisions of the policies and the impact of varying **scenarios** on that risk profile;

b. results of other analyses performed that may provide an indication of the risk profile of a proposed group of policies (for example, economic capital analysis or cash flow testing analysis);

c. the risk profile indicated by the demographics of the policyholders and insureds; and

d. any other information available to the actuary that indicates that the policies have similar or significantly different risk profiles.

3.2.2 Certification—In some cases, the stochastic exclusion test may be satisfied by providing a certification by a **qualified actuary** in accordance with section 6 of VM-20 that a group of policies is not subject to material interest rate risk or asset return volatility risk. When providing such a certification, the actuary should consider the significance of the impact on reserves of recognizing the interest rate or asset return volatility risks in the reserve calculations. Examples of the types of methods that may be used to support such a certification are provided in the guidance note of section 6 of VM-20. In applying these or any other method, the actuary should consider the possible impact on reserves of factors such as the following:

a. changes in the economic environment or competitive landscape that may cause a material interest rate or asset return volatility risk to arise in the future; and

b. other factors found to be significant based on the results of analyses that may have been completed as part of an economic capital measurement process or cash flow testing.

In certifying that a group of policies is not subject to material interest rate risk or asset return volatility risk and thus may be excluded from calculation of a **stochastic reserve**, the actuary may rely upon an analysis performed for a different purpose that uses a set of **scenarios** which, based on the actuary's professional judgement, adequately captures the interest rate or asset return volatility risk.

3.3 Modeling Stochastic and Deterministic Reserves—When calculating **stochastic reserves** or **deterministic reserves**, the actuary should use assumptions, methods, and models as described in sections 7, 8, and 9 of VM-20. The actuary should use modeling methods that are appropriate for the business being valued.

3.3.1 Model Segments—Section 7 of VM-20 requires companies to design and use a **cash flow model** that uses **model segments** that are consistent with the insurer's asset segmentation plan, investment strategies, or approach used to allocate investment income for statutory purposes. A separate **cash flow model** should be used for each **model segment**. The construction of **model segments** facilitates the calculation of net asset earned rates and discount rates. To do this, the actuary should model the reinvestment and disinvestment of cash flows in accordance with an investment strategy. Usually, this means that the segment should contain only policies that will be managed under a common investment policy, particularly with regard to reinvestment and borrowing practices. If this is not the case, the actuary should take into account the effects of variations in the proportions of the policies subject to each such investment policy due to plausible changes in future conditions and demonstrate that the **stochastic reserve** or **deterministic reserve** being calculated appropriately recognizes such variations.

The actuary may assign policies with offsetting risks to the same **model segment** if the assignment is consistent with the aggregation rules of the *Valuation Manual* and otherwise appropriate (for example, when there is a common investment strategy or when policies are managed together as part of an integrated risk management process) and the risks may reasonably be assumed to remain offsetting under plausible changes in future conditions. The actuary should identify offsetting risks and the rationale for assigning policies with offsetting risks to the same **model segment** in the model documentation.

3.3.2 Model Validation—The actuary should review a static validation that confirms that initial values (for example, **net premium reserves**, face amount, policy count, premium in force, account values, net amount at risk, and other measures of inforce exposure to risk) materially balance to the insurer's records as of the **valuation date** used to calculate the **stochastic reserves** and **deterministic reserves**. The actuary should consider the extent to which a model has been previously reviewed as well as controls around model changes in determining the level of model review required for the current valuation. A model that, in the actuary's judgment, was previously subject to rigorous review and testing, and

was subsequently updated in a controlled manner and validated, may require less rigorous current review.

The actuary should obtain evidence that the models used to perform the calculations discussed here appropriately represent the exposures and cash flows of the business being studied under varying experience levels. To this end, the actuary should consider conducting additional validation procedures such as the following:

a. performing a dynamic validation of the model that involves comparing the cash flows produced by the model to the actual historical data to verify, where appropriate, that the model produces results reasonably similar to those actually experienced;

b. evaluating the consistency of the model's results with the results of any other existing internal systems that have similar calculations, such as economic capital analysis and cash flow testing analysis; and

c. performing an analysis that critically reviews each of the changes made to the model since it was last validated.

3.3.3 Liability Modeling Considerations—In determining the **stochastic reserve** or **deterministic reserve**, the actuary should reflect relevant policy provisions and risks specific to the insurance contracts, including those arising from guarantees that have a reasonable probability of materially affecting future policy cash flows or other contract-related cash flows. Certain costs that are not specific to the insurance contract (for example, federal income taxes, shareholder dividends, and costs related to operational failures, mismanagement, fraud, and regulatory risks) are not recognized in the reserve calculation.

a. The actuary may group policies with similar risk profiles in representative **modeling cells**. The actuary should comply with the stipulations for simplifications, approximations, and modeling efficiency techniques found in section 2 of VM-20. Acceptable demonstrations of compliance may include, but are not limited to, the following:

1) comparison of the results of the grouping based on a representative sample of **modeling cells** to the results of a seriatim calculation on the same representative sample; and

2) a demonstration that extremes of adverse experience for a sample set of **scenarios** have closely similar effects on the **stochastic reserve** or **deterministic reserve** for all policies assigned to the same sample **modeling cells**.

Such demonstrations may be done as of a date other than the **valuation date** and need not be updated every year if the actuary determines that conditions have not changed in a manner that would materially affect the result.

b. In projecting policy or other liability cash flows, the actuary should consider the impact of projected changes in experience on cash flows arising from nonguaranteed elements (including policyholder dividends). For example, if the insurer bases credited rates on current asset yields, the actuary would model projected credited rates that are consistent with projected asset yields and with the company's policy for determining nonguaranteed elements. If such policy is not written, then the actuary would determine the approach the company has historically followed in setting nonguaranteed elements.

The actuary should evaluate whether the modeling of nonguaranteed elements is appropriately aligned with the company's policy or historical approach for determining nonguaranteed elements and document those findings. The actuary should consider contractual provisions, regulatory constraints, current management policy, and past company actions, such as any lag between a change in experience and a change in nonguaranteed elements, when projecting future nonguaranteed element changes.

The actuary should determine policyholder behavior assumptions that are consistent with the nonguaranteed element projections. For example, consistency may require increased lapse rates if credited interest rates tend to lag projected new money rates in a rising interest rate **scenario**.

3.3.4 Use of Prior Period Data—Section 2 of VM-20 provides that the company may calculate the **stochastic reserve** and the **deterministic 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**.

When using a calculation of a **stochastic reserve** or **deterministic reserve** as of a date prior to the **valuation date**, the actuary should document the nature of any updating adjustments made to the reserves and why the use of prior period data plus such adjustments would not produce a material difference from calculating reserves as of the **valuation date**. The actuary should also demonstrate that any material events known to the actuary that occurred between the two dates do not diminish the appropriateness of the results.

When evaluating the appropriateness of using prior period data, the actuary should consider the following:

a. a comparison of the asset portfolio between the two dates by type of asset, mix of assets by quality, and the nature of assets (for example, duration, yield, and type) and a comparison of the size and nature of the inforce policies between the two dates (for example, average size, policy counts, and mix);

b. changes in the interest rate curve, interest spreads, and equity values between the two dates, including, for example, changes causing guarantees to be "in the money" that were not as of the prior date, and vice-versa;

c. changes in policyholder behavior (such as surrenders, lapses, or premium patterns); and

d. validation procedures, such as comparing a subset of policies by calculating reserves as of both dates.

3.4 Assumptions for Stochastic and Deterministic Reserves—In setting **anticipated experience assumptions**, the actuary should consider ASOP No. 23, *Data Quality*, and ASOP No. 25, *Credibility Procedures,* as applicable. Within the range of acceptable practices described in VM-20, the actuary should use professional judgment in setting reasonable assumptions.

Section 9 of VM-20 states that the company shall use its own experience, if relevant and credible, to establish an **anticipated experience assumption** for any **risk factor**. Section 9 goes on to say that if the 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.

Where no relevant and credible company experience is available, the actuary should use professional judgment in advising on the adoption and modification of other sources of experience data. Examples of items that may result in modifications to the experience data include the company's underwriting and administrative practices, market demographics, product design, and economic and regulatory environments.

Section 9 of VM-20 requires **sensitivity testing** to determine which assumptions have the most significant impact on reserves. The actuary should consider performing more extensive analyses in setting assumptions that have a significant impact on valuation results.

The actuary should consider **granularity** in setting assumptions given the model structure. The actuary should use professional judgment to set **granularity** to reflect expected experience appropriately.

3.4.1 Mortality—To the extent appropriate, the actuary should base **anticipated experience assumptions** for mortality on the insurer's underwriting standards and mortality experience.

Section 9 of VM-20 limits the exposure period for a company's own experience to between three and ten years and requires the company to define mortality segments for which separate mortality assumptions will be set. The methods for determining **credibility** of the experience and the methods for grading experience tables into industry standard tables are set forth in section 9 of VM-20.

In choosing an exposure period, consideration should be given to the possibility that data may be obsolete if the period is too long, but that a shorter period may reduce the **credibility** to be assigned to the data. The actuary should refer to ASOP No. 25 for guidance on **credibility**. The actuary should consider the possibility of combining several mortality segments to achieve a higher level of **credibility**, but in doing so the actuary should be aware that section 9 of VM-20 allows such combining only if the mortality experience was determined for the combined segments and then appropriately subdivided for valuation purposes.

The actuary should consider reflecting the effect that lapse or nonrenewal activity or other anticipated policyholder behaviors has had or would be expected to have on mortality. The actuary should consider the effect of any anticipated or actual increase in gross premiums or cost of insurance charges on lapse rates and the resulting effect on mortality due to antiselection.

In determining anticipated mortality, the actuary should consider mortality trends that have been observed in company, industry, or population experience and determine the extent to which such trends are expected to continue.

If the actuary believes mortality trends are expected to continue beyond the **valuation date** and would cause an increase to reserves, then the actuary should consider reflecting such trends in the assumptions for the cash flow projections. Otherwise, for calculating reserves, the actuary should not project mortality trends beyond the **valuation date**.

While mortality improvement beyond the **valuation date** is not to be used for calculating reserves, the actuary may include implicit **margins**, such as absence of mortality improvement beyond the **valuation date**, when estimating the impact of individual and aggregate **margins** in the **deterministic reserve** that the actuary is required to report under VM-31.

3.4.2 Investment Experience—The actuary should make reasonable assumptions about future investment experience that take into consideration the insurer's asset/liability management strategy for the product portfolio.

a. The process for obtaining sets of **scenarios** of future U.S. Treasury rates and future equity values is specified in appendix 1 of VM-20. In applying these sets of **scenarios**, the actuary may use **scenario** reduction techniques. When using these techniques, the actuary should be satisfied that the techniques used are appropriate to the situation and comply with the requirements of section 7 of VM-20.

b. Factors and methods for determining prescribed default assumptions and spread assumptions are set forth in section 9 and appendix 2 of VM-20. The prescribed default assumptions apply to reinvested assets as well as **starting assets**. The actuary should model the reinvestment of cash flows in accordance with the insurer's investment strategy for the **model segment** or in accordance with a strategy that is closely similar to the actual strategy currently being used for the **model segment**. If the insurer's investment strategy is to duration-match assets and liabilities, the actuary should reflect the rebalancing needed specific to each **scenario** to the extent practicable. The actuary should comply with the requirement in section 7 of VM-20 that the modeled reserve is not less than the reserve that would have been obtained by using the alternative investment strategy.

c. The actuary should incorporate variability in the timing of the asset cash flows related to movements in interest rates, such as prepayment risk, as described in section 7 of VM-20 into the model. For example, the actuary should model prepayment, extension, call, and put features in a manner consistent with current asset adequacy analysis practice. (For related guidance, see ASOP No. 7, *Analysis of Life, Health, or Property/Casualty Insurer Cash Flows*, and ASOP No. 22, *Statements of Opinion Based on Asset Adequacy Analysis by Actuaries for Life or Health Insurers*.)

3.4.3 Policyholder Behavior—In modeling anticipated policyholder behavior, the actuary should develop assumptions related to option elections available to policyholders, including, but not limited to, premium payment patterns, premium persistency, surrenders, withdrawals, transfers between fixed and separate accounts on variable products, and benefit utilization.

a. General Considerations—The actuary should consider all policyholder behavior assumptions listed in section 9 of VM-20. In addition, the actuary should consider:

1) varying policyholder behavior assumptions by additional characteristics not listed in section 9 of VM-20, when deemed to be material for that block of business;

2) how policyholder behavior assumptions impact or interact with other assumptions used in the valuation;

3) whether it is reasonable to base assumed policyholder behavior on the outcomes and events exhibited by historical experience, especially when modeling policyholder behavior for a new product benefit or feature or when modeling a significantly different economic environment. Historical experience, when available, is often a good basis for such assumptions; however, the actuary should also consider the extent to which past behavior is a reasonable indicator of future behavior. For example, market or environmental changes can make historical experience less relevant;

4) whether any options embedded in the product, such as term conversion or policy loan options, may affect policyholder behavior. For example, as the value of a product option increases, the likelihood that policyholders will behave in a manner that maximizes their financial interest in the contract will increase. This may result in lower lapses or higher benefit utilization than otherwise anticipated;

5) whether anticipated policyholder behavior assumptions are consistent with **relevant experience** and reasonable future expectations. At any duration for which relevant data do not exist, the actuary should also consider the following:

   i. the policyholder may act like a rational investor who will consider the impact of different actions (for example, lapse the policy, persist, or take out a loan) on the value of the policy;

   ii. the policyholder may place value on factors other than maximizing the policy's financial value (for example, convenience of level premiums or personal budget choices); and

   iii. the policy's full economic value to the policyholder depends not only on its currently realizable value but also on factors not available for analysis, such as the health of the insured and the financial circumstances of the beneficiaries and policyholder; and

6) use of a scenario-dependent formulation for anticipated policyholder behavior. If the actuary uses a static assumption for policyholder behavior, the actuary should document the reasoning. The actuary should also consider creating demonstrations to support such reasoning. For **risk factors** that are scenario-

dependent, the actuary should incorporate a reasonable range of future expected behavior consistent with the economic **scenarios** and other variables in the model. In the absence of evidence to the contrary, modeling extreme behavior may not be necessary; however, the actuary should test the sensitivity of results to understand the materiality of using alternate assumptions.

b. Premium Payment Assumptions—The actuary should consider that not all policyholders will exhibit the same premium payment pattern. In setting assumptions about future premium payments for policies with fixed future premiums, the actuary should consider available policy options. When determining premium payment patterns, the actuary should consider the impact of non-cash options, such as loans to pay premiums, and the value a policyholder places on non-forfeiture benefits.

For policies with flexible or nonguaranteed premiums, the actuary, in designing assumptions about future premium payments, should consider such factors as the limitations inherent in the policy design, the amount of past funding of the policy, and the marketing of the policy. Premium payment assumptions may also vary by interest rate or market **scenario**. The actuary should consider using multiple premium payment pattern assumptions, for example, by subdividing the business into several **modeling cells**, each with a separate payment pattern assumption. If this is not done and consequently the business has one **modeling cell** and average pattern, the actuary should comply with the stipulations for simplifications, approximations, and modeling efficiency techniques found in section 2 of VM-20. Acceptable demonstrations of compliance may include results of **sensitivity testing**.

In setting premium payment assumptions, the actuary should consider the premium payment patterns listed in VM-31. The actuary should consider the following marketing factors that may affect the level and continuation of premium payments:

1) emphasis on death benefits;

2) emphasis on savings accumulation or tax advantages;

3) emphasis on premium payment flexibility;

4) policy illustrations showing premiums for a limited period;

5) automatic electronic payment of premiums;

6) bonuses for higher premiums or assets;

7) nonguaranteed elements; and

8) other factors the actuary deems appropriate.

In selecting premium payment patterns for modeling purposes, the actuary should consider the premium payment patterns listed in VM-31. The actuary may consider patterns based on one or more of the following: target premium, illustrated premium, billed premium, minimum premium, maximum commissionable premium, or continuation of past premium levels. The actuary should consider that a policyholder may utilize more than one premium payment pattern during the lifetime of the policy. For example, some policyholders may pay illustrated premiums for several years, followed by a period of paying minimum premiums to keep their policy in force.

c. Partial Withdrawal and Surrender Assumptions—The actuary should consider using a scenario-dependent formulation for modeling partial withdrawals and surrenders that is responsive to factors such as the projected interest rate environment, the funding level, premium increases, and benefit triggers. In setting partial withdrawal and surrender assumptions, the actuary should consider the insured's age and gender, the policy duration, the existence of policy loans, and scheduled changes in premium and benefit amounts. In addition, the actuary should consider taking into account such factors as the policy's competitiveness, surrender charges, interest or persistency bonuses, taxation status, premium frequency and method of payment, changes in nonguaranteed elements, and any guaranteed benefit amounts. The actuary should consider the fact that rates of surrender can decline dramatically prior to a scheduled sharp increase in surrender benefit (sometimes known as a "cliff") caused by a decrease in surrender charge, a bonus, or a maturity benefit and that rates of surrender can rise materially after such an event.

3.4.4 Expenses—The actuary should review the expenses that have been allocated, for financial reporting purposes, in recent years to the block of policies being evaluated. Expenses that are classified in financial reporting as "direct sales expenses" or as "taxes, licenses, and fees" should be allocated to the activity creating the expense. All non-direct expenses should be allocated to the appropriate activity count (for example, per policy or per claim) and by duration where appropriate, using reasonable principles of expense allocation and unit costs. The actuary should use this analysis as the basis for projecting expenses in doing the reserve valuation, unless, in the actuary's professional judgment, the expense experience is not a suitable basis for projection, in which case other sources of data may be used, as set forth in section 3.4.4(b), Applying Recent Expense Experience.

a. Expense Inflation—Section 9 of VM-20 requires expenses to reflect the impact of inflation. The actuary should appropriately adjust unit costs in the projection for the effect of inflation. Possible sources of information about inflation assumptions are published projections of the consumer price index or the price deflator, such as the rate selected by the Social Security Administration for its long-term intermediate projection. The actuary may also consider the possibility that future inflation rates will vary if prevailing new-money rates change. The actuary should review the resulting projection of implied "real return" to ensure that the inflation and investment return assumptions are consistent.

b. Applying Recent Expense Experience—In reviewing recent experience, the actuary should assure that the expenses being allocated to the block of policies being evaluated represent all expenses associated with the block, including overhead, according to statutory accounting principles. If the recent experience on the block is not, in the actuary's professional judgment, a suitable basis for projection, the actuary may consider the use of experience on a closely similar type of policy within the company or intercompany studies.

The actuary should consider including a provision for overhead that accounts for holding company expenses associated with running the life insurance business (for example, rent and executive compensation) that have not been recognized in other charges to or reimbursements from the life company.

In developing expense assumptions, the actuary should include acquisition expenses and significant non-recurring expenses expected to be incurred after the **valuation date** to the extent allocable to the business in force at the **valuation date**. The actuary should include provision for unusual future expenses that may be anticipated, such as severance costs or litigation costs.

If system development costs or other capital expenditures are amortized in the annual statement, the actuary should reflect such amortization in the assumptions. If such expenditures occurred in the exposure period and were not amortized, the actuary may exclude them from the experience but should consider the possibility that similar expenditures will occur in the future.

In projections of direct expenses, the actuary should consider recent changes in company practice, such as changes in commission rates that may not have been fully reflected in the experience. The actuary's projection of taxes, licenses, and fees should be based on a reasonable activity base (such as premium).

The actuary should reflect recent changes in company practice, such as changes in staffing levels that could increase non-direct expenses in the projection. In the case of changes that are planned but not fully implemented, the actuary may consider reflecting in the projection the probability that the changes will increase future expenses.

3.4.5 Taxes—Section 9 of VM-20 requires the company to determine reserves using models in which federal and foreign income taxes are excluded from consideration. The actuary should recognize all other taxes in the projection models.

3.4.6 Determining Assumption Margins—After the **anticipated experience assumptions** are established, the actuary should modify each assumption to include a **margin** for estimation error and moderately adverse deviation, such that the **stochastic reserve** or **deterministic reserve** being calculated is increased, except as indicated below. The actuary should incorporate an adequate **margin** with respect to assumptions that are modeled dynamically (i.e., assumed to vary as a function of a stochastic assumption, such as lapse rates) throughout all variations. The actuary is not required to include **margins** in assumptions for risks that are to be modeled stochastically as long as a moderately adverse proportion of the stochastically generated results is used for establishing the **stochastic reserve**.

a. Mortality Margins—Section 9 of VM-20 prescribes the **margins** that are to be added to the anticipated experience mortality assumptions but also requires the establishment of an additional **margin** if the prescribed **margin** is inadequate. The actuary should use professional judgment in determining such additional **margin**. The guidance in the remainder of this section on determining assumption **margins** does not apply to the prescribed mortality assumptions, but does apply when determining additional **margins** for mortality.

b. Establishing Margins—For each assumption that includes a **margin**, the actuary should reflect the degree of risk and uncertainty in that assumption in determining the magnitude of such **margin**. When determining the degree of risk and uncertainty, the actuary should take into account the magnitude and frequency of fluctuations in **relevant experience**, if available. In doing so, the actuary should consider using statistical methods to assess the potential volatility of the assumption in setting an appropriate **margin**.

In determining the **margins** for policyholder behavior assumptions for which there is an absence of credible and **relevant experience**, the actuary should follow the requirements of section 9 of VM-20 and consider the following:

1) experience trends by duration where there is relevant data; and

2) the expectation that experience will change in the future due to policy features, economic conditions, or other factors.

After establishing **margins** for individual assumptions, the actuary should review the cumulative impact for all assumptions to determine whether, in the actuary's professional judgment, the **margins** are at a level that provide for an appropriate amount of adverse deviation in the aggregate. The actuary then may reduce the **margin** for an individual **risk factor** provided the actuary can demonstrate that the reduction is reasonable, considering the correlations between this **risk factor** and other **risk factors** (see also section below on "Overall Impact of Assumption Margins").

c. Sensitivity Testing—The actuary should use **sensitivity testing** to evaluate the significance of an assumption in determining the valuation results. For assumptions that have a non-material impact on reserves, the actuary may decide to add little or no **margin** to the **anticipated experience assumption**.

d. Overall Impact of Assumption Margins—In evaluating the appropriateness of the assumption **margins**, the actuary may consider the amount of **margin** in the **deterministic reserve** for a group of policies, unless: 1) the actuary believes the impact of the individual **margins** would be significantly lower under the **stochastic reserve** calculation, and 2) the **stochastic reserve** is larger than the **deterministic reserve**. If these two conditions are met, the actuary may determine that the appropriateness of assumption **margins** should be evaluated on the basis of **stochastic reserves**.

If the actuary determines that evaluating the assumption **margins** in the **deterministic reserve** is appropriate, the actuary should compare the **deterministic reserve** to the **deterministic reserve** without **margins** (i.e., the **deterministic reserve** determined according to section 4 of VM-20 but using **anticipated experience assumptions**) for a group of policies. If the actuary determines that evaluating the assumption **margins** should be done on the basis of **stochastic reserves**, the actuary should compare the **stochastic reserve** to a **stochastic reserve** without **margins** (i.e., the **stochastic reserve** determined according to section 5 of VM-20 but using **anticipated experience assumptions**) for a group of policies. For this purpose, "group of policies" may mean a line of business, or the actuary may make the comparison on several groups of policies within a line of business. The actuary should set **margins** for individual assumptions such that the **stochastic reserves** or **deterministic reserves** being calculated are greater than the corresponding reserves without **margins** by an amount

that is consistent with the risks to which the group of policies is exposed. In evaluating the appropriateness of the assumption **margins** to the risks to which the group of policies is exposed, the actuary may, for example, relate the assumption **margins** to a percentage of the present value of risk capital requirements on the group of policies, consider the conditional tail expectation implied by the use of **prudent estimate assumptions**, or consider historical variations in experience.

If the actuary concludes that the assumption **margins** are either excessive or inadequate in comparison to the risks to which the group of policies is exposed, the actuary should adjust **margins** for individual assumptions so that the **stochastic reserve** or **deterministic reserve** being calculated is appropriate in comparison to the risks to which the group of policies is exposed. The actuary may reduce the initially determined **margin** if the actuary can demonstrate that the method used to justify the reduction is reasonable, considering (1) the range of **scenarios** contributing to the conditional tail expectation calculation, (2) the **scenario** used to calculate the **deterministic reserve**, or (3) appropriate adverse circumstances for **risk factors** not stochastically modeled.

When calculating the aggregate **margin** for VM-31 purposes, the actuary should follow the requirements of VM-31.

3.5 Reinsurance—This section applies to reserves for policies ceded or assumed under the terms of a reinsurance agreement. The terms "reinsurance" and "reinsurer" include retrocession and retrocessionaire, respectively.

3.5.1 Stochastic and Deterministic Reserves Net of Reinsurance—According to section 8 of VM-20, the **stochastic reserves** and **deterministic reserves** shall be based on assumptions and models that project cash flows that are net of reinsurance ceded. Thus, the actuary should use cash flows that reflect the effects of reinsurance assumed and ceded when calculating **stochastic reserves** and **deterministic reserves**.

The actuary should not calculate the **stochastic reserve** or **deterministic reserve** by deducting a formulaic reinsurance credit (such as the Statement of Statutory Accounting Principles No. 61 reserve credit) from a **stochastic reserve** or **deterministic reserve** that is based on hypothetical pre-reinsurance cash flows as discussed in section 3.5.2 below, unless, in the actuary's professional judgment, such a procedure meets the criteria for using simplifications, approximations, and modeling efficiency techniques found in section 2 of VM-20.

3.5.2 Pre-Reinsurance-Ceded Minimum Reserve—Section 8 of VM-20 requires a pre-reinsurance-ceded **minimum reserve**, if needed, to be calculated pursuant to the requirements of the *Valuation Manual*, using methods and assumptions consistent with those used in calculating the **minimum reserve**, but excluding the effect of

ceded reinsurance. Determining the **minimum reserve** requires the calculation on a pre-reinsurance-ceded basis of all necessary reserve components, which may include a **net premium reserve**, a **stochastic reserve**, and a **deterministic reserve** for each group of policies defined in section 2 of VM-20, and the application of any exclusion tests.

Section 8 of VM-20 states that the assumptions used in calculating the pre-reinsurance-ceded **minimum reserve** should 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. In arriving at the assumptions for use in the **cash flow model** required for **deterministic reserve** and **stochastic reserve** calculations, the actuary should consider using methods and assumptions for the ceded business that are consistent with those used for retained business of the same kind (reflecting any known differences, such as differences in average policy size). For example, the calculation of a pre-reinsurance-ceded **stochastic reserve** or **deterministic reserve** requires the construction of a hypothetical portfolio of **starting assets** and a corresponding model investment strategy. Possible methods for constructing the hypothetical portfolio include, but are not limited to, the following:

a. basing the portfolio on assets available at the time the cash flows were ceded;

b. assuming the portfolio consists of assets consistent with those backing the portion of the business retained for policies of the same kind; and

c. assuming the portfolio consists of a pro-rata slice of the assets of the reinsurer that back the reserve for the segment of its business that includes the ceded policies.

If the hypothetical portfolio is assumed to include **starting assets** held by the reinsurer or another party, the actuary should refer to the guidance in section 3.5.7 of this ASOP.

3.5.3 Credit for Reinsurance Ceded—According to section 8 of VM-20, the credit for reinsurance is the difference between the excess, if any, of the pre-reinsurance-ceded **minimum reserve** and the post-reinsurance-ceded **minimum reserve**. The actuary should apply the exclusion criteria and formulas of section 2 of VM-20 separately for each of these **minimum reserves** and should apply the guidance of this standard to calculate any needed **stochastic reserve** or **deterministic reserve** component. The actuary should be aware that the credit for reinsurance might not be the difference between the pre- and post-reinsurance-ceded versions of the same reserve component.

The actuary should allocate the credit for reinsurance ceded using a method that is consistent with section 8 of VM-20 and produces reasonable results. The actuary should document the allocation methodology used.

3.5.4 Recognition of Reinsurance Cash Flows in the Deterministic Reserve or Stochastic Reserve—VM-20 requires the calculation of the **stochastic reserve** or **deterministic reserve** to be based on assumptions and **margins** that are appropriate for each company involved in a reinsurance agreement. The two parties to the agreement are not required to use the same assumptions and **margins** for the reinsured policies.

The actuary should choose assumptions for projecting cash flows for assumed reinsurance and for ceded reinsurance that consider all aspects of applicable reinsurance agreements, including all elements of the agreements that the assuming company can change (such as the current scale of reinsurance premiums and expense allowances) and all actions either party may take that could affect the reinsurance cash flows (such as changes by the ceding company in nonguaranteed elements or the recapture of ceded policies). The actuary should consider whether such changes depend on the economic **scenario** being modeled.

a. In modeling nonguaranteed elements, the actuary may consider any limits placed upon the reinsurer's ability to change the terms of the treaty, including the presence or absence of guarantees of reinsurance premiums and allowances; known actions of the ceding company, such as changes in dividend scales; known past practices of reinsurers in general and the assuming reinsurer in particular regarding the changing of such terms; and the ability of the ceding company to modify the terms of the reinsured policies in response to changes in the reinsurance agreement.

b. The actuary should consider any actions that have been taken or appear likely to be taken by the ceding company or direct writer, if different, that could affect the expected mortality or other experience of assumed policies. Examples of such actions include internal replacement programs and table-shave programs.

c. The actuary should choose assumptions and **margins** assuming that all parties to a reinsurance agreement are knowledgeable of the terms of the reinsurance agreement and will exercise options to their advantage, taking into account the context of the agreement in the entire economic relationship between the parties.

d. In applying the considerations in paragraphs a, b, and c above, the actuary should take into account the impact of the economic conditions inherent in the **scenario** being modeled.

e. Section 8 of VM-20 requires the use of stochastic modeling or analysis to set assumptions for **risk factors** associated with certain provisions of reinsurance agreements. A guidance note in section 8 of VM-20 identifies stop-loss reinsurance as an example of such a provision. The actuary should consider the distribution of claims for the coverage provided under the provisions of the reinsurance agreement to determine whether and to what extent a single deterministic valuation assumption adequately captures the risk.

Stochastic modeling of assumptions for **risk factors** for which a single deterministic valuation assumption is inadequate may be introduced directly in the **cash flow model**, or a separate stochastic analysis outside the model may be performed. In deciding between these approaches, the actuary should consider the degree to which a separate stochastic analysis of assumptions should interact with the variables in the **cash flow model**. When there is a high degree of interaction, the actuary should consider incorporating the analysis directly into the **cash flow model**.

In setting **margins** for such assumptions, the actuary should take into account any conservatism introduced by the stochastic modeling method (such as the conservatism introduced by a conditional tail expectation method).

3.5.5 Margin for Risk of Default by a Counterparty—Section 8 of VM-20 requires the company to establish a **margin** for the risk of default if the company has knowledge that a counterparty is financially impaired. In the absence of such knowledge (or if the impact on cash flows is insignificant) no such **margin** is required. In determining the risk **margin** for counterparty default if one is needed, the actuary may rely upon the company's determination of whether such impairment exists and the probability of default.

3.5.6 Reinsurance Agreements that Do Not Qualify for Credit for Reinsurance—Section 8 of VM-20 states that 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 reduction in surplus. The impact on surplus may be ascertained by calculating the **minimum reserve** with and without reflection of the non-qualifying reinsurance agreement or amendment. If the actuary concludes that such calculations are unnecessary, the actuary should document the testing and rationale leading to that conclusion.

3.5.7 Assets Held by the Counterparty or Another Party—If, under the terms of the reinsurance agreement, some of the assets supporting the reserve are held by the counterparty or another party, the actuary should determine whether such assets should be modeled to determine discount rates or projected cash flows. In making

this determination, section 8 of VM-20 requires that the actuary consider the degree of linkage between the portfolio performance and the calculation of the reinsurance cash flows and the sensitivity of the valuation result to the asset portfolio performance. If the actuary concludes that modeling is unnecessary, the actuary should document the testing and rationale leading to that conclusion. If the actuary determines that modeling is necessary, the actuary may make use of the other party's modeling of the assets it holds, since section 8 of VM-20 provides that one party to a reinsurance transaction may make use of reserve calculations of the other party. The actuary should demonstrate that such modeling is consistent with the other assumptions made in the calculation of the **stochastic reserve** or **deterministic reserve** or that appropriate adjustments have been made.

3.6 Reliance on Data or Other Information Supplied by Others—When relying on data or other information supplied by others, the actuary should refer to ASOP No. 23 for guidance. In addition, where the actuary relies on others for data, assumptions, projections, or analysis in determining the **principle-based reserves**, the actuary should comply with specific requirements of the *Valuation Manual*.

3.7 Documentation—Section 2 of VM-31 states that the **PBR actuarial report** must include documentation and disclosure sufficient for another actuary qualified in the same practice area to evaluate the work. The actuary should include the rationale for all material decisions and actuarial certifications made and information used by the company in complying with the **minimum reserve** requirements and in complying with the documentation and reporting requirements set forth in the *Valuation Manual* with respect to the **PBR actuarial report**.

To the extent practicable, the actuary should support the retention of documentation required by section 2 of VM-31 for a reasonable period of time (and no less than the length of time necessary to comply with the *Valuation Manual*, and any statutory, regulatory, or other requirements). The actuary need not retain the documentation personally; for example, the actuary's principal may retain it.

The **qualified actuary** assigned responsibility for a group of policies under VM-G should document the procedures performed to support required verifications. The actuary may include such documentation in the **PBR actuarial report**.

Section 4. Communications and Disclosures

4.1 Actuarial Communications—When issuing actuarial communications under this standard, the actuary should refer to ASOP Nos. 23 and 41. In addition, the actuary should refer to ASOP No. 21, *Responding to or Assisting Auditors or Examiners in Connection with Financial Audits, Financial Reviews, and Financial Examinations*, where applicable.

4.2 PBR Actuarial Report—The **qualified actuary** assigned by the company the responsibility of preparing the **PBR actuarial report** or a subreport for a particular group of policies should follow the requirements of VM-31.

Because VM-20 requires the company, rather than the **qualified actuary**, to set the assumptions, the **qualified actuary** should refer to the disclosure requirements in section 3.4.4 of ASOP No. 41 when preparing the **PBR actuarial report** or a subreport.

Whether required by VM-31 or not, the **qualified actuary** should consider including the verifications referenced in section 3.7 of this ASOP in the **PBR actuarial report**.

4.3 Additional Disclosures—The actuary should include the following, as applicable, in the **PBR actuarial report** or any other actuarial communication:

a. the disclosure in ASOP No. 41, section 4.2, if any material assumption or method was prescribed by applicable law (statutes, regulations, and other legally binding authority);

b. the disclosure in ASOP No. 41, section 4.3, if the actuary states reliance on other sources and thereby disclaims responsibility for any material assumption or method selected by a party other than the actuary; and

c. the disclosure in ASOP No. 41, section 4.4, if in the actuary's professional judgment, the actuary has otherwise deviated materially from the guidance of this ASOP.

Appendix 1

Background and Current Practices

Note: This appendix is provided for informational purposes and is not part of the standard of practice.

Background

Principle-based reserving for life insurance policies is a new field of endeavor for actuaries, and accepted methods of practice are expected to emerge as experience in the field develops. New developments will arise and be published in practice notes or other types of actuarial literature.

Prior to 1980, the regulation of life insurance statutory reserves was very stable, with only occasional changes in the statutory interest rates and mortality tables. For many years, there were no significant changes in the basic approach. After 1980, interest rate volatility of unprecedented magnitude, as well as the increasing popularity of new policy types that did not fit easily into the existing structure, began to cast doubt on the approach that was being used.

In response to the problem, changes were introduced, including the adoption of dynamic statutory valuation interest rates, the use of cash flow testing of reserves, and a number of adaptations of minimum reserve requirements to provide formulas appropriate for different policy types. It became increasingly difficult to modify the existing structure to keep up with changing conditions.

In addition, the statutory factors for interest and mortality were designed to produce reserves that were high enough to cover a wide variety of situations and thus were viewed as unnecessarily conservative for many companies. It was also evident that some risk factors were not explicitly addressed in the statutory approach, such as the variety of choices open to policyholders (i.e., the items generally grouped under the heading of “policyholder behavior”) and the level and pattern of insurance company expenses. These risk factors have a significant impact on reserve adequacy.

The formulaic nature and prescriptive assumption set of statutory valuation techniques worked well for many years. However, as insurance products increased in complexity, and as new and innovative product designs changed the risk profile of products offered by an insurer, it became apparent that revised regulations and numerous actuarial guidelines were not the best solution for the industry as a whole. On the insurance regulatory side, the National Association of Insurance Commissioners (NAIC), state commissioners, and insurance departments faced the challenge of maintaining the solvency objective of statutory reporting while creating a valuation platform that could be maintained efficiently, enhance uniformity among the states, persist into the future, and remain appropriate for all types of insurance products under various economic conditions.

Thus, there were many reasons for considering the need for radical changes in the statutory reserving system. In many other countries, programs for change had already been under way for

some time. In the United States, the NAIC Model Law 805, *Standard Valuation Law*, was revised in 2009 to provide for a new approach, "principle-based valuation," under which reserve calculations make use of a company's own experience, when credible, subject to procedures set forth in a *Valuation Manual*. The phrases "principle-based valuation" and "principle-based reserves" are quite broad and could apply to many different types of reserves.

Committees within the actuarial profession have been developing the detailed regulatory provisions needed to implement principle-based reserving. The Life Practice Council of the American Academy of Actuaries has developed a practice note with respect to principle-based reserving. The need was also recognized for an actuarial standard of practice that would accompany the regulatory effort and would provide additional guidance to the actuary preparing principle-based reserves.

The regulatory structure for principle-based reserves is intended to be consistent with the objectives of statutory financial reporting, which emphasize solvency for the protection of policyholders. In addition to statutory reserves, the insurer is also required to hold additional assets, known as "risk-based capital." These reserves and risk-based capital are intended to create an adequate margin of safety to ensure that policyholder obligations and other legal obligations will be met when they come due.

While the responsibility for setting methods, models, and assumptions for each group of policies belongs to the company, VM-G of the *Valuation Manual* requires the company to assign to one or more qualified actuaries the responsibility of verifying that the methods, models, and assumptions appropriately reflect the requirements of the *Valuation Manual*. The actuary is expected to perform these responsibilities in a manner consistent with the reserve requirements prescribed in the *Valuation Manual*, keeping in mind that the reserve requirements are intended to support a statutory objective of a conservative valuation. The objective of a conservative valuation is discussed in both the Introduction to the *Valuation Manual* and in section 12 of the *Standard Valuation Law*. The Introduction to the *Valuation Manual* states that the statutory objective of a conservative valuation is to provide protection to policyholders and promote company solvency despite adverse fluctuations in financial conditions or operating results, pursuant to *Standard Valuation Law* requirements. Section 12 of the *Standard Valuation Law* states that the funding associated with the contracts and their risks must incorporate a level of conservatism that reflects conditions, including unfavorable events, that have a reasonable probability of occurring during the lifetime of the contracts.

Current Practices

Since its introduction in the 1980s, cash flow testing has become a well-established technique in most life insurance companies. ASOP No. 7, *Analysis of Life, Health, or Property/Casualty Insurer Cash Flows*, gives guidance on this technique. The current proposals for principle-based reserve regulations use cash flow testing as a component of the recommended approach.

The adoption of the *Actuarial Opinion and Memorandum Regulation* in 1991, together with ASOP No. 22, *Statement of Opinion Based on Asset Adequacy Analysis by Actuaries for Life or Health Insurers*, made it mandatory for companies to use one or more of a set of techniques

(collected under the general heading of "asset adequacy analysis") in testing for adequacy of reserves in light of the assets supporting them. Foremost among these techniques was cash flow testing. Asset adequacy analysis was designed as an aggregate test to determine whether the insurer should establish reserves in excess of the statutory minimums and includes methods of quantifying this amount. To a degree, these same techniques are paralleled in the determination of certain components of a principle-based valuation.

Product design features introduced since the 1980s have led to a need for additional guidance on how to reserve for products. Model Regulation 830, *Valuation of Life Insurance Policies Model Regulation* (XXX), and Actuarial Guideline 38 (AG 38), *Application of the Valuation of Life Insurance Policies Model Regulation* (AXXX), were developed to address concerns for specific products. Many observers believed these guidelines require reserves that are overly conservative, and a number of companies began using captives to finance these extra reserves. Recent changes to AG 38 and the introduction and subsequent revision of Actuarial Guideline 48, *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* (AG 48) and the introduction of Model Regulation 787, *Term and Universal Life Insurance Reserve Financing Model Regulation* (*Reserve Financing Regulation*), which deal with captive financing arrangements, have caused many companies to model their assets and reserves, rather than following a formulaic tabular approach. For 2015 and 2016 valuations, actuaries have been using methods from the *Valuation Manual* as part of the calculations required by AG 38 and AG 48. AG 48 and the Reserve Financing Regulation specifically reference VM-20.

Appendix 2

Comments on the Exposure Draft and Responses

The exposure draft of this proposed ASOP, *Principle-Based Reserves for Life Products under the NAIC Valuation Manual*, was issued in March 2017 with a comment deadline of May 31, 2017. Fourteen comment letters were received, some of which were submitted on behalf of multiple commentators, such as by firms or committees. For purposes of this appendix, the term "commentator" may refer to more than one person associated with a particular comment letter. The Principle-Based Reserve Task Force carefully considered all comments received, reviewed the exposure draft, and proposed changes. The Life Committee and the ASB reviewed the proposed changes and made modifications where appropriate.

Summarized below are the significant issues and questions contained in the comment letters and responses.

The term "reviewers" in appendix 2 includes the Principle-Based Reserves Task Force, the Life Committee, and the ASB. Also, unless otherwise noted, the section numbers and titles used in appendix 2 refer to those in the exposure draft.

GENERAL COMMENTS	
Comment	Several commentators said that the draft ASOP repeats too much of the Valuation Manual, and much of the text could be deleted.
Response	The reviewers considered these comments and made changes. In many places, the reviewers believe much of the overlap is necessary to set the stage for guidance.
Comment	One commentator said that the use of "should consider" within the ASOP gives the actuary "an overly easy out."
Response	The ASB is deliberate regarding the use of different terms of construction. The reviewers note that ASOP No. 1, *Introductory Standard of Practice*, indicates that the phrase "should consider" denotes action. ASOP No. 1 goes on to say, "If, after consideration, in the actuary's professional judgment an action is not appropriate, the action is not required and failure to take this action is not a deviation from the guidance in the standard." The reviewers believe the use of "should consider" is appropriate in the places it is used in this ASOP, and therefore made no change.
Comment	One commentator noted that the *Valuation Manual* is expected to be revised frequently, and that direct quotes may soon become outdated.
Response	The reviewers agree and removed direct quotes.
Comment	One commentator asked whether the ASOP could clarify whether Actuarial Guidelines apply to PBR.
Response	The reviewers note that VM-20 section 3.A.2 requires the application of VM-A and VM-C, which includes the Actuarial Guidelines. Therefore, the reviewers made no change.

Comment	One commentator noted overlap between the draft ASOP and the practice note on PBR.
Response	The reviewers note that practice notes and ASOPs may cover the same issues but serve different purposes, and therefore made no change.
Comment	One commentator suggested changing the title to *Principle-Based Reserves for Life Products under VM-20.*
Response	The reviewers agree with the suggestion and changed the title to *Principle-Based Reserves for Life Products under the NAIC Valuation Manual.*
Comment	One commentator suggested having a separate section to address simplifications, approximations, and model efficiency techniques as allowed under VM-20 Section 2.G.
Response	The reviewers chose not to restructure the ASOP, but did update individual sections.
Comment	Several commentators questioned whether this ASOP is necessary.
Response	The reviewers believe that the guidance provided in this ASOP is a necessary addition to actuarial standards.
TRANSMITTAL MEMORANDUM QUESTIONS	
Question 1: Is the guidance concerning VM-G clear and appropriate (section 3.1)?	
Comment	Most commentators said the guidance was clear and appropriate.
Comment	One commentator suggested moving the last paragraph of section 3.1, Regulatory Requirements, into section 1.2, Scope.
Response	The reviewers agree and moved the paragraph.
Question 2: Is the guidance concerning the PBR Actuarial Report clear and appropriate (section 4.2)?	
Comment	One commentator suggested adding "qualified" before "actuary" in section 4.2.
Response	The reviewers agree and made the change.
Question 3: Are there any significant inconsistencies between the requirements of this draft ASOP and the requirements of the *Valuation Manual*?	
Comment	Several respondents said there were no significant inconsistencies. The rest noted specific inconsistencies.
Response	The reviewers moved comments about inconsistencies to the appropriate section and addressed them there.
Question 4: Does the proposed effective date of December 31, 2017 provide sufficient time to comply with this standard if the ASB adopts the standard in September 2017?	
Comment	Three respondents said yes; two expressed concern that companies would not have enough time to comply with the ASOP.
Response	Given that companies could be calculating reserves under VM-20 by December 31, 2017, and limited concerns regarding the effective date, the ASB set December 31, 2017 as the ASOP's effective date.
SECTION 1. PURPOSE, SCOPE, CROSS REFERENCES, AND EFFECTIVE DATE	
Section 1.2, Scope	
Comment	One commentator suggested that the ASOP specify whether the ASOP applied to group or individual products.

Response	The reviewers prefer to keep the general reference to life products, as the guidance should apply to both individual and group products. The reviewers removed the word "individual" in sections 1.2 and 3.1. The actuary should refer to the *Valuation Manual* for applicability.
Comment	One commentator said it was unclear whether the ASOP pertains to quarterly valuations or only the annual filing.
Response	The reviewers note this standard applies to actuaries when performing actuarial services in connection with the calculation or review of reserves for life insurance policies subject to VM-20.
SECTION 2. DEFINITIONS	
Comment	Several commentators said that definitions in the *Valuation Manual* and the ASOP should be consistent.
Response	The reviewers agree that terms defined in the ASOP should conform to those in the *Valuation Manual* and noted such in the introduction to section 2. The reviewers also updated the definitions to conform to those in the *Valuation Manual.*
Section 2.6, Granularity (now section 2.5)	
Comment	One commentator asked why the definition of granularity was inconsistent with the proposed *Modeling* ASOP. Another commentator suggested language to streamline the definition.
Response	The reviewers made changes to make the definition more consistent with the definition in the proposed *Modeling* ASOP.
Section 2.13, Principle-based Reserve (now section 2.12)	
Comment	One commentator suggested that a clarification was needed if the reference to *Standard Valuation Law* was intended to mean the standard valuation law of the state of domicile, as opposed to the NAIC model *Standard Valuation Law*.
Response	The intended reference was to the NAIC model *Standard Valuation Law* (see section 1.1). The reviewers therefore revised the definition to clarify this.
Section 2.16, Relevant Experience (now section 2.15)	
Comment	One commentator asked why the definition of relevant experience was inconsistent with the definition in ASOP No. 25, *Credibility Procedures*.
Response	The reviewers note that the definition of relevant experience in ASOP No. 25 used another term neither defined in nor used in this ASOP and chose not to use the definition in ASOP No. 25.
Section 2.19, Sensitivity Testing (now section 2.18)	
Comment	One commentator suggested that the definition of sensitivity testing refer to one or more assumptions rather than a single assumption.
Response	The reviewers agree and made the change.
SECTION 3. ANALYSIS OF ISSUES AND RECOMMENDED PRACTICES	
Comment	One commentator suggested that the ASOP more closely align with the VM-20 language requiring that model simplifications and scenario reductions both not materially differ from and not result in a less conservative reserve than a directly calculated value.
Response	The reviewers agree and made changes throughout section 3 of the ASOP to bring the language into line with section 2 of VM-20.

Section 3.2, Minimum Net Premium Reserve (deleted)	
Comment	One commentator suggested removing the section on Net Premium Reserve because it offered no guidance.
Response	The reviewers agree and removed the section.
Section 3.3.1, Grouping (now section 3.2.1)	
Comment	Two commentators suggested wording changes to the section on grouping for exclusion tests.
Response	The reviewers agree and made the changes.
Section 3.3.2, Certification (now section 3.2.2)	
Comment	One commentator suggested having another section discussing actuarial demonstration for the stochastic exclusion test.
Response	The reviewers believe that section 6 of VM-20 provides sufficient guidance and made no change.
Comment	One commentator suggested eliminating some of the discussion taken directly from VM-20 of when and how a certification by a qualified actuary could be used to satisfy the stochastic exclusion test.
Response	The reviewers disagree and believe the language in the ASOP from VM-20 provides the context for the guidance. Therefore, reviewers made no change.
Section 3.3.2(a) (now section 3.2.2[a])	
Comment	One commentator suggested that the requirement to consider the impact on reserves of future material interest rate or asset return volatility risk leads the reader to believe that this is not a concern now.
Response	The reviewers believe the guidance is clear and made no change.
Section 3.3.2(b) (now section 3.2.2[b])	
Comment	One commentator suggested clarifying the guidance around certification to satisfy the stochastic exclusion test.
Response	The reviewers clarified the language.
Section 3.4.1, Modeling (now section 3.3, Modeling Stochastic and Deterministic Reserves)	
Comment	One commentator suggested that multiple references to minimum reserves in section 3.4 were not correct and should have been references to deterministic or stochastic reserves.
Response	The reviewers agree and changed the references to deterministic reserves or stochastic reserves. In addition, the reviewers changed the text with respect to overall margin (now section 3.3.2[f][4]) to clarify the intent of the ASOP.
Comment	Two commentators thought that the reference to the cost of shareholder dividends could be confused with policyholder dividends or dividends on assets.
Response	The reviewers disagree and made no change.
Section 3.4.1(a), (Cash Flow Model) (now combined with section 3.3.1, Model Segments)	
Comment	One commentator said that the text in 3.4(a)(1) was a restatement of VM-20.
Response	The reviewers agree and deleted some of the text that restated VM-20.

Comment	One commentator thought that certain references in the text could be deleted because the items were included in the definition of Asset Segmentation Plan in the ASOP.
Response	The reviewers note that the subject text appears in VM-20 and is necessary to set the context for the guidance, and did not make changes to this section of the ASOP. The reviewers deleted the definition of Asset Segmentation Plan as it is not needed.
Comment	One commentator suggested that the requirement to perform projections until no obligations remain was too stringent.
Response	The reviewers note that the subject text is a direct quote from VM-20. However, in clarifying another section of the ASOP, the reviewers deleted the reference to this requirement.
Section 3.4.1(b), Model Segments (now combined with section 3.3.1, Model Segments)	
Comment	One commentator suggested the reference to "asset earned rates" should be a reference to "net asset earned rate."
Response	The reviewers agree and made the change.
Comment	One commentator thought the ASOP might introduce an unintended restriction not in VM-20 to have separate segments for separate asset portfolios.
Response	The reviewers modified the language to clarify the intent.
Section 3.4.1(c), Model Validation (now section 3.3.1.2)	
Comment	One commentator was concerned about the level of review required for recent model updates.
Response	The reviewers modified the language to clarify the intent.
Comment	One commentator thought the ASOP should be more specific with respect to how a dynamic validation should be constructed.
Response	The reviewers believe the specifics of the dynamic validation may vary depending on the block and modeling system and made no changes to the text.
Comment	One commentator thought that the actuary should be required to review a static valuation of inforce values, and the ASOP did not require such review, but rather required the actuary to consider a static validation.
Response	The reviewers agree and modified the language accordingly.
Section 3.4.1(d)(1) (Liability Modeling Considerations) (now section 3.3.3[a])	
Comment	Two commentators thought the language allowing the actuary to use demonstrations of the impact of liability grouping done as of a date other than the valuation date was too lenient.
Response	The reviewers agree and modified the language to bring it into line with section 2 of VM-20.
Comment	One commentator suggested that the phrase "prior as of date" was unclear.
Response	The reviewers agree and modified the language to bring it into line with section 2 of VM-20.
Section 3.4.1(d)2 (Liability Modeling Considerations) (now section 3.3.3[b])	
Comment	One commentator thought that this section did not provide guidance beyond what is provided in VM-20 and VM-31 and that the examples covered some but not all of the situations that are included in the *Valuation Manual*.
Response	The reviewers believe the ASOP provides additional guidance beyond the text of VM-20 and VM-31, and therefore did not make these changes.

Section 3.4.1(e), Use of Prior Period Data (now section 3.3.4)	
Comment	One commentator suggested that the phrase "prior as of date" was unclear.
Response	The reviewers agree and made changes to the text.
Comment	One commentator suggested eliminating the first two paragraphs of this section that paraphrase VM-31 D.11.g.
Response	The reviewers believe that it is preferable to give the regulatory context in which the guidance is offered. Therefore, the reviewers made no change in response to this comment.
Section 3.4.2, Assumptions (now section 3.4, Assumptions for Stochastic and Deterministic Reserves)	
Comment	One commentator suggested reference to the draft ASOP on Assumptions.
Response	The reviewers note that ASOPs do not include references to draft standards, and therefore made no change.
Comment	One commentator suggested clarifying the use of sensitivity tests during the assumption setting process.
Response	The reviewers agree and clarified the language.
Section 3.4.2(a), Mortality (now section 3.4.1)	
Comment	Several commentators suggested clarifying the language around mortality trends.
Response	The reviewers agree and clarified the language.
Comment	Two commentators recommended that lack of a mortality improvement assumption be labelled as an implicit margin.
Response	The reviewers clarified the reference to implicit margins.
Section 3.4.2(b), Investment Experience (now section 3.4.2)	
Comment	Two commentators pointed out that a reference was missing to the alternative investment strategy mentioned in VM-20 section 7.
Response	The reviewers added the following sentence: "The actuary should comply with the requirement in section 7 of VM-20 that the modeled reserve is not less than the reserve that would have been obtained by the alternative investment strategy."
Section 3.4.2(c)(1)(vi) (Policyholder Behavior) (now section 3.4.3[a][6])	
Comment	One commentator pointed out redundancy in the guidance on scenario-dependent assumptions for policyholder behavior.
Response	The reviewers modified the language to address the commentator's concern.
Section 3.4.2(c)(2), Premium Assumptions (now section 3.4.3[b], Premium Payment Assumptions)	
Comment	Two commentators suggested that language around premium patterns be clarified.
Response	The reviewers agree and revised the paragraph.
Section 3.4.2(d)(2), Applying Recent Expense Experience (now section 3.4.4[b])	
Comment	One commentator suggested new language for consideration of unusual expenditures.
Response	The reviewers disagree and made no change.

Section 3.4.2(e), Taxes (now section 3.4.5)	
Comment	One commentator suggested removing the section on taxes because it duplicates VM-20.
Response	The reviewers believe the language included in the ASOP provides clarity, and therefore made no change in response to this comment.
Comment	One commentator pointed out that both Federal and foreign income taxes should be excluded from reserve calculations.
Response	The reviewers agree and revised the language.
Section 3.4.2(f), Determining Assumption Margins (now section 3.4.6)	
Comment	One commentator pointed out that nonguaranteed elements are not assumptions, but management decisions, and asked for clarification on how to apply margins to this assumption.
Response	The reviewers excluded nonguaranteed elements from the example in response to this comment.
Comment	One commentator pointed out that although mortality assumptions are highly prescribed, some of the ASOP guidance for other assumptions could be applied to the mortality assumption, and asked that language be changed to apply the guidance to the mortality assumption.
Response	The reviewers agree and changed the language in 3.4.2(f)(1) to clarify that the guidance applies to nonprescribed mortality margins.
Section 3.4.2(f)(2), Establishing Margins (now section 3.4.6[b])	
Comment	One commentator suggested that the ASOP reference the VM-31 requirement of estimating an aggregate margin in the deterministic reserves.
Response	The reviewers agree and added a sentence to this effect to section 3.4.2(f)(4) (now 3.3.2[f][4]).
Section 3.4.2(f)(3), Sensitivity Testing (now section 3.4.6[c])	
Comment	One commentator objected to the term "relatively insignificant" as applied to margins.
Response	The reviewers revised the language to "non-material impact."
Section 3.5.1, Stochastic and Deterministic Reserves Under Reinsurance (now Stochastic and Deterministic Reserves Net of Reinsurance)	
Comment	One commentator suggested that the ASOP more closely align with the VM-20 language regarding model simplifications and scenario reductions.
Response	The reviewers agree and made changes to bring the language into line with section 2 of VM-20.
Section 3.5.2, Pre-Reinsurance-Ceded Minimum Reserve	
Comment	One commentator suggested that the term "net premium reserve" be replaced by the defined term "minimum net premium reserve" in section 3.5.2.
Response	The reviewers deleted the definition and revised the language to be consistent with VM-20.
Comment	One commentator requested clarification of when a hypothetical portfolio would be required.
Response	The reviewers revised the language to clarify when a hypothetical portfolio is required.
Section 3.5.3, Credit for Reinsurance Ceded	
Comment	One commentator suggested a revision to language around credit for reinsurance.
Response	The reviewers agree and made this change.

Section 3.7, Documentation	
Comment	One commentator suggested streamlining the language around verification.
Response	The reviewers agree and modified the language.
Comment	One commentator believed that verification that methods, models, assumptions, and controls meet the standards of the *Valuation Manual* is part of a company's internal control process, and should not be included in the PBR report.
Response	The reviewers note that the verifications are required by VM-G, but modified the language to take the commentator's concerns into account.
Section 4, Communications and Disclosures	
Comment	One commentator suggested that the qualified actuaries' responsibilities spelled out in VM-G be detailed in the ASOP.
Response	The reviewers do not believe it is necessary to repeat this portion of the *Valuation Manual* and therefore made no change.
Section 4.2, PBR Actuarial Report	
Comment	One commentator said the language around using the work of the appointed actuary for the stochastic exclusion test was not strict enough, since the appointed actuary is not required to do cash flow testing.
Response	The reviewers moved the guidance from section 4.2 to section 3.3.2 (now section 3.2.2, Certification), and added language to say, "the actuary may rely upon an analysis performed for a different purpose that uses a set of scenarios which, based on the actuary's professional judgement, adequately captures the interest rate or asset return volatility risk."

ACTUARIAL STANDARDS BOARD

Actuarial Standard
of Practice
No. 53

Estimating Future Costs for Prospective Property/Casualty Risk Transfer and Risk Retention

Developed by the
Ratemaking Task Force of the
Casualty Committee of the
Actuarial Standards Board

Adopted by the
Actuarial Standards Board
December 2017

Doc. No. 190

T A B L E O F C O N T E N T S

APPENDIXES

ASOP No. 53—Doc. No. 190

December 2017

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Estimating Future Costs for Prospective Property/Casualty Risk Transfer and Risk Retention

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 53, *Estimating Future Costs for Prospective Property/Casualty Risk Transfer and Risk Retention*

This document contains ASOP No. 53, *Estimating Future Costs for Prospective Property/Casualty Risk Transfer and Risk Retention*.

Background

Estimating future costs for prospective property/casualty risk transfer and risk retention has been a fundamental part of actuarial practice since the beginning of the profession. Estimating future costs based on sound actuarial practice is essential to the integrity of the insurance and risk financing system and is key to fulfilling the promises embodied in insurance contracts. The board of directors of the Casualty Actuarial Society (CAS) adopted the *Statement of Principles Regarding Property and Casualty Ratemaking* (*Statement of Principles*) in May 1988 (before the ASB was established). This document featured four fundamental principles of ratemaking and also discussed additional considerations. In 2009, the CAS requested that the ASB develop an actuarial standard of practice in the area of property/casualty ratemaking. In its request, the CAS noted that the *Statement of Principles* contained considerations that might be expanded to become the basis of an ASOP.

Ratemaking has become much more complex and sophisticated since the CAS *Statement of Principles* was adopted. In crafting this ASOP and responding to comments from its initial exposures, the ASB quickly realized that there are significant differences of opinion within the profession regarding certain aspects of ratemaking, including pricing, price optimization methodologies, and rate filing requirements, that would need to be reconciled before a comprehensive standard of practice on ratemaking could be developed. Therefore, to create a standard of practice for the core aspects of ratemaking that could be issued in a reasonable amount of time, the ASB has chosen to develop this ASOP to pertain solely to the development or review of future cost estimates for prospective property/casualty risk transfer and risk retention. It should be noted, however, that upon completion of this proposed ASOP, the ASB will give consideration to the development of a standard of practice on rate filings in an attempt to address the various issues within rate regulatory discussions today (for example, price optimization, unfair discrimination, and the Principles contained in the current CAS *Statement of Principles*).

It should be noted that this ASOP incorporates all of the Considerations contained in the CAS *Statement of Principles* and addresses issues related to the estimation of costs for risk transfer

and risk retention not currently addressed in existing ASOPs. This ASOP also references other existing ASOPs that include relevant issues related to the estimation of future costs for prospective risk transfer and risk retention.

First Exposure Draft

In September 2014, the ASB approved a first exposure draft with a comment deadline of January 31, 2015. Twenty-two comment letters were received and considered in making changes that were reflected in the second exposure draft.

Second Exposure Draft

In December 2015, the ASB approved a second exposure draft with a comment deadline of April 30, 2016. Eighteen comment letters were received and considered in making changes that were reflected in the third exposure draft.

Third Exposure Draft

In December 2016, the ASB approved a third exposure draft with a comment deadline of April 30, 2017. Thirteen comment letters were received and considered in making changes that are reflected in this ASOP. As a result of the comment letters, the ASB made changes, including the following: (1) modified the title of the ASOP to *Estimating Future Costs for Prospective Property/Casualty Risk Transfer and Risk Retention*; (2) limited the disclosure of assumptions to material assumptions; (3) clarified the guidance for the treatment of unusual events, while changing the designation to be infrequent events; and (4) clarified the guidance for intended measure. For a summary of issues contained in these comment letters, please see appendix 2. In addition, the ASB took editorial suggestions where they improved the document.

The ASB thanks everyone who took the time to contribute comments and suggestions on each of the exposure drafts.

The ASB voted in December 2017 to adopt this standard of practice.

ASOP No. 53—Doc. No. 190

Ratemaking Task Force

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The Actuarial Standards Board (ASB) sets standards for appropriate actuarial practice in the United States through the development and promulgation of Actuarial Standards of Practice (ASOPs). These ASOPs describe the procedures an actuary should follow when performing actuarial services and identify what the actuary should disclose when communicating the results of those services.

ASOP No. 53—Doc. No. 190

ACTUARIAL STANDARD OF PRACTICE

ESTIMATING FUTURE COSTS FOR PROSPECTIVE PROPERTY/CASUALTY RISK TRANSFER AND RISK RETENTION

STANDARD OF PRACTICE

Section 1. Purpose, Scope, Cross References, and Effective Date

1.1 Purpose—This actuarial standard of practice (ASOP) provides guidance to actuaries when performing actuarial services with respect to developing or reviewing future cost estimates for prospective property/casualty **risk transfer** and **risk retention**. This includes future cost estimates for insurance, reinsurance, self-insurance, loss portfolio transfers, or any other mechanisms for **risk transfer** or **risk retention**.

1.2 Scope—This standard applies to actuaries when performing actuarial services with respect to developing or reviewing future cost estimates (commonly known as actuarial indications) for prospective property/casualty **risk transfer** and **risk retention**. For example, this standard applies when actuaries are developing future cost estimates underlying product prices, estimating funding requirements for self-insured programs and captives, and developing reinsurance prices.

As estimates are often made for separate elements of the cost of **risk transfer** and **risk retention** (for example, loss and loss adjustment expenses, operational and administrative expenses, the cost of reinsurance, and the cost of capital) and subsequently summed to a total cost estimate, this standard applies to the separate elements as well as the total. If the actuary's role relates to any of the elements of the future cost estimate, the guidance in this standard applies only to the actuarial services related to those elements. If the actuary's actuarial services involve reviewing future cost estimates developed by another party, the actuary should use the guidance in section 3 to the extent practicable. This standard also applies to developing or reviewing the future cost estimates by class within a risk classification system.

Actuarial services involved in developing or reviewing estimates of future costs may include actuarial communications, expert testimony, regulatory activities, legislative activities, or statements concerning public policy to the extent these activities involve providing an opinion on property/casualty future cost estimates.

If the actuary departs from the guidance set forth in this standard in order to comply with applicable law (statutes, regulations, and other legally binding authority), or for any other reason the actuary deems appropriate, the actuary should refer to section 4.

1.3 Cross References—When this standard refers to the provisions of other documents, the reference includes the referenced documents as they may be amended or restated in the future, and any successor to them, by whatever name called. If any amended or restated

document differs materially from the originally referenced document, the actuary should consider the guidance in the referenced standard as amended or restated to the extent it is applicable and appropriate.

1.4 Effective Date—This standard is effective for work performed on or after August 1, 2018.

Section 2. Definitions

The terms below are defined for use in this standard.

2.1 Coverage—The terms and conditions of a plan or contract, or the requirements of applicable law, that create an obligation to pay benefits, expenses, or claims associated with contingent events.

2.2 Exposure Base—A basic unit that is used to measure the future cost of **risk transfer** and **risk retention**. This unit can vary by element of cost.

2.3 Method—A systematic procedure for developing, reviewing, or revising future cost estimates or elements thereof.

2.4 Model—A simplified representation of relationships among real world variables, entities, or events using statistical, financial, economic, mathematical, or scientific concepts and equations.

2.5 Risk Retention—A risk-management and risk-control strategy for the assessment, management, or financing of retained risk associated with the specific **coverage**. Examples of **risk retention** include self-insurance and certain types of single parent captives.

2.6 Risk Transfer—A risk-management and risk-control strategy, involving legally binding agreements, that shifts responsibility from one party to another or indemnifies one party by another party for the financial obligations associated with the **coverage**. Examples of **risk transfer** include insurance, reinsurance, and loss portfolio transfers.

Section 3. Analysis of Issues and Recommended Practices

3.1 Future Cost Estimate—The actuary should determine the elements that are appropriate to include in the future cost estimate. Such elements should relate to the applicable **coverage** and include loss and loss adjustment expenses, operational and administrative expenses, the cost of reinsurance, and the cost of capital.

3.2 Intended Measure—The actuary should determine the intended measure of the future cost estimate based on the purpose or use of the estimate. The intended measure may vary for

each element of the future cost estimate as needed and appropriate. Intended measures will be affected by the desires or needs of the principal, legal requirements, and the regulatory environments in which the future cost estimate will be used.

Examples of intended measures include the mean, the mean plus risk margin, the high or low estimate within a range of reasonably possible outcomes, and a specified percentile of the distribution of reasonably possible outcomes. There are instances in which other measures may be appropriate based upon the purpose or use of the estimate.

3.3 Organization of Data—The actuary should determine what data are available and appropriate for estimating future costs. Based on what data are available and appropriate, the actuary should determine how the data will be organized to develop or review the future cost estimate or any element of the future cost estimate.

The actuary should consider the level of data aggregation that the actuary believes is appropriate for the types of cost estimation analyses to be undertaken. Examples of aggregation **methods** include aggregating by accident period, calendar period, policy period, and report period. The nature of the **coverage**, the element of the future cost being estimated, and the type of analysis will influence the actuary's selection of the level of data aggregation.

The actuary also should consider segmenting the data if the actuary believes it will improve the cost estimation analysis, subject to credibility considerations (see section 3.11). Examples of data segmentation include segmenting the data by **coverage**, risk class, or risk characteristic. Segmenting the data to more refined levels may be appropriate for estimating future costs within a risk classification system.

3.4 Data Quality—The actuary should refer to ASOP No. 23, *Data Quality*, for guidance in the consideration of the choice and use of data for estimating future costs.

3.5 Methods, Models, and Assumptions—The actuary should select appropriate **methods** or **models** consistent with the intended measure for each element of the future cost. The actuary should use reasonable assumptions (including parameters) appropriate to each **method** or **model**. Assumptions may be implicit or explicit and may involve interpreting available experience, projecting future experience, or adjusting for changes in conditions affecting the available experience. The actuary should use **methods** or **models**, along with reasonable assumptions, that, in the actuary's professional judgment, have no known significant bias in the aggregate relative to the intended measure. When using **models**, the actuary should refer to ASOP No. 38, *Using Models Outside the Actuary's Area of Expertise (Property and Casualty).*

3.6 Exposure Base—If selecting a new **exposure base** or changing an existing **exposure base**, the actuary should select an **exposure base** that bears a strong relationship to the cost of **risk transfer** or **risk retention** and is practical. Characteristics of a practical **exposure base** may include that the **exposure base** is objectively measurable and easily verifiable.

Some mechanisms for implementing **risk transfer** and **risk retention** may use multiple **exposure bases**, with different **exposure bases** applying to different aspects of **coverage** provided (for example, sales revenue for general liability, amount of insurance for commercial property). In undertaking analyses for these mechanisms, it may be appropriate to select one **exposure base**, referred to as the composite **exposure base**, to act as a proxy for the more refined **coverage**-by-**coverage exposure bases**.

3.7 Risk Classification System—Risk classification systems can be an integral part of the development of future cost estimates for prospective property/casualty **risk transfer** and **risk retention**. The actuary should refer to ASOP No. 12, *Risk Classification (for All Practice Areas)*, for guidance in designing, reviewing, or changing a risk classification system.

3.8 Use of Historical Data—The actuary should determine the extent to which historical data (premium, exposure, loss, and loss adjustment) are available and appropriate for estimating future costs. For example, the data should be consistent with insurance policy provisions or risk-management and risk-control strategies of the applicable insurance, reinsurance, self-insurance, loss portfolio transfers, or any other mechanisms for **risk transfer** or **risk retention**.

3.8.1 Use of Historical Exposure and Premium Data—If the actuary is using historical exposure and premium data, the actuary should consider adjusting the data to reflect a consistent measurement of the historical exposures and rate level, if applicable. These considerations include adjusting historical data to a common exposure level and adjusting premium data for historical changes in the way premium charges are calculated, including both changes to manual rates and the impact of any individual risk rating plans, if applicable. If the actuary is adjusting historical exposure and premium data, the actuary should consider changes during and after the historical period and should select an appropriate **method** for adjustments that is consistent with the nature of the available data, the intended measure, and the purpose of the analysis.

3.8.2 Use of Historical Loss and Loss Adjustment Expenses—The actuary should determine the extent to which historical loss and loss adjustment expenses are available and appropriate as a basis for estimating future costs. In estimating future costs related to loss and loss adjustment expenses, the actuary should consider adjusting historical data using **methods** or **models**, along with reasonable assumptions, that, in the actuary's professional judgment, reflect the ultimate value of the loss and loss adjustment expenses. The actuary also should consider the following:

a. the **coverage** being evaluated;

b. the type of analysis (such as overall future cost level analysis or risk classification analysis); and

c. the differences between the future period and the historical conditions under which the historical claims occurred, the claims were adjusted, and the claim reserves were set.

The actuary should consider whether the analysis of loss adjustment expense data requires different **methods**, **models**, or assumptions than the analysis of loss data. Additionally, the actuary should consider whether different **coverages** within a line of business may require different **methods**, **models**, or assumptions.

3.8.3 Trends—The actuary should consider past and prospective changes in claim costs, claim frequencies, exposures, and premiums. The actuary should refer to ASOP No. 13, *Trending Procedures in Property/Casualty Insurance*, for guidance in the selection of trends for estimating future values of costs associated with the elements that make up the future cost estimate.

3.8.4 Additional Adjustments to Historical Data—The actuary should consider whether additional adjustments to the historical data are needed to reflect the environment expected to exist in the period for which the future costs are being estimated. If the actuary makes adjustments, these adjustments should be made so that the historical data are stated and used on a consistent basis. Examples of changes that may suggest the need for adjustments include the following:

a. judicial, legislative, or regulatory changes;

b. mix of business changes;

c. policy contract changes;

d. claim practice or reserving changes;

e. operational changes;

f. accounting changes; and

g. reinsurance changes.

3.9 Expenses—Some types of expenses may require different treatment for future cost estimates than other types of expenses. The actuary should refer to ASOP No. 29, *Expense Provisions in Property/Casualty Insurance Ratemaking*, and ASOP No. 13 for guidance in estimating future expenses.

3.10 New Coverages or Exposures—If the actuary is estimating the future cost for a new **coverage** or exposure, and the historical loss and loss adjustment expenses are either unavailable, limited, or not fully representative of the new **coverage** or exposure, the

actuary should consider the following in selecting data and developing **methods**, **models**, or assumptions for use in estimating the future costs:

a. data from **coverages** or exposures that are similar to the new **coverage** or exposure;

b. data on the phenomenon or events that are contemplated by the new **coverage** or exposure;

c. differences between **coverages** or exposures with available relevant data and the new **coverage** or exposure; and

d. appropriate adjustments to the available relevant data to reflect expected differences identified in section 3.10(c).

3.11 Credibility—The actuary should refer to ASOP No. 25, *Credibility Procedures*, for guidance in considering the credibility given to a particular set of data and the selection of the relevant experience used to supplement the data, which is often referred to as the complement of credibility.

3.12 Treatment of Catastrophes—The actuary should refer to ASOP No. 38 and ASOP No. 39, *Treatment of Catastrophe Losses in Property/Casualty Insurance Ratemaking*, for guidance in the consideration of catastrophes.

3.13 Treatment of Infrequent Events—The actuary should consider whether it is necessary to use **methods** that adjust for either the presence or absence of infrequent large losses in the historical data set. For example, some data sets may require using a longer experience period to calculate an appropriate provision for large losses. Similarly, when estimating expected losses in higher layers that contain infrequent losses, different **methods** may be appropriate. In some cases, the **methods** used to deal with catastrophe losses may be applicable and the actuary should refer to ASOP No. 39.

3.14 Reinsurance—When the cost of reinsurance is reflected in future cost estimates, the actuary should select appropriate **methods** or **models**, along with reasonable assumptions, for estimating the cost associated with reinsurance arrangements expected to apply during the period for which the future costs are being estimated. If the cost of reinsurance is treated as an expense, the actuary should refer to ASOP No. 29 for additional guidance.

3.15 Profit and Contingency Provisions and the Cost of Capital—The actuary should refer to ASOP No. 30, *Treatment of Profit and Contingency Provisions and the Cost of Capital in Property/Casualty Insurance Ratemaking*, for guidance in the consideration of the profit and contingency provisions and the cost of capital.

3.16 Additional Funding Sources—In some mechanisms for **risk transfer**, income may come from other sources, such as assessments paid by policyholders or other parties including

insurers, a group of insurance purchasers, or taxpayers. The actuary should consider additional sources of funding and their allocation and timing when estimating future costs.

Section 4. Communications and Disclosures

4.1 Actuarial Communications—When issuing actuarial communications under this standard, the actuary should refer to ASOP Nos. 12, 13, 23, 25, 29, 30, 38, 39, and 41, *Actuarial Communications*. In addition, the actuary should disclose the following in an appropriate actuarial communication:

a. the elements included in the future cost estimates (see section 3.1);

b. the intended measure used in developing or reviewing the future cost estimates (see section 3.2);

c. the **methods** or **models** used in developing or reviewing the future cost estimates (see section 3.5); and

d. the material assumptions made by the actuary and used in developing or reviewing the future cost estimates (see section 3.5).

4.2 Disclosures—The actuary should also include the following in an actuarial communication, if and when applicable:

a. if appropriate data are available for the analysis, the actuary should disclose the data organization (level of data aggregation and, if considered, segmentation) used for each element (see section 3.3);

b. if the actuary selects a new **exposure base** or changes an existing **exposure base**, the actuary should disclose the new or revised **exposure base** (see section 3.6);

c. if the actuary uses historical data, the actuary should disclose any adjustments made to the historical data to account for expected differences between the historical data and future experience (see sections 3.8 and 3.10). For adjustments made to address issues of data quality, refer to ASOP No. 23;

d. if the actuary estimates future costs for a **coverage** or exposure when the historical data are unavailable, limited, or not fully representative, the actuary should disclose the data used and any appropriate adjustments made to the data (see sections 3.8.4 and 3.10);

e. when the cost of reinsurance is reflected in future cost estimates, the actuary should disclose the **methods** or **models**, along with the material assumptions, used in estimating the costs of reinsurance (see section 3.14);

f. if the actuary considers additional sources of funding, the actuary should disclose how the funding was reflected in estimating the future cost (see section 3.16);

g. the disclosure in ASOP No. 41, section 4.2, if any material assumption or **method** was prescribed by applicable law;

h. the disclosure in ASOP No. 41, section 4.3, if the actuary states reliance on other sources and thereby disclaims responsibility for any material assumption or **method** selected by a party other than the actuary; and

i. the disclosure in ASOP No. 41, section 4.4, if, in the actuary's professional judgment, the actuary has otherwise deviated materially from the guidance of this ASOP.

Appendix 1

Background and Current Practices

Note: This appendix is provided for informational purposes and is not part of the standard of practice.

Background

Cost estimation, ratemaking, and risk retention have been a fundamental part of actuarial practice since the beginning of the profession. A critical piece of these professional activities is the estimation of future costs.

Ratemaking principles and standards of practice are important to protect the soundness of the system, permit economic incentives to operate, and thereby encourage widespread availability of coverage. The board of directors of the Casualty Actuarial Society (CAS) adopted the *Statement of Principles Regarding Property and Casualty Ratemaking* in May 1988. The *Statement of Principles* has served as a foundational source of information regarding future cost estimation and ratemaking, providing both principles and considerations. Several actuarial standards of practice (ASOPs) issued by the Actuarial Standards Board are also important in future cost estimation, including the following:

- ASOP No. 12, *Risk Classification (for All Practice Areas);*
- ASOP No. 13, *Trending Procedures in Property/Casualty Insurance*;
- ASOP No. 23, *Data Quality*;
- ASOP No. 25, *Credibility Procedures;*
- ASOP No. 29, *Expense Provisions in Property/Casualty Insurance Ratemaking*;
- ASOP No. 30, *Treatment of Profit and Contingency Provisions and the Cost of Capital in Property/Casualty Insurance Ratemaking*;
- ASOP No. 38, *Using Models Outside the Actuary's Area of Expertise (Property and Casualty)*;
- ASOP No. 39, *Treatment of Catastrophe Losses in Property/Casualty Insurance Ratemaking*; and
- ASOP No. 41, *Actuarial Communications*.

Current Practices

Over the years, a multitude of methods and models for the estimation of future costs have been designed, put into use, and modified as a result of experience. Materials and publications of the CAS such as the *Syllabus of Basic Education* (formerly the *Syllabus of Examinations*), *Variance*, *Proceedings* (discontinued in 2014), *Foundations of Casualty Actuarial Science*, Ratemaking and Ratemaking/Product Management Seminar archives, and others provide discussions of current practices. While these may provide useful educational guidance to practicing actuaries, none is an actuarial standard of practice.

Throughout our history as a profession, actuarial future cost estimates have not always been the sole basis for rates and prices in risk-transfer or risk-retention transactions. For example, other important influences may include regulatory requirements and business objectives. Such other influences may support or compete with actuarial future cost estimates in deciding upon final rates and prices.

The increased availability of data and advances in technology, tools, techniques, and learnings from other disciplines have resulted in continued evolution of methods and models for the estimation of future costs. Innovation and use of new data and technologies will continue.

Appendix 2

Comments on the Third Exposure Draft and Responses

The third exposure draft of this ASOP, *Estimating Future Costs for Prospective Property/Casualty Risk Transfer and Risk Funding* (previously *Property/Casualty Ratemaking*), was issued in December 2016 with a comment deadline of April 30, 2017. Thirteen comment letters were received, some of which were submitted on behalf of multiple commentators, such as firms or committees. For purposes of this appendix, the term "commentator" may refer to more than one person associated with a particular comment letter. The Ratemaking Task Force carefully considered all comments received, reviewed the exposure draft, and proposed changes. The Casualty Committee and the ASB reviewed the proposed changes and made modifications where appropriate.

Summarized below are the significant issues and questions contained in the comment letters and responses.

The term "reviewers" in appendix 2 includes the Ratemaking Task Force, the Casualty Committee, and the ASB. Unless otherwise noted, the section numbers and titles used in appendix 2 refer to those in the third exposure draft.

TRANSMITTAL MEMORANDUM QUESTIONS	
Question 1: Does the proposed ASOP provide sufficient and appropriate guidance to actuaries estimating future costs for prospective property/casualty risk transfer and risk funding?	
Comment	Six commentators agreed that the proposed ASOP provided sufficient guidance.
Question 2: The proposed ASOP has added reference to "intended measure" for the estimation of all future costs to eliminate any implication that the only appropriate estimate of all future costs was an expected value without any consideration of potential variability. Is it clear what is meant by "intended measure"?	
Comment	One commentator suggested that the section does not recognize the instances where elements of the future cost estimates have different intended measures, whereas other sections do (for example, section 3.5).
Response	The reviewers agree and made the suggested change.
Comment	One commentator suggested that the reference in this section to the appropriate consideration of potential variability, versus expected value, is too limiting. The commentator said that the benefit and value of the ASOP's use of "intended measure" for actuarial cost estimates is to recognize that a number of key considerations can affect the basis for such estimates. The commentator also noted that such considerations for the intended measure might include adjustments for large infrequent losses, catastrophic losses, paucity of relevant data, data credibility issues, etc.
Response	The reviewers modified section 3.14 (now section 3.13) to provide guidance to actuaries when dealing with infrequent events and associated data issues.
Question 3: Are the definitions of "risk transfer" and "risk funding" in the proposed ASOP complete from the perspective of all activities in which an actuary is involved when estimating future costs for prospective property/casualty risk transfer and risk funding?	
Comment	Two commentators agree that the definitions are sufficient and clear.

Comment	Several commentators suggested that the phrase "risk funding" may be confusing or misleading, and two commentators suggested replacing "risk funding" with "risk retention."
Response	The reviewers agree that the phrase "risk funding" could be misinterpreted and changed it to "risk retention."
Comment	One commentator suggested clarifying that the scope of the ASOP broadly includes estimating revenue/funding associated with risk transfer contracts, not just the estimation of future costs.
Response	The reviewers agree that the use of the word "funding" in the two cases may be confusing and clarified the language of the scope to "developing or reviewing future cost estimates…for prospective property/casualty risk transfer and risk retention."
Comment	One commentator suggested deleting "contractual" from the definition of risk transfer, as this would make the definition more consistent with the definition of "coverage."
Response	The reviewers agree and made the suggested change.
Question 4: Is it clear that this proposed ASOP provides guidance only for the estimation of future costs for prospective property/casualty risk transfer and risk funding? Is it clear that the scope does not include items such and the balancing and interaction of potentially competing objectives related to regulation, business objectives, and actuarial cost estimates?	
Comment	Four commentators stated that the scope of the proposed ASOP was clear.
Comment	One commentator said that the proposed ASOP was not completely clear with regard to not including items such as the balancing and interaction of potentially competing objectives related to regulation, business objectives, and actuarial cost estimates. The commentator suggested adding language in the appendix that clearly stated these exclusions from the scope.
Response	The reviewers believe that the scope is clear, and therefore made no change in response to this comment.
Comment	One commentator said that generally it was clear that the ASOP provides guidance for the estimation of future costs for prospective property/casualty risk transfer and risk funding, but noted that the introduction of the intended measure may address considerations underlying the other objectives.
Response	The reviewers made changes to section 3.2 to further clarify the concept.
Question 5: When the role of the actuary is reviewing the estimate of future costs developed by another actuary, is the guidance provided in the proposed ASOP sufficient and clear?	
Comment	Four commentators responded that the proposed ASOP was clear on this point.
Question 6: Is the level of disclosure required in the proposed ASOP sufficient and appropriate? If the response is no, what are the issues?	
Comment	Four commentators responded that the level of disclosure was sufficient and appropriate.
GENERAL COMMENTS	
Comment	Two commentators said that the proposed ASOP addressed many of the concerns that were present in earlier drafts. One of these commentators said that there were still a few areas that could benefit from clarification.
Response	The reviewers addressed specific comments in the relevant sections.

SECTION 1. PURPOSE, SCOPE, CROSS REFERENCES, AND EFFECTIVE DATE	
Section 1.1, Purpose	
Comment	One commentator suggested changing the language to "future cost estimates for prospective decisions or transactions."
Response	The reviewers consider the current language to be sufficiently clear and therefore made no change.
Comment	One commentator suggested that the second sentence be expanded to mention "risk pooling" and to add a reference to "any other risk-retention mechanisms."
Response	The reviewers disagree regarding the addition of "risk pooling," as it is a subset of many of the other items mentioned; however, the reviewers agree that the addition of "any other risk-retention mechanism" clarifies the language and made the suggested change.
Section 1.2, Scope	
Comment	One commentator suggested deleting the word "contract" in the phrase "developing reinsurance contract prices," as at times it may not be a contract but rather a slip or program that the estimate is being developed for.
Response	The reviewers agree and made the suggested change.
SECTION 2. DEFINITIONS	
Section 2.2, Exposure Base	
Comment	One commentator suggested expanding the definition of exposure base to refer to the quantity of risk-transfer or risk-funding cost.
Response	The reviewers note that terms such as "measure" and "cost" are by their very nature quantitative, and made no change.
Comment	One commentator suggested that the definition of exposure base be modified to state that it is a basic unit that "may be used to measure future risk transfer and risk transfer costs" because there are several cases where this basic unit may only be used for rating and not exposure measurement.
Response	The reviewers note that when an actuary develops an estimate of the future cost, that cost typically is relative to some basis. Therefore, the phrase "is used" is more appropriate than "may be used." The reviewers made no change.
Comment	One commentator suggested that the definition include "as a measure which is approximately proportional to the future costs."
Response	The reviewers note that section 3.6 addresses considerations for an exposure base and that the phrase "bears a strong relationship to…cost" is more appropriate than the suggested language. Therefore, the reviewers made no change.
Section 2.4, Model	
Comment	Two commentators suggested that the definition of Model be revised to eliminate the words "a simplified presentation" because models are often quite complex. They also suggested using the definition in ASOP No. 38, *Using Models Outside the Actuary's Area of Expertise (Property and Casualty)*.
Response	The reviewers note that even complex models are always a simplified representation of all the items that impact the modeled system. The reviewers also note that ASOP No. 38 is currently being revised to pertain to catastrophe model use in all areas of practice. Therefore, the reviewers made no change.

Section 2.5, Risk Funding (now Risk Retention)	
Comment	One commentator suggested replacing "risk funding" with "risk retention," as the very act of creating a future cost estimate is a step toward risk funding. Once the estimate has been made, the estimate is the basis for retaining or transferring the risk.
Response	The reviewers agree and replaced "risk funding" with "risk retention."
Comment	One commentator suggested replacing the word "loss" with "specific coverage," as it is the coverage that gives rise to the need to estimate the future cost.
Response	The reviewers agree and made the change.
Section 2.6, Risk Transfer	
Comment	One commentator suggested that the word "loss" in this context should be replaced by "coverage," as the risk transfer is truly defined in terms of the coverage.
Response	The reviewers agree and made the change.
Comment	One commentator suggested replacing the word "contractual" with "legally binding agreements." The commentator also suggested adding "indemnify one party by another party," as the agreements cannot legally shift the responsibility for risk but they can indemnify.
Response	The reviewers agree and made the changes.
SECTION 3. ANALYSIS OF ISSUES AND RECOMMENDED PRACTICES	
Section 3.1, Future Cost Estimate	
Comment	One commentator suggested expanding the list of examples of the elements of a future cost estimate to include the cost of ceded reinsurance.
Response	The reviewers understood the concern, added the cost of reinsurance as an item in this section and in section 1.2, and modified section 3.14 and 4.2(e).
Comment	One commentator suggested modifying the second sentence to include language that specifically relates the elements to the applicable coverage.
Response	The reviewers agree and made the change.
Section 3.2, Intended Measure	
Comment	Several commentators said that the section was unclear, and one commentator suggested that the section would be clearer if the language was recast in terms of the purpose or presumed use.
Response	The reviewers agree and revised the section to clarify that the intended measure is determined by the actuary based on the purpose or use of the future cost estimate.
Comment	Two commentators suggested that the "intended measure" might be better handled as a definition.
Response	The reviewers disagree and have followed the treatment of intended measure in the same manner as ASOP No. 43, *Property/Casualty Unpaid Claim Estimates*.
Comment	One commentator suggested changing the word "intent" to "intended use."
Response	The reviewers agree that the word "intent" should be changed and have replaced it with "purpose or use of the estimate."

Comment	One commentator suggested that the ASOP be more specific about the measurement basis or considerations that impact the intended measure that is selected and provided suggested language.
Response	The reviewers did not add the suggested language but instead added a non-statistical (but still numeric) example in "high or low estimate within a range of reasonably possible outcomes."
Comment	One commentator suggested that "intended measure" be changed to "intended statistical measure," as all the examples are statistical in nature, and the phrase "intended measure" could be interpreted as having a non-statistical meaning.
Response	The reviewers note that non-statistical measures may also be used for the intended measure and have added a non-statistical example to this section.
Section 3.3, Organization of Data	
Comment	One commentator suggested adding a reference to ASOP No. 25, *Credibility Procedures*, when addressing organization of data (specifically balancing homogeneity with volume).
Response	The reviewers added a reference to section 3.11 of this ASOP, which cites ASOP No. 25.
Comment	One commentator suggested that this section more specifically state that the actuary should determine what data are available.
Response	The reviewers agree and made the change.
Comment	One commentator suggested changing the focus from "granularity" to "level of data organization" and expanding the examples of level of data to include coverage and risk classification.
Response	The reviewers agree and made changes consistent with this suggestion.
Comment	One commentator suggested adding the phrase "that the actuary believes" to highlight that this step involves judgment.
Response	The reviewers agree and made the change.
Section 3.5, Methods, Models, and Assumptions	
Comment	One commentator asked whether the fact that one of the methods, models, or assumptions may have a bias disqualifies it from being used even if the actuary offsets for that bias in the determination of the final result.
Response	The reviewers modified the language to read as follows: "have no known significant bias in the aggregate."
Comment	One commentator suggested adding the phrase "adjusting for changes in conditions affecting the use of past data when estimating future costs."
Response	The reviewers agree with the suggestion in part and added language regarding "adjusting for changes in conditions affecting the available experience."
Section 3.6, Exposure Base	
Comment	One commentator suggested that this section was too limited in its applicability and suggested changing it from "if selecting a new exposure base or changing an existing exposure base" to "when using or changing …or selecting a new exposure base."
Response	The reviewers disagree with the suggestion to require the evaluation of existing exposure bases. Many exposure bases have long-term and widely accepted use.

Section 3.7, Risk Classification System	
Comment	One commentator suggested changing "risk classification systems are an integral part of the development of future cost estimates" to "risk classification systems can be an integral part."
Response	The reviewers agree and made the change.
Section 3.8, Use of Historical Data	
Comment	One commentator suggested adding a specific reference to ASOP No. 23, *Data Quality*, in this section.
Response	The reviewers note that section 3.4, Data Quality, refers the actuary to ASOP No. 23 in the consideration and choice of data for estimating future costs, and therefore made no change.
Comment	One commentator suggested changing the phrase "insurance policy provisions" to "coverage provisions," as the revised language can be applied more broadly to all risk-transfer or risk-retention mechanisms without specifying self-insurance or other mechanisms.
Response	The reviewers agree with the commentator's concern, and changed "risk management provisions" to "risk management and risk control strategies."
Section 3.8.1, Use of Historical Exposure and Premium Data	
Comment	One commentator suggested replacing "a consistent exposure and rate level" with "a consistent measure of the historical exposures and the rates used to determine the historical premiums."
Response	The reviewers agree in part and added the phrase "measurement of the historical exposures" but did not revise the language regarding a consistent rate level, as the reviewers believe the commentator's suggested language could be misinterpreted.
Section 3.8.2, Use of Historical Loss and Loss Adjustment Expenses	
Comment	One commentator suggested adding a mention of the need to be consistent in adjusting the loss and loss adjustment data with how the premium data are adjusted.
Response	The reviewers agree with the suggestion and added language to section 3.8.3 (now section 3.8.4) to address the issue raised.
Comment	One commentator suggested language clarifying the relationship and differences between the historical period and future period.
Response	The reviewers agree and added clarifying language.
Section 3.8.3, Additional Adjustments to Historical Data (now section 3.8.4)	
Comment	One commentator suggested revising the first sentence to say "the actuary should consider whether additional adjustments to the historical data may be needed…."
Response	The reviewers agree and made the change.
Section 3.10, New Coverages or Exposures	
Comment	One commentator suggested changing "loss and loss adjustment expenses" to "data" to be consistent with language in the rest of this section.
Response	The reviewers disagree, as the reference to "data" in the remainder of the section refers to information that is broader than "loss and loss adjustment expenses."

Comment	One commentator suggested adding the word "future" so that it would read "future coverage or exposure."
Response	The reviewers agree that clarification is needed and have modified the opening paragraph to identify the coverage as new coverage.
Section 3.12, Modeling (deleted)	
Comment	One commentator suggested that this section is redundant, as these points are already contained in section 3.5.
Response	The reviewers agree and removed this section.
Section 3.14, Treatment of Unusual Events (now section 3.13, Treatment of Infrequent Events)	
Comment	Two commentators said that the phrase "infrequent events" was more appropriate than "unusual events," since the characteristic trait for these events is low frequency/high severity.
Response	The reviewers agree and retitled this section "Treatment of Infrequent Events."
Comment	Two commentators suggested that the proposed ASOP does not provide guidance for treating coverages (such as Umbrella) where the frequency of losses by layer varies in such a way that it may be appropriate to use different methodologies by layer.
Response	The reviewers agree and added a reference to address estimating losses in higher layers where different methodologies may be appropriate.
Section 3.17, Additional Funding Sources (now section 3.16)	
Comment	One commentator suggested changing the title to "Additional Sources of Income."
Response	The reviewers disagree as the change from "funding" to "income" would more narrowly define the type of funds that may be available.
Comment	One commentator suggested changing "assessments to policyholders" to "assessments paid by policyholders."
Response	The reviewers agree and made the change.
SECTION 4. COMMUNICATIONS AND DISCLOSURES	
Section 4.1, Actuarial Communications	
Comment	Several commentators suggested that the requirement to disclose the assumptions used in developing or reviewing the future cost estimates was overly broad or burdensome. A few of these commentators suggested that the disclosure be limited to material and explicit assumptions.
Response	The reviewers modified the language to require disclosure of material assumptions.
Section 4.2, Disclosures	
Comment	One commentator suggested limiting the required disclosure to material assumptions.
Response	The reviewers modified the language to require disclosure of material assumptions.

Comment	Two commentators said that the language is too broad and appears to encompass all adjustments made to the historical data including adjustments made to address issues of data quality. The commentator suggested that the adjustments made to address data quality should be governed by ASOP No. 23 and that clarifying language be added to this section.
Response	The reviewers agree and revised the section as follows: "if the actuary uses historical data, the actuary should disclose any adjustments made to the historical data to account for expected differences between the historical data and future experience (see sections 3.8 and 3.10). For adjustments made to address issues of data quality, refer to ASOP No. 23."
APPENDIX	
Comment	One commentator suggested revising the last sentence in the next-to-last paragraph to "Such other influences may affect decisions about prices or premium rates, but such influences may or may not be consistent with the intended measure used for actuarial future cost estimates in deciding upon final rates and prices."
Response	The reviewers believe the existing language is sufficiently clear and made no change.
Comment	One commentator suggested adding the following: "as innovation and the use of new data and technologies affect the environment in which actuaries operate, continuing education for actuaries will be important for the application of this ASOP."
Response	The reviewers do not believe the suggested language is needed here as actuaries are already subject to continuing education requirements per the *Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States*.

ACTUARIAL STANDARDS BOARD

Actuarial Standard
of Practice
No. 54

Pricing of Life Insurance and Annuity Products

Developed by the
Life Insurance and Annuity Pricing Task Force
of the Life Committee of the
Actuarial Standards Board

Adopted by the
Actuarial Standards Board
June 2018

Doc. No. 193

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June 2018

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in the Pricing of Life Insurance and Annuity Products

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 54, *Pricing of Life Insurance and Annuity Products*

This document is the final version of ASOP No. 54, *Pricing of Life Insurance and Annuity Products*.

History of the Standard

The ASB periodically reviews the completeness of ASOPs for all practice areas and asked the Life Committee to consider whether an ASOP addressing life insurance and annuity pricing principles would be appropriate. In October 2014, the ASB Life Committee distributed a Request for Comments regarding an ASOP focused on life insurance and annuity pricing. Sixteen comment letters were received. Most of the comments supported the drafting of such an ASOP.

The pricing of products is one of the most important functions actuaries perform. Therefore, the ASB Life Committee believes that the profession would be well served by an ASOP providing guidance regarding life insurance and annuity product pricing. The ASB agreed and approved the creation of an exposure draft.

First Exposure Draft

In March 2016, the ASB approved an exposure draft of this proposed ASOP. Seventeen comment letters were received and considered in making changes that were reflected in the second exposure draft.

Second Exposure Draft

In June 2017, the ASB approved a second exposure draft with a comment deadline of October 31, 2017. Six comment letters were received and considered in making changes that are reflected in this final ASOP.

The ASB thanks all those who made comments on each of the exposure drafts.

Notable Changes from the Second Exposure Draft

Notable changes from the second exposure draft in response to the comment letters include the following:

1. The fifth paragraph of section 1.2 was clarified by adding the following: "To the extent that a product does not clearly fall into the scope just described, the actuary should use professional judgment to determine whether the product is in scope."

2. An example was added to the sixth paragraph of section 1.2 to clarify that the ASOP would apply in the case of a product written on an individual policy form that offers both a death benefit and a long-term care benefit.

3. A seventh paragraph was added to section 1.2 to clarify that the standard "does not apply to actuaries when performing actuarial services with respect to the pricing of reinsurance contracts."

4. The definition of pricing in section 2.2 was revised by adding the phrase "including evaluating the product's profitability and underlying risks" to the first sentence;

5. Section 3.5.1, Cost of Capital, was removed. The concept is now covered in section 3.1.1(c).

6. Several clarifying revisions were made to section 3.6, Governance and Controls.

7. Guidance was added to section 4.1 to state that the actuary should disclose "the material results of any additional profitability analysis that was performed."

The ASB voted in June 2018 to adopt this standard.

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Life Insurance and Annuity Pricing Task Force

David A. Brentlinger, Chairperson

Jodi L. Kravitz	Steven L. Putterman
Lisa S. Kuklinski	Anthony J. Tokarz

Life Committee of the ASB

David A. Brentlinger, Chairperson

Janice A. Duff	Henry W. Siegel
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The Actuarial Standards Board (ASB) sets standards for appropriate actuarial practice in the United States through the development and promulgation of Actuarial Standards of Practice (ASOPs). These ASOPs describe the procedures an actuary should follow when performing actuarial services and identify what the actuary should disclose when communicating the results of those services.

ASOP No. 54—Doc. No. 193

PRICING OF LIFE INSURANCE AND ANNUITY PRODUCTS

STANDARD OF PRACTICE

Section 1. Purpose, Scope, Cross References, and Effective Date

1.1 Purpose—This actuarial standard of practice (ASOP) provides guidance to actuaries when performing actuarial services with respect to the **pricing** of life insurance and annuity products, including riders attached to such products. Throughout the remainder of the ASOP, the use of the term "product" includes riders attached to life insurance and annuity products.

1.2 Scope—This standard applies to actuaries when performing actuarial services with respect to the **pricing** of life insurance and annuity products when a product is initially developed or when charges or benefits are changed for future sales.

This standard does not apply to any changes made on in-force policies. Such resetting of nonguaranteed elements, including dividends, on products in force is outside the scope of this ASOP and is addressed in ASOP No. 2, *Nonguaranteed Charges or Benefits for Life Insurance Policies and Annuity Contracts*, and No. 15, *Dividends for Individual Participating Life Insurance, Annuities, and Disability Insurance*. The actuary should also refer to ASOP Nos. 2 or 15 when determining nonguaranteed elements or dividends when a product is initially developed or when charges or benefits are changed for future sales.

The standard does not include guidance on compliance with federal antitrust laws or the evaluation of other considerations (such as marketing, sales, and competition) that may affect the ultimate price.

The standard applies to actuaries when performing actuarial services related to life insurance and annuity products written on individual policy forms and to group master contracts with individual certificates that are priced in a similar manner to products written on individual life and annuity policy forms.

Products not priced in a similar manner to those written on individual life and annuity policy forms or products that do not have material mortality or morbidity risk are not in scope. Two examples are traditional group term life and certain retirement funding products (for example, synthetic guaranteed interest contracts). To the extent that a product does not clearly fall into the scope just described, the actuary should use professional judgment to determine whether the product is in scope.

To the extent that the guidance in this standard may conflict with guidance in other ASOPs regarding the **pricing** of specific benefits other than life and annuity benefits, the guidance in other ASOPs will govern the **pricing** of such other specific benefits. For

example, the **pricing** of a product that offers both a death benefit and a long-term care benefit written on an individual policy form would be within the scope of this ASOP. However, to the extent that the guidance in this standard conflicts with guidance in other ASOPs regarding the **pricing** of the long-term care benefit, the guidance in other ASOPs would govern the **pricing** of such long-term care benefits.

This standard does not apply to actuaries when performing actuarial services with respect to the **pricing** of reinsurance contracts.

This standard does not apply to actuaries when performing actuarial services with respect to illustrations of nonguaranteed charges or benefits subject to ASOP No. 24, *Compliance with the NAIC Life Insurance Illustrations Model Regulation*.

If the actuary departs from the guidance set forth in this standard in order to comply with applicable law (statutes, regulations, and other legally binding authority) or for any other reason the actuary deems appropriate, the actuary should refer to section 4.2.

1.3 Cross References—When this standard refers to the provisions of other documents, the reference includes the referenced documents as they may be amended or restated in the future, and any successor to them, by whatever name called. If any amended or restated document differs materially from the originally referenced document, the actuary should consider the guidance in this standard to the extent it is applicable and appropriate.

1.4 Effective Date—This standard will be effective for any actuarial services performed on or after December 1, 2018.

Section 2. Definitions

The terms below are defined for use in this actuarial standard of practice.

2.1 Modeling Cell—Policies or contracts that are treated in a model as being completely alike with regard to, for example, demographic characteristics, assumptions, policy provisions, and underwriting class.

2.2 Pricing—The process of determining charges for, and benefits provided by, an insurance policy or annuity contract at issue, including evaluating the product's profitability and underlying risks. Examples of charges include premiums, cost of insurance charges, separate account charges, surrender charges, and policy fees. Examples of benefits include death benefits, surrender benefits, interest credits, dividends, and income benefits.

2.3 Profitability Analysis—An evaluation of a product's expected financial results using a set of assumptions, a specified model, and specified **profitability metric(s)**.

2.4 Profitability Metric—A measurement used to assess a product's expected level of financial results.

2.5 Risk Capital—The amount of capital a company chooses to hold to meet a business objective, given its risk profile.

2.6 Sensitivity Analysis—Analysis performed by changing an assumption or set of assumptions and comparing the results to those resulting from the baseline assumption(s).

2.7 Stochastic Analysis—Analysis performed using a model that estimates distributions of potential outcomes by allowing random variation in one or more inputs to the model.

Section 3. Analysis of Issues and Recommended Practices

3.1 Initial Pricing Considerations—When preparing for the **pricing** exercise, the actuary should take into account the criteria of the actuary's principal and the relevant characteristics of the product.

3.1.1 Criteria of the Actuary's Principal—Criteria of the actuary's principal, which are usually related to profitability and risk, include, but are not limited to, the following:

a. the choice of **profitability metrics**;

b. targets for **profitability metrics**, including any special circumstances, such as targets for shorter periods of time or situations where profits are expected to be followed by losses. Targets often are stated at an aggregate product level and may be stated at other levels as determined by the principal, such as at the **modeling cell** level;

c. the approach for incorporating the cost of maintaining a defined level of **risk capital** into the **profitability analysis**; and

d. how risk management policies of the company relate to product **pricing**; for example, how tolerant the actuary's principal is to volatility in earnings and the balance sheet.

3.1.2 Relevant Characteristics of the Product—Relevant characteristics of the product include, but are not limited to, the following:

a. the intended design objectives of the product;

b. the intended market, anticipated sales, and the competitive alternatives to the product;

c. how the product will be sold, for example, underwriting, distribution, and marketing;

d. how the product will be administered, including any limitations in administrative and valuation systems that could impact product design or operational risks;

e. potential risk mitigation strategies such as reinsurance and hedging;

f. applicable law (statutes, regulations, and other legally binding authority); and

g. the tax treatment of the product as it applies to both the owner and the insurer.

3.2 Selecting Profitability Metrics—The actuary should select one or more **profitability metrics** in a manner consistent with the criteria of the actuary's principal and the underlying design and risks of the product.

3.2.1 Profitability Metrics—The actuary should consider using more than one **profitability metric** when evaluating the expected profitability and underlying risks. Examples of **profitability metrics** include, but are not limited to, the following:

a. the expected return on initial invested capital, often referred to as the internal rate of return;

b. the average of expected future periodic returns on capital, often referred to as average return on equity;

c. a measure of profitability expressed as a percentage of premium, often referred to as profit margin;

d. the present value of expected future profits as a percentage of the present value of expected assets, often referred to as return on assets;

e. the present value of expected future profits, often referred to as the value of new business; and

f. the time period when a measure of cumulative profits turns positive, often referred to as break-even year.

The actuary should use discount rates that are appropriate for the selected **profitability metric**, where applicable.

3.2.2 Considerations When Selecting a Profitability Metric—When selecting a **profitability metric**, the actuary should consider the following:

a. the expected pattern of profits over time (for example, the pattern of gains and losses, however measured);

b. the significance of the product's underlying risks (for example, the size and pattern of **risk capital**); and

c. any other considerations that the actuary determines are relevant (for example, limitations of the **profitability metric** for the product being priced).

3.3 Developing or Selecting the Model—The actuary should develop or select the model to support **pricing** in a manner consistent with the criteria of the actuary's principal. The actuary should develop or select a model that accommodates the design of the product and the selected **profitability metrics** and reasonably simulates the future financial impact of the product.

When developing or selecting the model, the actuary should consider the following:

a. Time Horizon—the degree to which the model extends over a sufficient time period such that the profitability results and underlying risks of the product are adequately captured;

b. Granularity—the degree to which the model accommodates the necessary detail of model components, such as time intervals, **modeling cell** structure, and assumptions that vary by **modeling cell**, to appropriately represent the expected profitability and underlying risk of future sales;

c. Dynamic Assumptions—the degree to which the model accommodates how certain assumptions, such as policy behavior assumptions, may vary based on other factors;

d. Asset Returns—the degree to which the model accommodates asset returns consistent with how returns are expected to be recognized and allocated to the product;

e. Economic Scenarios—the degree to which the model accommodates, if appropriate, market consistent or real world scenarios that represent an appropriate range of future economic conditions;

f. Accounting and Actuarial Bases—the degree to which the model accommodates the accounting standards and practices (for example, statutory, GAAP, and tax) and the assumptions and methods used to calculate reserves and other actuarial balances that underlie the **profitability metrics** to be used in **pricing**;

g. Risk Capital Framework—the degree to which the model accommodates a **risk capital** framework that is expected to be used in practice;

h. Taxes—the degree to which the model accommodates a tax structure that is expected to apply, given the product, the tax position of the company, and the company's tax allocation practices;

i. Risk Evaluation—the degree to which the model accommodates an appropriate method to evaluate risks, as described in section 3.5;

j. Risk Mitigation—the degree to which the model appropriately accommodates risk mitigation strategies that are expected to be used to support the product;

k. Model Validation—the degree to which the model is sufficiently transparent to support validation, as described in section 3.6; and

l. any other items the actuary determines are significant to the model.

3.4 Pricing Assumptions—The actuary should use professional judgment to set assumptions that are reasonable for the intended purpose and reflect expected future experience based on the following considerations.

3.4.1 Historical Experience Used When Setting Assumptions—The actuary should use professional judgment to ensure that relevant historical experience is reflected when setting assumptions.

3.4.1.1 Assumptions Based on Relevant and Credible Data—The actuary should use assumptions based on relevant and credible data, such as company experience, industry experience, and other relevant experience, which may be modified to reflect any data deficiencies.

3.4.1.2 Assumptions Based on Historical Experience—When using historical experience, the actuary should consider whether there are reasons to expect that future experience will differ from past experience.

3.4.1.3 Assumptions When There Is No Relevant Historical Experience—In some instances, no relevant historical experience is available to the actuary. In this situation, the actuary should use professional judgment, considering available sources of data, when setting assumptions.

3.4.2 Assumption Margins—The actuary should consider the appropriateness of including a margin in the assumptions. When setting a margin, the actuary should consider the following:

a. the degree to which there is uncertainty around the assumptions due to lack of relevant, credible company or industry experience data to support the assumptions;

b. whether the degree of uncertainty may vary over different periods of time within the time horizon of the model; and

c. whether the level of margins is appropriate for each assumption individually and in aggregate for all assumptions.

3.4.3 Consistency of Assumptions—The actuary should use assumptions that are internally consistent and reflect any interdependencies with each other, consistent with current and anticipated company practices, and, where appropriate, consistent with similar assumptions used for other assignments within the company and its associated entities.

3.4.4 Assumption Setting—When setting assumptions, the actuary should consider the following:

a. sales mix assumptions that reflect the anticipated distribution of sales across **modeling cells**;

b. investment assumptions and economic market assumptions that reflect real world or market consistent theory, where appropriate, and that include assumptions for reinvestment, asset default, and investment expenses;

c. mortality and morbidity assumptions that incorporate the effects of risk selection and classification of future applicants, the impact of expected trends on future assumptions, and product features such as conversion and level premium periods on term coverage;

d. for experience that is elective in nature, such as the policyholder's ability to pay or not pay premiums, to receive certain types of benefits, or to terminate the contract, assumptions that consider the causal variables impacting the policyholder's behavior, such as relevant policyholder characteristics (for example, age), policy or rider characteristics (for example, size of policy), tax treatment of the product as it applies to the owner, and the value of guaranteed benefits driven by external factors (for example, the current interest rate environment and underlying market performance);

e. expense assumptions that reflect anticipated future trends in expenses (for example inflation or expense efficiencies). The actuary should consider the appropriateness of the basis (for example, fully allocated, marginal) when developing expense assumptions; and

f. the principal's capacity and intent with regard to in-force management strategies, including the determination of nonguaranteed elements and dividends.

The actuary should consider the extent to which certain of these assumptions may also be influenced by the following:

1. product design;

2. the intended market and the competitive alternatives to the product; and

3. how the product will be sold, for example, underwriting, distribution, and marketing.

When setting assumptions in areas outside the actuary's area of expertise, the actuary should consider incorporating the views of experts. However, the actuary should set assumptions that reflect his or her professional judgment.

3.4.5 Capital Market Assumptions—When analyzing the cost of a benefit that can be replicated using liquid capital market instruments, the actuary should consider comparing the cost of the benefit using market consistent assumptions to the price of a comparable investment guarantee observed in capital markets to assess how well the results of the analysis align with the profitability goals and risk management policy of the actuary's principal.

3.4.6 Documentation of Assumptions, Rationale, and Data Modifications—The actuary should document the assumptions, the rationale behind the assumptions, and any modifications made to data sources. If margins are included in assumptions, the actuary should document the approach used and, where practicable, the margin component of each assumption.

In setting assumptions, the actuary should refer to ASOP No. 25, *Credibility Procedures*, for guidance.

3.5 Risk Evaluation—The actuary should evaluate the risks in the product when performing a **profitability analysis**.

3.5.1 Sensitivity Analysis—The actuary should use **sensitivity analysis** to evaluate the impact of deviations in assumptions on profitability results and should consider performing more analysis for assumptions that have a significant impact on the **profitability analysis** than for assumptions that have less impact.

3.5.2 Stochastic Analysis—The actuary should consider using **stochastic analysis** to evaluate the distribution of the results of the **profitability analysis** from variations in key assumptions, in particular interest rates and equity returns. When performing **stochastic analysis**, the actuary should evaluate the results of the **profitability analysis** not only in the aggregate but also for a selection of individual scenarios.

The actuary may consider other risk evaluation techniques, as appropriate.

The actuary should consider the impact of risk mitigation strategies that are expected to be implemented at the product and company level and the expected effectiveness of those strategies.

3.6 Governance and Controls—The actuary should use, or, if appropriate, may rely on others to use, reasonable governance and controls over the actuarial services provided as part of **pricing**. Examples of possible governance and controls include the following:

a. effective oversight of methods and assumptions used in **pricing**;

b. preservation and protection of the model from unintentional or untested changes;

c. validation of the appropriate use of the inputs in model calculations;

d. validation that values from the models are consistent with independent calculations of such values from outside the model;

e. validation that the model reasonably simulates the expected future financial impact of the product; and

f. review of assumptions and other aspects of the model by another knowledgeable person who conducts the review in an objective way.

The actuary should document the governance and controls used by the actuary as part of **pricing**. The actuary should disclose any reliance on governance and controls used by others.

3.7 Reliance on Data or Other Information Supplied by Others—When relying on data or other information supplied by others, the actuary should refer to ASOP No. 23, *Data Quality*, for guidance. The actuary should disclose the extent of any such reliance.

3.8 Reliance on Assumptions Provided by Others—When relying on assumptions provided by others, the actuary should refer to ASOP No. 41, *Actuarial Communications*. The actuary should disclose the extent of any such reliance.

3.9 Documentation—The actuary should prepare and retain documentation in accordance with ASOP No. 41.

Section 4. Communications and Disclosures

4.1 Actuarial Communications—When issuing any actuarial communication relating to this ASOP, the actuary should refer to ASOP No. 41. The actuary should consider the needs of the intended user in communicating the actuarial findings in any actuarial report. In

addition, in any actuarial report concerning **pricing**, the actuary should disclose the following, if practical and relevant:

a. criteria of the actuary's principal, as described in section 3.1.1;

b. relevant characteristics of the product, as described in section 3.1.2;

c. the **profitability metrics** used in the **profitability analysis** and how these metrics are consistent with the criteria of the actuary's principal, as described in section 3.2;

d. the considerations used to determine the model, as described in section 3.3;

e. material pricing assumptions and the manner in which the actuary established these assumptions to reflect expected future experience, adjusted to include any margin, as described in section 3.4;

f. results of risk evaluation, as described in section 3.5;

g. any reliance on governance and controls used by others, as described in section 3.6;

h. any reliance on data or other information supplied by others, as described in section 3.7;

i. any reliance on assumptions provided by others, as described in section 3.8; and

j. results of the **profitability analysis**, in a format comparable to the **profitability metric** targets described in section 3.1.1(b), and the material results of any additional **profitability analysis** that was performed.

4.2 Additional Disclosures—The actuary should also include the following disclosures, as applicable, in an actuarial communication:

a. the disclosure in ASOP No. 41, section 4.2, if any material assumption or method was prescribed by applicable law (statutes, regulations, and other legally binding authority);

b. the disclosure in ASOP No. 41, section 4.3, if the actuary states reliance on other sources and thereby disclaims responsibility for any material assumption or method selected by a party other than the actuary; and

c. the disclosure in ASOP No. 41, section 4.4, if, in the actuary's professional judgment, the actuary has otherwise deviated materially from the guidance of this ASOP.

Appendix 1

Background and Current Practices

Note: This appendix is provided for informational purposes and is not part of the standard of practice.

Background

Pricing life insurance and annuity products is a complex process and requires management to make decisions based on a variety of inputs that often include analyses of profitability and risk performed by actuaries. The roles performed by actuaries when pricing are significant and varied. They can range from technical analysis of profitability to the development of marketing strategies for a proposed product. While the final decisions on product design, price, and marketing are the responsibility of management, information necessary for making those decisions is most often provided by actuaries. Management must balance business growth, profitability, and other strategic goals when setting the parameters for a proposed new product. Actuaries are typically asked to evaluate the profitability and risk inherent in those parameters. Management relies on actuarial analyses to make decisions that impact the ability of the insurance company to meet its goals in the future.

Several ASOPs currently address various aspects of the pricing of life insurance and annuity products. Examples include the following:

- ASOP No. 2, *Nonguaranteed Charges or Benefits for Life Insurance Policies and Annuity Contracts*;
- ASOP No. 7, *Analysis of Life, Health, or Property/Casualty Insurer Cash Flows*;
- ASOP No. 12, *Risk Classification (for All Practice Areas)*; and
- ASOP No. 15, *Dividends for Individual Participating Life Insurance, Annuities, and Disability Insurance*.

This ASOP supplements the guidance provided by existing ASOPs and provides guidance to actuaries providing actuarial services related to the pricing of life insurance and annuity products, including riders attached to such products.

Most life insurance and annuity products provide multi-year guarantees in the form of a fixed premium, guaranteed benefits, or limits on the ability of the company to change future premiums, fees, or benefits. In these situations, the company must commit to the price before the product is sold and may have to honor that commitment for a lifetime. It is critical that the actuarial analyses supporting that commitment meet accepted standards.

Current Practices

Pricing life insurance and annuity products typically requires developing an actuarial model to apply expected future experience to measure the risks inherent in the product design and the likely future profit. Setting the assumptions for future experience is typically the role of the actuary, although at times either regulation (for example, unisex legislation) or management will mandate the use of a certain assumption.

Developments in consumer preferences and medical science will continue to affect policyholder behavior, future mortality rates, and product profitability. Other examples of existing trends that are expected to affect life insurance and annuity product pricing include the following:

- Principle-based approaches to determining statutory accounting requirements provide more flexibility and responsibility for actuaries in establishing the assumptions and methods that are used in that context.

- Vendors and other third parties are playing increasingly important roles in the traditional pricing and product distribution functions.

- Risks and opportunities are created by new distribution models, disruptive market entrants, and technology.

Appendix 2

Comments on the Second Exposure Draft and Responses

The second exposure draft of this proposed ASOP, *Pricing of Life Insurance and Annuity Products*, was issued in June 2017 with a comment deadline of October 31, 2017. Six comment letters were received, some of which were submitted on behalf of multiple commentators, such as by firms or committees. For purposes of this appendix, the term "commentator" may refer to more than one person associated with a particular comment letter. The Life Insurance and Annuity Pricing Task Force carefully considered all comments received, reviewed the exposure draft, and proposed changes. The Life Committee and the ASB reviewed the proposed changes and made modifications where appropriate.

Summarized below are the significant issues and questions contained in the comment letters and responses.

The term "reviewers" in appendix 2 includes the Life Insurance and Annuity Pricing Task Force, the ASB Life Committee, and the ASB. Also, unless otherwise noted, the section numbers and titles used in appendix 2 refer to those in the second exposure draft.

TRANSMITTAL MEMORANDUM QUESTIONS	
Question 1: Is it clear what actuarial services are covered in section 1.2, Scope? If not, please give an example of an actuarial service or a product whose exclusion is unclear and how to clarify.	
Comment	All commentators who answered this question answered "yes." Three of these commentators included additional comments, which the reviewers addressed in the relevant section.
Question 2: Throughout the ASOP, there are references to "the criteria of the actuary's principal." Are the examples in section 3.1.1, Criteria of the Actuary's Principal, adequate to apply the guidance included in the draft ASOP?	
Comment	All commentators who answered this question answered "yes." Two of these commentators included additional comments, which the reviewers addressed in the relevant section.
Question 3: Is the guidance in section 3.6, Governance and Controls, clear?	
Comment	All commentators who answered this question answered "yes." Two of these commentators included additional comments, which the reviewers addressed in the relevant section.
GENERAL COMMENTS	
Comment	One commentator suggested organizational changes to the document.
Response	The reviewers considered the suggestions and made those that they believe improve the ASOP.
Comment	Several commentators suggested minor editorial changes throughout the ASOP.
Response	The reviewers considered the suggestions and made those that they believe improve the ASOP.

Comment	One commentator encouraged the ASB to minimize areas of overlap between the life and annuity pricing ASOP and ASOPs that are currently in development and, where overlap is unavoidable, to strive for consistency.
Response	The reviewers note that sections in the life and annuity pricing ASOP were created with other draft ASOPs in mind for consistency. Specifically, the reviewers believe it is appropriate to include guidance regarding modeling and assumption setting, two areas being addressed by draft ASOPs, in the life and annuity pricing ASOP.
SECTION 1. PURPOSE, SCOPE, CROSS REFERENCES, AND EFFECTIVE DATE	
Section 1.2, Scope	
Comment	One commentator suggested clarifying whether long-term care riders or benefits were included in the scope of this ASOP.
Response	The reviewers addressed the comment by adding an example to the fifth paragraph of section 1.2.
Comment	One commentator said that the second paragraph seemed to contradict section 3.1.2.
Response	The reviewers note that items listed in section 3.1.2 are items that should be taken into account when preparing for pricing. The reviewers do not believe clarification is needed, and therefore made no change.
Comment	One commentator suggested adding language stating that the actuary should use professional judgment to determine whether a product is in scope if the product does not obviously fall into the scope described in section 1.2.
Response	The reviewers agree and added language consistent with the suggestion.
Comment	One commentator suggested including the review of pricing work in the scope of the ASOP.
Response	The reviewers believe that the review of actuarial services is already included per the definition of "actuarial service" in the *Code of Professional Conduct* and ASOP No. 1, *Introductory Actuarial Standard of Practice*, and therefore made no change.
Comment	One commentator suggested deleting the sentence "Actuarial services may also include advising on the design of the product" and adding "design" in the following sentence: "Although the actuary needs to be mindful of all considerations that may affect the ultimate price and design of the product."
Response	The reviewers noted the comment and deleted the reference to design.
Comment	One commentator suggested revisions to clarify the types of investment products that are out of scope of this ASOP.
Response	The reviewers revised the language to address the commentator's concern.
SECTION 2. DEFINITIONS	
Section 2.1, Modeling Cell	
Comment	Two commentators suggested changes to the definition to clarify it and make it more consistent with existing ASOPs.
Response	The reviewers note that the use of the definition within this ASOP is focused on the liability model rather than the asset model. The definition is consistent with the definition in ASOP No. 52, *Principle-Based Reserves for Life Products under the NAIC Valuation Manual*, but has been slightly revised to better fit the scope of this ASOP. Therefore, the reviewers made no change.

Section 2.2, Pricing	
Comment	One commentator said that the definition of pricing seemed too narrow, considering the scope of the guidance in the rest of the ASOP. The commentator also said that the definition did not recognize that the actuary may not set final charges and benefits/credits.
Response	The reviewers believe that the definition adequately describes the pricing process. The reviewers also believe that further guidance with regard to the pricing process is more appropriately presented in other sections of the ASOP. Therefore, the reviewers made no change.
Comment	One commentator recommended expanding the definition to include "credits" along with charges and benefits and address guaranteed and nonguaranteed elements.
Response	The reviewers incorporated some of the suggested revisions to the definition.
Section 2.3, Profitability Analysis	
Comment	One commentator recommended including analysis of various levels (for example, model cell) in the definition.
Response	The reviewers believe that further guidance with regard to the pricing process is more appropriately presented in other sections of the ASOP, and therefore made no change.
Section 2.4, Profitability Metric	
Comment	One commentator suggested replacing "metric" with "measure" for clarification.
Response	The reviewers believe that the definition is consistent with common usage and is used appropriately throughout the ASOP, and therefore made no change.
Comment	One commentator recommended including the examples of profitability metrics as part of the definition.
Response	Given the importance of profitability metrics, the reviewers believe it is more appropriate to list the examples in section 3.2.1, and therefore made no change.
Section 2.5, Risk Capital	
Comment	One commentator questioned the reference to "severe risk," stating that "risk capital" is designed to address events significant enough to adversely affect the expected profitability of a product, and that some people may not consider such events "severe."
Response	The reviewers agree that the definition needed to be clarified and revised the language.
SECTION 3. ANALYSIS OF ISSUES AND RECOMMENDED PRACTICES	
Section 3.1, Initial Pricing Considerations	
Comment	One commentator suggested that the ASOP focused on profitability metrics to the exclusion of items such as the patterns of reserves and capital and the examination of individual scenarios in stochastic testing.
Response	The reviewers note that section 3.1.1(b) addresses patterns of reserves. The reviewers agree with the comment regarding stochastic testing and added language to section 3.5.3 (now section 3.5.2) consistent with the suggestion.
Comment	One commentator suggested replacing the phrase "take into account the criteria of the actuary's principal and the relevant characteristics of the product" in the first paragraph with "consider the following."
Response	The reviewers disagree with the suggestion, and therefore did not make the change.

Section 3.1.1, Criteria of the Actuary's Principal	
Comment	One commentator suggested moving "criteria of the actuary's principal" to the end of section 3.1.
Response	The reviewers disagree with the suggestion, and therefore did not make the change.
Comment	One commentator suggested changing the language from "include, but not limited to" to "may" in the first sentence.
Response	The reviewers disagree with the suggestion, and therefore did not make the change.
Section 3.1.1(a)	
Comment	One commentator stated that the description contributed to confusion about whether metrics are a measurement basis or a number, and suggested revisions.
Response	The reviewers believe that metrics are appropriately defined in section 2.4 as measurements and distinguished from numbers via section 3.1.1(b), which addresses targets for these metrics. The reviewers made revisions to address the commentator's suggestions, including moving the reference to aggregate product and modeling cell levels from 3.1.1(a) to 3.1.1(b).
Section 3.1.1(b)	
Comment	One commentator noted the absence of guidance on setting targets if they are not included in the criteria of the principal.
Response	The reviewers believe that guidance on setting targets for profitability metrics that are not included in the criteria of the principal is outside the scope of the ASOP, and therefore made no change.
Comment	One commentator suggested changing "metrics" to "results."
Response	The reviewers disagree and retained the word "metrics."
Section 3.1.1(c) (now section 3.1.1[d])	
Comment	One commentator suggested adding the words "the type and" prior to "the level of risk contained in the product being priced."
Response	The reviewers addressed the comment by revising section 3.1.1(c) (now section 3.1.1[d]) and by adding a new section 3.1.1(c).
Comment	One commentator asked for clarification of "risk management policies" and noted that concrete examples would be helpful.
Response	The reviewers addressed the comment by revising section 3.1.1(c) (now section 3.1.1[d]), adding a new section 3.1.1(c), and revising the example.
Section 3.1.2, Relevant Characteristics of the Product	
Comment	One commentator questioned whether the actuary should consider unintended consequences for the product.
Response	The reviewers believe this situation is addressed in section 3.5.2 (now section 3.5.1), and therefore made no change.
Comment	One commentator suggested replacing this section with a term such as "policy considerations" and defining the term in section 2, citing concerns that the list was not all-inclusive.
Response	The reviewers prefer to enumerate these characteristics in the body of the standard to give these considerations appropriate emphasis. Given that the section states that considerations are not limited to this list, additional considerations may apply. The reviewers therefore made no change.

Comment	One commentator stated that laws and regulations are not product characteristics.
Response	The reviewers believe that applicable laws directly impact the product, and therefore made no change.
Comment	One commentator proposed adding risk mitigation strategies to the list of product characteristics.
Response	The reviewers agree and made revisions consistent with the suggestion in a new section 3.1.2(e).
Section 3.1.2(b)	
Comment	One commentator suggested adding "anticipated" before "sales" and deleting "goals."
Response	The reviewers agree and made the changes.
Section 3.2.2, Considerations When Selecting Profitability Metrics	
Comment	One commentator suggested moving discount rates from section 3.4.4(f) to section 3.2.2, because they are not assumptions.
Response	The reviewers agree with the commenter's reasoning and moved the language on discount rates to section 3.2.1.
Section 3.2.2(b)	
Comment	One commentator pointed out that product risk and capital-intensity are not necessarily related, and cited Whole Life as an example.
Response	The reviewers revised the language to address the commentator's concern.
Comment	One commentator suggested adding a point to refer to the limitations of the profitability metric.
Response	The reviewers agree and modified section 3.2.2(c) to include limitations as an example of other considerations the actuary may determine to be relevant.
Section 3.3, Developing the Model	
Comment	One commentator suggested including the situation of the actuary as user but not developer of the model.
Response	The reviewers added "or select" after "the actuary should develop" the model.
Comment	One commentator suggested changing "uses" to "reflects" in section 3.3(g).
Response	The reviewers addressed the comment by replacing "use" and "incorporate" with "accommodate" throughout section 3.3.
Section 3.3(b), Granularity	
Comment	One commentator suggested shortening the description of granularity to "the degree to which (1) the number of modeling cells represents the number of different policy characteristics, and (2) the modeling cells reflect different assumptions or time intervals," and deleting the example.
Response	The reviewers revised the language to address the commentator's concerns.
Section 3.3(f), Accounting and Actuarial Bases	
Comment	Several commentators asked for clarification or suggested revisions to "accounting and actuarial bases."
Response	The reviewers revised the language to clarify "accounting and actuarial bases" and address the commentators' concerns.

Section 3.3(j), Risk Mitigation	
Comment	One commentator suggested moving examples of risk mitigation strategies to section 3.1.2.
Response	The reviewers agree and made changes consistent with the comment.
Section 3.4, Pricing Assumptions	
Comment	One commentator noted that it was not clear how sections 3.4.1.2 and 3.4.1.3 differed from 3.4.1 and 3.4.1.1.
Response	The reviewers note that sections 3.4.1.1, 3.4.1.2, and 3.4.1.3 elaborate on the guidance provided in section 3.4.1.
Comment	One commentator asked whether this section was too detailed given that a proposed ASOP on setting assumptions is also in development. The commentator also asked whether there were any special considerations related specifically to setting pricing assumptions and noted the risk of guidance in different ASOPs conflicting.
Response	The reviewers believe the guidance is appropriate for actuaries when performing actuarial services as defined in section 1. The reviewers note that new standards address conflicts with other ASOPs. Therefore, the reviewers made no change in response to this comment.
Comment	One commentator suggested adding references to ASOP Nos. 23, *Data Quality*, and 25, *Credibility Procedures*, in section 3.4.
Response	The reviewers moved the reference to ASOP No. 25 to the end of the section so that it applies to all of section 3.4. The reviewers note that a reference to ASOP No. 23 is already included in section 3.7, and therefore did not add another in this section.
Section 3.4.1, Historical Experience Used When Setting Assumptions	
Comment	One commentator suggested deleting this section.
Response	The reviewers note that this section sets up the associated considerations in sections 3.4.1.1, 3.4.1.2, and 3.4.1.3, and therefore made no change.
Section 3.4.1.1, Assumptions Based on Relevant and Credible Data	
Comment	One commentator suggested adding “smoothness and data quality” as a reason to modify the assumptions.
Response	The reviewers revised the language by adding a reference to data deficiencies. The reviewers also eliminated the reference to “circumstances being modeled” and added “are reasonable for the intended purpose” to the first paragraph of section 3.4. The reviewers believe that, with this revision, smoothness is adequately addressed in the first paragraph of section 3.4, and therefore did not make the suggested change.
Comment	One commentator suggested moving the reference to ASOP No. 25 to section 3.4.
Response	The reviewers agree and made the change.
Section 3.4.2, Assumption Margins	
Comment	One commentator suggested deleting “such as when a new product is being introduced to the marketplace” in section 3.4.2(a).
Response	The reviewers agree and made the change.

Section 3.4.3, Consistency of Assumptions	
Comment	One commentator suggested clarifying the phrase "other components of the model."
Response	The reviewers agree and revised the sentence to read, "The actuary should use assumptions that are internally consistent and reflect any interdependencies with each other …."
Comment	One commentator suggested that the interaction of different assumptions should be considered.
Response	The reviewers agree and added appropriate language.
Comment	One commentator suggested that examples be included after the phrase "… consistent with assumptions used for other assignments within the entity."
Response	The reviewers believe the language is sufficiently clear and therefore made no change.
Section 3.4.4, Product Design and Assumption Setting (now Assumption Setting)	
Comment	One commentator suggested deleting "Product Design" from the title.
Response	The reviewers agree and made the change.
Comment	One commentator sought clarification of the phrase "classification of future applicants" in 3.4.4(c).
Response	The reviewers replaced "classification" with "risk selection and classification."
Comment	One commentator suggested adding "population characteristics" to the mortality and morbidity assumptions considerations in 3.4.4(c).
Response	The reviewers believe the comment is adequately addressed, and therefore made no change.
Comment	One commentator suggested adding the phrase "if those features exist in the product" to the end of section 3.4.4(g) (now section 3.4.4[f]).
Response	The reviewers do not believe the suggested wording is necessary, and therefore made no change.
Comment	One commentator suggested adding "other" before "nonguaranteed elements" in section 3.4.4(g) (now section 3.4.4[f]).
Response	The reviewers revised the sentence to reference nonguaranteed elements prior to dividends.
Comment	One commentator suggested replacing "distribution channel through which the product will be sold" in the second-to-last paragraph of section 3.4.4 with the "relevant product considerations" that are listed in section 3.1.2.
Response	The reviewers deleted "distribution channel through which the product will be sold" and added the items from section 3.1.2 that the actuary should consider in setting assumptions.
Comment	One commentator suggested deleting the word "incorporating" from the last paragraph and that the paragraph should be broadened to apply to more sections of the proposed ASOP.
Response	The reviewers believe including "incorporating" is appropriate and did not delete it. The reviewers believe that expanding "incorporating the view of experts" into other areas of the ASOP is not necessary, and therefore did not make that change.
Section 3.4.5, Capital Market Assumptions	
Comment	One commentator recommended revising the language in the last sentence from "to assure that it aligns" to "to assess how well it aligns."
Response	The reviewers agree and made revisions consistent with the comment.

Comment	One commentator recommended deleting the entire "Capital Markets Assumption" section, stating that the first sentence is covered in both "Consistency of Assumptions" and "Assumption Setting," and the second sentence is too detailed and prescriptive for an ASOP.
Response	The reviewers agree with regard to the first sentence and deleted it. The reviewers disagree with regard to the second sentence and retained it, but note that the sentence has been revised in response to another comment.
Section 3.4.6, Documentation of Assumptions, Their Rationale, and Data Modifications (now Documentation of Assumptions, Rationale, and Data Modifications)	
Comment	One commentator recommended moving all references of documentation to section 3.8.
Response	The reviewers did not move all references to documentation to section 3.8, as it is ASB practice to include guidance relating to documentation, as appropriate, throughout section 3.
Comment	One commentator suggested adding a documentation requirement if the company sets a design or price that is different from what the actuary recommends.
Response	The reviewers disagree, and therefore made no change.
Section 3.5, Risk Evaluation	
Comment	One commentator suggested replacing "evaluate the impact on profitability metrics from deviations in assumptions" with "conduct a risk evaluation."
Response	The reviewers made changes consistent with the comment.
Comment	One commentator suggested including "the impact of product design features" in addition to risk mitigation strategies in the last paragraph.
Response	The reviewers believe that the existing reference to product design features in section 3.4.4(g) (now section 3.4.4[f]) already addresses the comment. Therefore, the reviewers made no change.
Section 3.5.1, Cost of Capital (deleted)	
Comment	One commentator asked for clarification of "Cost of Capital," because "Cost of Capital" could be the hurdle rate, which is the estimated minimum required rate given the level of risk, and it is usually determined by a company's Treasury department. The commentator also said that "Cost of Capital" in the draft guidance might be interpreted as the required capital amount.
Response	The reviewers eliminated the term "cost of capital" throughout the ASOP. The concept of cost of capital was moved from section 3.5.1 to section 3.1.1(c).
Comment	One commentator suggested that Cost of Capital may fit better under "Initial Pricing Considerations."
Response	The reviewers agree and moved the section to section 3.1.1(c).
Comment	One commentator stated that the three uses of "profitability metrics" in this section description contributed to confusion about whether metrics are a measurement basis or a number, and suggested replacing "profitability metrics" with "profitability targets."
Response	The reviewers agree and revised sections 3.5 and 3.5.1 (now section 3.1.1[c]) to eliminate the use of "profitability metrics" and replaced "metrics" with "results" in section 3.5.3 (now section 3.5.2).
Section 3.5.2, Sensitivity Analysis (now section 3.5.1)	
Comment	One reviewer suggested that sensitivity analysis should not be required.
Response	The reviewers disagree and therefore made no change.

Section 3.5.3, Stochastic Analysis (now section 3.5.2)	
Comment	One commentator suggested deleting the phrase "the level of" in the last sentence.
Response	The reviewers revised the language to address the commentator's concern.
Suggested Addition: Section 3.5.4, Risk Identification and Classification	
Comment	One commentator suggested adding a risk evaluation technique, "Risk Identification and Classification - The actuary should consider identifying the types of risk in the product and classifying them (for example, high, medium, or low)."
Response	The reviewers believe that this type of exercise is outside the scope of the ASOP, and therefore did not make the change.
Section 3.6, Governance and Controls	
Comment	One commentator said that the language used in the second sentence may imply that the list of governance and controls are requirements and suggested changing the sentence to "examples of governance and controls may include the following."
Response	The reviewers clarified the language by adding the word "possible" before "governance and controls" and eliminating the phrase "but are not limited to."
Comment	One commentator suggested replacing "the product's expected impact on the company's future financial and risk position" with "the future financial impact of the product," noting that in practice, pricing is done on a standalone product basis, rather than on a portfolio basis. The process of considering the impact on the company's financials and risk profile can be part of the forecasting and Enterprise Risk Management process rather than a pricing exercise.
Response	The reviewers agree and made the change, but also added the word "expected" before "future financial impact."
Comment	One commentator suggested that documenting the governance and controls in pricing is a reasonable requirement and recommended replacing the phrase "should consider" with "should."
Response	The reviewers agree and made the change.
Comment	One commentator sought clarification for item (c), "separation of duties."
Response	The reviewers deleted "separation of duties" from the list of examples because the phrase could be a component of each of the other examples.
Comment	One commentator suggested adding "another" before the words "knowledgeable party."
Response	The reviewers agree and made the change.
SECTION 4. COMMUNICATIONS AND DISCLOSURES	
Section 4.1, Actuarial Communications	
Comment	One commentator suggested documenting in the actuarial report the competitive analysis that was used in the pricing analysis.
Response	The reviewers believe the comment is addressed in the revised section 4.1(a), "relevant characteristics of the product, as described in section 3.1.2."
Comment	One commentator suggested replacing "profitability metrics used to evaluate profitability" with "profitability metrics used in the profitability analysis."
Response	The reviewers agree and made the change.

ACTUARIAL STANDARDS BOARD

Actuarial Standard
of Practice
No. 55

Capital Adequacy Assessment

Developed by the
Enterprise Risk Management Committee of the
Actuarial Standards Board

Adopted by the
Actuarial Standards Board
June 2019

Doc. No. 194

ASOP No. 55—Doc. No. 194

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APPENDIXES

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June 2019

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Capital Adequacy Assessment

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 55, *Capital Adequacy Assessment*

This document contains ASOP No. 55, *Capital Adequacy Assessment*.

History of the Standard

When the ASB's Enterprise Risk Management (ERM) Task Force (now Committee) started work on ASOP No. 46, *Risk Evaluation in Enterprise Risk Management*, and ASOP No. 47, *Risk Treatment in Enterprise Risk Management*, it was intended that those standards would, in addition to providing general guidance to actuaries performing ERM work, provide support as building blocks for a standard on actuarial opinions regarding the still-developing own risk and solvency assessment (ORSA) process.

Starting in 2012, insurance regulators began implementing the ORSA process throughout the world. Specifically, the ORSA process is a part of the Insurance Core Principles (ICP) set out by the International Association of Insurance Supervisors (IAIS) and is required by the NAIC accreditation standards. A key feature of ORSA is that it requires a formal assessment of capital adequacy be a part of an insurer's ERM program. However, what is included in a capital adequacy assessment varies significantly across the industry. Given the disparity in current practices, the ASB determined that a separate ASOP covering capital adequacy assessments was needed to supplement ASOP Nos. 46 and 47.

In addition to satisfying regulatory requirements, risk-taking enterprises will, on occasion, want to assess their capital adequacy. The purpose of this proposed standard is to provide additional guidance to actuaries preparing an assessment of capital adequacy, whether for a specific regulatory requirement or for general management purposes.

First Exposure Draft

The ASB issued a first exposure draft of this ASOP in September 2016 with a comment deadline of January 31, 2017. Nine comment letters were received and considered in developing modifications that were reflected in the second exposure draft.

Second Exposure Draft

The ASB issued a second exposure draft in September 2017 with a comment deadline of March 1, 2018. Nine comment letters were received and considered in making changes that were reflected in the third exposure draft.

Third Exposure Draft

The ASB issued a third exposure draft in November 2018 with a comment deadline of March 1, 2019. Four comment letters were received and considered in making changes that were reflected in this ASOP. For a summary of the issues contained in these comment letters, please see appendix 2.

Notable Changes from the Third Exposure Draft

There were no notable changes from the third exposure draft. Certain changes were made to improve readability, clarity, or consistency.

The ASB thanks everyone who took the time to contribute comments and suggestions on the exposure drafts.

The ASB voted in June 2019 to adopt this standard.

ASOP No. 55—Doc. No. 194

ERM Committee of the ASB

Frank D. Pierson, Chairperson

Anthony Dardis	Elisabetta Russo
Jamie B. Krieger	David K. Sandberg
David Paul	John W.C. Stark
Max J. Rudolph	

Actuarial Standards Board

Kathleen A. Riley, Chairperson

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The Actuarial Standards Board (ASB) sets standards for appropriate actuarial practice in the United States through the development and promulgation of Actuarial Standards of Practice (ASOPs). These ASOPs describe the procedures an actuary should follow when performing actuarial services and identify what the actuary should disclose when communicating the results of those services.

ACTUARIAL STANDARD OF PRACTICE No. 55

CAPITAL ADEQUACY ASSESSMENT

STANDARD OF PRACTICE

Section 1. Purpose, Scope, Cross References, and Effective Date

1.1 Purpose—This actuarial standard of practice (ASOP or standard) provides guidance to actuaries when performing professional services with respect to an evaluation of the resiliency of an insurer through a **capital adequacy assessment**.

1.2 Scope—This standard applies to actuaries involved in **capital adequacy assessment** work for life or health insurers (including fraternal benefit societies and health benefit plans), property and casualty insurers, mortgage and title insurers, financial guaranty insurance companies, risk retention groups, public entity pools, captive insurers, and similar entities or a combination of such entities, when affiliated (collectively, referred to as "insurer"). The term insurer includes entities that insure or reinsure any entity mentioned in the preceding sentence. For the purposes of this standard, if an actuary is asked to assess the **capital** needed to support self-insured obligations of the types of insurance written by the businesses listed in the first sentence, the term "insurer" includes such self-insured obligations.

This standard applies to actuaries designing, performing, or reviewing a **capital adequacy assessment**.

If the actuary's actuarial services involve reviewing a **capital adequacy assessment**, the reviewing actuary should be reasonably satisfied that the **capital adequacy assessment** was performed in accordance with this standard. The reviewing actuary should use the guidance in this standard to the extent practicable within the scope of the actuary's assignment.

When designing, performing, or reviewing a **capital adequacy assessment** of a **group**, the actuary need not assess the **capital** of individual members of the **group** unless warranted by the specific circumstances of the **group**.

This standard does not apply to actuaries when providing actuarial services within the scope of ASOP No. 6, *Measuring Retiree Group Benefits Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions*.

If the actuary departs from the guidance set forth in this standard in order to comply with applicable law (statutes, regulations, and other legally binding authority), or for any other reason the actuary deems appropriate, the actuary should refer to section 4. If a conflict

exists between this standard and applicable law, the actuary should comply with applicable law.

1.3 Cross References—When this standard refers to the provisions of other documents, the reference includes the referenced documents as they may be amended or restated in the future, and any successor to them, by whatever name called. If any amended or restated document differs materially from the originally referenced document, the actuary should consider the guidance in this standard to the extent it is applicable and appropriate.

1.4 Effective Date—This standard is effective for work commenced on or after November 1, 2019.

Section 2. Definitions

The terms below are defined for use in this actuarial standard of practice and appear in bold throughout the ASOP.

2.1 Adverse Capital Event—A modeled or actual event that either a) causes **capital** to be significantly less than the **risk capital target(s)** or b) causes **capital** to be less than the **risk capital threshold(s)**.

2.2 Capital—The excess of the value of assets over the value of liabilities, which depends on the **valuation basis** chosen.

2.3 Capital Adequacy Assessment—An assessment of **capital** of an insurer relative to its **risk capital target(s)** or **risk capital threshold(s)**.

2.4 Group—Affiliated group of individual entities, of which at least one is an insurer.

2.5 Risk Appetite—The level of aggregate risk that an organization chooses to take in pursuit of its objectives.

2.6 Risk Capital Target—The preferred level of **capital** based on specified criteria, which is expressed as a function of a measure of risk. A **risk capital target** can be a single value or a range. There may be multiple **risk capital targets** based on different risk metrics at any one time. A **risk capital target** is aligned with the insurer's **risk tolerance** and may include individual company, regulatory, and rating agency developed targets.

2.7 Risk Capital Threshold—The minimum level of **capital** necessary for an entity to operate effectively based on specified criteria and expressed as a function of a measure of risk. There may be multiple **risk capital thresholds** based on different risk metrics at any one time. A **risk capital threshold** is aligned with the insurer's **risk tolerance** and may include individual company, regulatory, and rating agency developed thresholds or targets.

2.8 Risk Profile—The risks to which an organization is exposed over a specified period of time.

2.9 Risk Tolerance—The aggregate risk-taking capacity of an organization.

2.10 Valuation Basis—An accounting or economic framework for the recognition and measurement of assets and liabilities.

Section 3. Analysis of Issues and Recommended Practices

3.1 General Considerations—In designing, performing, or reviewing a **capital adequacy assessment**, the actuary should take into account the following:

a. the insurer's **risk profile** and **capital**;

b. the business and risk drivers, including the legal, tax, regulatory, and economic environments in which the insurer operates, as well as any past and anticipated changes or trends in those drivers;

c. the insurer's plans and strategies and the likelihood of their successful execution;

d. the timing and variability of projected liability-related and asset-related cash flows (commonly the basis of a liquidity analysis), reflecting the marketability and availability of assets and other financial resources including reinsurance;

e. the timing and intensity of future calls on **capital** and the means and ability to replenish **capital** in a timely manner;

f. existing or accessible resources, including those from affiliated entities as well as the capabilities of the insurer and affiliated entities to use these resources. Examples of resources may include **capital**, data, computing power and storage, and human resources;

g. the effect on capital adequacy of changes, or projected changes, in the **risk profile**;

h. correlation of risks and events, concentration of exposures, diversification benefits, and the uncertainty of the interdependence between risks;

i. projections of future economic conditions;

j. parameter uncertainty; and

k. the methodology used to assess the adequacy of **capital** consistent with the scope of the actuary's assignment.

3.2 Additional General Considerations—In designing, performing, or reviewing a **capital adequacy assessment**, the actuary should consider the following:

a. the insurer's definition of risk, the primary risk metric(s) used in the risk management system of the insurer, the risk identification process, the risks identified by the insurer, relevant management risk reports, and the limitations of the analytical tools and processes that will be used by the insurer to evaluate and quantify each risk;

b. the insurer's **risk appetite** and **risk tolerance**, including any conflicts between the **risk profile** and the **risk appetite** and how the **risk appetite** and **risk profile** are expected to change over time;

c. inconsistencies between the **capital adequacy assessment** and information contained in publicly released reports the actuary considers relevant, such as annual statements and SEC filings, and the rationale for any inconsistencies;

d. prior **capital adequacy assessments**, including underlying assumptions;

e. if the insurer is part of a **group**, or the assessment is of a **group**:

1. access to **capital** from the entities in the **group**;

2. intra-**group** transactions, including, for example, dividends, reinsurance, and guarantees;

3. transfers of risks from the **group** to each individual entity, for example, reinsurance with aggregates or limits on a multi-company basis; and

4. transfers of risks from each entity to the **group** and the degree to which the **group** manages capital adequacy for each individual entity or primarily at the **group** level; and

f. management actions, including whether they can be executed in a timely manner (see section 3.7).

3.3 Valuation Bases Underlying a Capital Adequacy Assessment—When designing or reviewing a **capital adequacy assessment**, the actuary should review the selected **valuation bases** for assets and liabilities to determine whether they are consistent with and appropriate for the intended use of the **capital adequacy assessment**. When doing so, the actuary should consider the following:

a. criteria used by management for making risk and other financial decisions;

b. any differences between the selected **valuation bases** and any mandated (for

example, by regulators, accountants, or others) **valuation bases**;

c. the time horizon(s) considered by management in decision-making;

d. the characteristics and implications of the selected **valuation bases**; and

e. any restrictions on assets or **capital** that are not otherwise reflected in the **valuation bases**.

3.4 Risk Capital Target or Risk Capital Threshold—When the actuary assists in the design of or the review of the appropriateness or applicability of **risk capital target(s)** or **risk capital threshold(s)**, the actuary should take into account the following (on a historical, current, and prospective basis, as appropriate):

a. the **valuation bases**;

b. the principal's objectives for **capital** (such as maintaining minimum ratios of regulatory or rating agency capital, insurer stability, acquisition plans, new business, or infrastructure investment) and reasons they could change;

c. normal and adverse environments;

d. the time horizon over which the **capital** is assessed;

e. the methods used to aggregate results, including diversification benefits and the uncertainty of the interdependence among the risks; and

f. alignment with any existing **risk appetite** and **risk tolerance**.

3.5 Additional Considerations Regarding Risk Capital Target or Risk Capital Threshold—When the actuary assists in the design of or the review of the appropriateness or applicability of **risk capital target(s)** or **risk capital threshold(s)**, the actuary should consider the following:

a. the approach used to determine the "sufficient" level of **capital** (such as models based on factors, historical averages, and economic capital), as well as the uncertainty inherent in the approach;

b. the relative merits of using a range for the **risk capital targets** versus a single number;

c. whether the insurer will be able to access additional **capital** if and when needed, including the availability and sources of **capital** within the **group** when the insurer is part of a **group**;

d. the **risk capital targets** or **risk capital thresholds** that are in use within the

group, if applicable; and

e. the relationship of **risk capital targets** or **risk capital thresholds** established by management to the current **capital** and risks of the insurer.

3.6 Scenario Tests and Stress Tests—When scenario tests and stress tests are included in a **capital adequacy assessment**, the actuary should follow applicable guidance for scenario testing and stress testing in ASOP No. 46, *Risk Evaluation in Enterprise Risk Management*, and ASOP No. 47, *Risk Treatment in Enterprise Risk Management*. In addition, the actuary should consider the following:

3.6.1 Types of Tests—One or more forms of scenario tests or stress tests such as the following:

a. Deterministic—Tests to challenge the insurer in specific ways based on its unique exposures. For example, emerging risks may be considered using deterministic stress tests;

b. Stochastic—Tests chosen from one or more sets of stochastically generated scenarios;

c. Combination—Tests where multiple events happen simultaneously or sequentially; and

d. Reverse—Reverse-engineered tests that create an **adverse capital event**.

3.6.2 Level of Adversity—Different levels of adversity such as the following:

a. periods of normal volatility;

b. plausible adverse conditions; and

c. tail events.

3.6.3 Sensitivity Testing—The actuary may use sensitivity testing as part of a **capital adequacy assessment**. For example, sensitivity testing can be used to determine the applicability of the results of the scenario tests and stress tests under changing conditions, including the passage of time, as well as testing the materiality or impact of different assumptions, including stochastic model assumptions.

3.7 Incorporating Management Actions—When management actions are incorporated into a **capital adequacy assessment**, the actuary should consider the following:

a. effectiveness and applicability of prior management actions, given changes between when such actions were taken and the projection period, for example:

1. the magnitude of the impact of the prior action compared with the impact needed in the projection;

2. the differences in risk environment, including differences in the insurer's business and operations, and the legal and regulatory environment;

3. differences in the insurer's enterprise risk management program and **risk profile**; and

4. differences in the insurer's financial strength;

b. feedback from board members or management;

c. legal, regulatory, and execution timing requirements;

d. experience, if available, of other insurers and non-insurance entities who took similar actions; and

e. expected reactions of regulators and other stakeholders.

3.8 Insurers That Operate under More Than One Regulatory Regime—When the actuary is designing, performing, or reviewing a **capital adequacy assessment** of an insurer that individually or as part of a **group** operates under more than one regulatory regime, the actuary should take into account the following factors:

a. different regulatory regimes that might apply to different parts of the insurer or different entities (including non-insurance entities) of the **group**, including:

1. cooperation and existence or non-existence of memorandums of understanding between regulators;

2. differing requirements for **capital**, scenario and stress tests, and financial reporting structures;

3. expected regulatory changes;

4. differing amounts of regulatory oversight;

5. impact of rules, restrictions, and time-lags on **capital** availability;

6. differing definitions of "insurance company" and "regulated entity"; and

7. differing **valuation bases**; and

b. variations in taxation and approaches to litigation in various regulatory regimes.

3.9 Additional Considerations Regarding Insurers That Are Part of a Group—When the actuary is designing, performing, or reviewing a **capital adequacy assessment** of an insurer that is part of a **group**, or the assessment is of a **group**, the actuary should consider the following, if applicable:

a. level of complexity and extent of information available across all entities in the **group**;

b. levels of autonomy in selecting **capital** strategies for individual entities within the **group**; and

c. the impact of varying ownership interests, including the following:

1. ownership splits, particularly between customers and shareholders;

2. shares listed on multiple stock exchanges; and

3. ownership concentrations.

3.10 Reliance on Data or Other Information Supplied by Others—When relying on data or other information supplied by others, the actuary should refer to the following ASOPs for guidance: ASOP No. 23, *Data Quality*; ASOP No. 41, *Actuarial Communications*; and, if applicable, ASOP No. 38, *Using Models Outside the Actuary's Area of Expertise (Property and Casualty)*. When relying on projections or supporting analysis supplied by others, the actuary should disclose the fact and the extent of such reliance.

3.11 Documentation—The actuary should consider preparing and retaining documentation to support compliance with the requirements of section 3 and the disclosure requirements of section 4. When preparing such documentation, the actuary should prepare such documentation in a form such that another actuary qualified in the same practice area could assess the reasonableness of the actuary's work or could assume the assignment if necessary. The degree of such documentation should be based on the professional judgment of the actuary and may vary with the complexity and purpose of the actuarial services. In addition, the actuary should refer to ASOP No. 41, section 3.8, for guidance related to the retention of file material other than that which is to be disclosed under section 4.

Section 4. Communications and Disclosures

4.1 Required Disclosures in an Actuarial Report—When issuing an actuarial report to which this standard applies, the actuary should refer to ASOP Nos. 23, 41, 46, 47, and, if applicable, 38. In addition, the actuary should disclose the following in such actuarial reports, if applicable:

a. the businesses (insurance or non-insurance) that are included or excluded (and reasons for exclusion) in the assessment;

b. the key current and future business and risk drivers, including the legal, tax, regulatory, and economic environments in which the insurer operates (see section 3.1[b]);

c. the key elements of business and risk management plans and strategies included in the **capital adequacy assessment** (see section 3.1[c]);

d. how the timing and variability of projected liability-related and asset-related cash flows were taken into account (see section 3.1[d]);

e. how future calls on **capital**, and the insurer's means and ability to replenish **capital** were taken into account (see section 3.1[e]);

f. how correlation of risks and events, concentration of exposures, diversification benefits, and the uncertainty of the interdependence between risks were taken into account (see section 3.1[h]);

g. the basis for projections of future economic conditions (see section 3.1[i]); and

h. the selected valuation bases for assets and liabilities, and why they are appropriate (see section 3.3).

4.2 Additional Disclosures in an Actuarial Report—The actuary should include the following disclosures, when applicable, in an actuarial report:

a. the extent to which information regarding prior sources of **capital** was reflected in the **capital adequacy assessment**, including any reasons for deviations from past trends in such sources and uses, if such information was available;

b. how the insurer's risk management practices or processes, or the insurer's **risk profile**, **risk appetite**, or **risk tolerance** were reflected in the assumptions or methodology underlying the **capital adequacy assessment**, if they were material to the **capital adequacy assessment** (see sections 3.2[a] and 3.2[b]);

c. any material differences between a prior **capital adequacy assessment** or relevant publicly available or internal reports and analyses and the assumptions underlying the **capital adequacy assessment**, if the actuary had access to such assessment or reports and analyses (see sections 3.2[c] and 3.2[d]);

d. whether the actuary has considered any **capital adequacy assessments** performed at the **group** level and how that information has been used, and describe how being part of the **group** is reflected in the **capital adequacy assessment**, if the insurer is a part of a **group** (see sections 3.2[e] and 3.9);

e. a description of specific management actions, their impact on the **capital adequacy assessment**, and whether the actions could be effectively implemented in a timely manner, if the **capital adequacy assessment** reflects such actions (see sections 3.2[f] and 3.7);

f. the actuary's role and the rationale underlying the design or the results of the actuary's review, if the actuary had a role in the design of or reviewed the **risk capital targets** or **risk capital thresholds** (see sections 3.4 and 3.5);

g. a summary of the tests, including the type and levels of adversity, and the results of the tests, if scenario or stress tests are part of the **capital adequacy assessment** (see section 3.6);

h. a description of how operating under more than one regulatory regime is reflected in the **capital adequacy assessment**, if the insurer operates, either individually or as part of a **group**, under more than one regulatory regime (see section 3.8);

i. the disclosure in ASOP No. 41, section 4.2, if any material assumption or method was prescribed by applicable law;

j. the disclosure in ASOP No. 41, section 4.3, if the actuary states reliance on other sources and thereby disclaims responsibility for any material assumption or method selected by a party other than the actuary; and

k. the disclosure in ASOP No. 41, section 4.4, if, in the actuary's professional judgment, the actuary has otherwise deviated materially from the guidance of this ASOP.

Appendix 1

Background and Current Practices

Note: This appendix is provided for informational purposes and is not part of the standard of practice.

Background

Enterprise risk management (ERM) has been the focus of the insurance industry, including insurers, regulators, and rating agencies, for some time. In response to this increased attention to ERM, the Actuarial Standards Board (ASB) created the ERM Task Force (now Committee), which developed ASOP No. 46, *Risk Evaluation in Enterprise Risk Management*, and ASOP No. 47, *Risk Treatment in Enterprise Risk Management*. These two ASOPs provide guidance to the actuary for overall ERM work.

Historically, most insurers did not undertake formal assessments of capital adequacy. Instead, they tended to use rules of thumb (for example, premium to surplus ratios) or relied on regulatory rules (for example, risk-based capital ratios) or rating agencies (for example, A. M. Best's Capital Adequacy Ratio). Many companies also relied on stress tests or what-if analyses to assess capital levels. Insurance regulators designed deterministic stress tests that reflected potential experience beyond the range of an insurer's normal operations. Over time, deterministic stress tests were developed for a wide variety of assumptions.

Starting in 2012, insurance regulators began implementing the own risk and solvency assessment (ORSA) process throughout the world. Specifically, the ORSA process is required by the NAIC accreditation standards and is a part of the Insurance Core Principles (ICP 16) set out by the International Association of Insurance Supervisors (IAIS). A key feature of ORSA is that it requires a formal assessment of capital adequacy to be a part of an insurer's ERM program.

Current Practices

Given the new ORSA requirements and the increasing demands from regulators, rating agencies, and other external stakeholders, insurers are under pressure to perform formal, more sophisticated capital adequacy assessments. These formal capital adequacy assessments typically involve considerations of complex contingencies in determining the impact of adverse experience on the insurer and its capital adequacy, usually involving actuaries in some or all of the assessment process.

Company practice in making these assessments varies significantly. Some companies have created their own stochastic models (or use commercially available software) that simulate underwriting results across all lines of business and geographies, as well as economic conditions and investment results. These models typically incorporate the insurer's strategic plan and may include complicated feedback loops that reflect management's responses, if any, to specific situations (for example, underwriting results, a recession, multiple catastrophic events, a

pandemic). They may also include predictions of how regulators and rating agencies may react to changes in the financial condition of the insurer. Other models may analyze capital adequacy at very high levels of aggregation and have limited or no feedback loops (i.e., they analyze specific management actions one at a time).

Larger insurers may have whole departments focused on analyzing the global economy. For smaller insurers, this work may be tasked to a specific individual or may be outsourced to consultants. In many of these insurers, actuaries and non-actuaries are involved in these analyses and the building of the models.

Rating agencies and regulators are concerned with individual company and group-wide capital adequacy. Many insurers are part of complex, multinational organizations (including insurers and non-insurers) that span many different accounting, financial, and regulatory regimes. The relationships among the members of a group and the differences among these regimes can have a significant impact on capital adequacy and the group's ability to fulfill its promises to its customers. In most countries, ORSA requires groups operating in multiple countries to perform a group-wide assessment of their capital adequacy across all jurisdictions.

Appendix 2

Comments on the Third Exposure Draft and Responses

The third exposure draft of this ASOP, *Capital Adequacy Assessment*, was issued in November 2018 with a comment deadline of March 1, 2019. Four comment letters were received. The Enterprise Risk Management Committee carefully considered all comments received, reviewed the third exposure draft, and proposed changes. The ASB reviewed the proposed changes and made modifications where appropriate.

Summarized below are the significant issues and questions contained in the comment letters and responses. Minor wording or punctuation changes that were suggested but not significant are not reflected in the appendix, although they may have been adopted.

The term "reviewers" in appendix 2 includes the Enterprise Risk Management Committee and the ASB. Also, unless otherwise noted, the section numbers and titles used in appendix 2 refer to those in the third exposure draft.

GENERAL COMMENTS	
Comment	One commentator wanted to clarify that the insurer's actual capital is not part of the assessment but is just compared to the needed capital.
Response	The reviewers believe that the standard is appropriate and therefore made no change.
SECTION 2. DEFINITIONS	
Section 2.5, Risk Appetite	
Comment	One commentator said that the definitions of "risk tolerance" and "risk appetite" were unclear and wanted examples added to clarify these terms.
Response	The reviewers note that the definitions are consistent with the definitions in ASOP No. 46, *Risk Evaluation in Enterprise Risk Management*, and ASOP No. 47, *Risk Treatment in Enterprise Risk Management*, and are appropriate for this ASOP, and therefore made no change.
Sections 2.6 and 2.7, Risk Capital Target and Risk Capital Threshold	
Comment	One commentator didn't understand how "risk capital threshold" and "risk capital targets" were functions of "risk tolerance." In addition, the same commentator didn't see the need for both "risk capital targets" and "risk capital thresholds."
Response	The reviewers agree the definitions need to be clarified regarding risk tolerance and made changes. The reviewers believe that using both "risk capital targets" and "risk capital thresholds" is appropriate and made no changes in this regard.
Section 2.7, Risk Capital Threshold	
Comment	One commentator said that a "risk capital threshold" was not always a function of "risk tolerance."
Response	The reviewers agree the definition needs to be clarified regarding risk tolerance and made changes.
Section 2.9, Risk Tolerance	
Comment	One commentator said defining "risk tolerance" in terms of "capacity" was inappropriate and suggested an alternative definition.

Response	The reviewers note that the definitions are consistent with the definitions in ASOP Nos. 46 and 47 and are appropriate for this ASOP, and therefore made no change.
SECTION 3. ANALYSIS OF ISSUES AND RECOMMENDED PRACTICES	
Section 3.1(f), General Considerations	
Comment	One commentator said that the list of "resources" in this section was too broad and the disclosure requirements might force an actuary to reveal confidential insurer information.
Response	The reviewers believe the guidance is appropriate but clarified the language to indicate that the list provides examples of resources.
Comment	One commentator said that availability of capital within a group did not necessarily mean the insurer could get the capital when needed.
Response	The reviewers agree and changed "available resources" to "accessible resources."
Comment	One commentator said that the actuary needed to evaluate fungibility and frictional costs of transferring assets when doing a group capital assessment.
Response	The reviewers made a change from "available" to "accessible" to address the issue of fungibility but believe that the current guidance is otherwise sufficient.
Section 3.2(e)(1), Additional General Considerations	
Comment	One commentator suggested reviewing this section in light of any changes made in section 3.1(f) regarding the availability of capital.
Response	The reviewers believe the guidance in this section is sufficient and made no change.
Section 3.5(e), Additional Considerations Regarding Risk Capital Target or Risk Capital Threshold	
Comment	One commentator said that "regulators" in the parenthetical remark was redundant, as "regulators" were referenced explicitly later in the sentence.
Response	The reviewers modified the language.
Section 3.6.1(b), Stochastic	
Comment	One commentator said that contexts or sources should be provided for the types of stress tests used by the actuary.
Response	The reviewers believe that this concern is appropriately covered by the disclosure requirement in section 4.2(g) and made no change.
Section 3.6.2(c), Combination	
Comment	One commentator said that the requirement to consider "extremely unlikely catastrophic events" is too open-ended and may require the actuary to consider unreasonably severe events.
Response	The reviewers modified the language to "tail events."
Section 3.7, Incorporating Management Actions	
Comment	One commentator was concerned that the requirement to consider past management actions had no time limit.
Response	The reviewers believe the current guidance is appropriate and therefore made no change.

Comment	One commentator said that management actions should include an insurer's internal allocation of capital.
Response	The reviewers believe the internal allocation of capital is beyond the scope of this standard and therefore made no change.
Section 3.8, Insurers That Operate in Multiple Jurisdictions (now Insurers That Operate under More Than One Regulatory Regime)	
Comment	One commentator questioned whether considering "variations in taxation" might require the actuary to assess capital on both a pre- and post-tax basis.
Response	The reviewers believe the guidance is appropriate and therefore made no change.
Comment	One commentator said that "multiple jurisdictions" should be changed to "multiple regulatory regimes" because there may be multiple regulatory regimes within the same jurisdiction.
Response	The reviewers agree and made the change.
SECTION 4. COMMUNICATIONS AND DISCLOSURES	
Section 4.1, Actuarial Communication (now Required Disclosures in an Actuarial Report)	
Comment	One commentator said the requirement to "disclose … a discussion" was unclear and awkward.
Response	The reviewers agree and made changes to sections 4.1 (d), (e), and (h).
Section 4.2(a), Additional Disclosures in an Actuarial Report	
Comment	One commentator thought the standard required disclosure of all information whenever available, whether relevant to the current capital assessment or not, and recommended adding "and relevant" to 4.2 so it says, "as applicable and relevant."
Response	The reviewers believe the current guidance is appropriate and made no change.
Section 4.2(c), Additional Disclosures in an Actuarial Report	
Comment	One commentator thought there was a conflict between the introductory paragraph that says, "as applicable" and section 4.2 (c) that requires disclosure if the actuary had access to prior assessments.
Response	The reviewers believe the current wording is clear and therefore made no change.
Section 4.2(d), Additional Disclosures in an Actuarial Report	
Comment	One commentator said that requiring the actuary to disclose whether he or she had considered a group capital assessment might raise red flags about the group when the actuary does not consider the group assessment.
Response	The reviewers believe the current language is appropriate and made no change.

ACTUARIAL STANDARDS BOARD

Actuarial Standard
of Practice
No. 56

Modeling

Developed by the
Modeling Task Force of the
General Committee of the
Actuarial Standards Board

Adopted by the
Actuarial Standards Board
December 2019

Doc. No. 195

ASOP No. 56—Doc. No. 195

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APPENDIXES

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December 2019

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Modeling

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 56

This document contains ASOP No. 56, *Modeling*.

History of the Standard

The ASB first began work on a standard for modeling in the late 1990s. Motivated primarily to address the role catastrophe modeling of earthquakes and hurricanes played in casualty ratemaking, this work was focused on the use of specialized models where actuaries would have to rely on a model that was developed by professionals other than actuaries. As a result of this work, ASOP No. 38, *Using Models Outside the Actuary's Area of Expertise*, was approved by the ASB in June of 2000 with the scope of the standard limited to the Property/Casualty area of practice. Historically, ASOP No. 38 had been the only ASOP that specifically addressed modeling.

Recently, the number and importance of modeling applications in actuarial science have increased, with the results of actuarial models sometimes being reflected in financial statements.

Recognizing this trend, the ASB asked the Life Committee in 2010 to begin work on an ASOP focused on modeling. The Life Committee formed a task force to address this issue and, in February of 2012, a discussion draft titled *Modeling in Life Insurance and Annuities* was released and nineteen comment letters were received. The transmittal letter also mentioned that the scope might be expanded to all practice areas and asked for comments on this idea.

Based upon the feedback received, and numerous other discussions on the topic of modeling, in December of 2012 the ASB created two multi-disciplinary task forces under the direction of the General Committee: i) a general Modeling Task Force, charged with developing an ASOP to address modeling applications in all practice areas, and ii) a Catastrophe Modeling Task Force to consider expanding ASOP No. 38 to all practice areas while focusing exclusively on using catastrophe models. The membership of these task forces has experience in all actuarial practice areas, including enterprise risk management.

First Exposure Draft

The first exposure draft was released in June 2013 with a comment deadline of September 30, 2013. Forty-eight comment letters were received and considered in making changes that were reflected in the second exposure draft.

Second Exposure Draft

A second exposure draft was released in November 2014 with a comment deadline of March 1, 2015. Thirty-seven comment letters were received and considered in making changes that were reflected in the third exposure draft.

Third Exposure Draft

A third exposure draft was released in June 2016 with a comment deadline of October 31, 2016. Twenty-eight comment letters were received and considered in making changes that were reflected in the fourth exposure draft.

Fourth Exposure Draft

A fourth exposure draft was released in December 2018 with a comment deadline of May 15, 2019. Twenty-six comment letters were received and considered in making changes that were reflected in this final ASOP. For a summary of the issues contained in these comment letters, please see appendix 2.

Notable Changes from the Fourth Exposure Draft

Notable changes made to the fourth exposure draft are summarized below. Additional changes were made to improve readability, clarity, or consistency.

1. Section 3.1.6(b), Margins, was deleted because it did not provide sufficiently clear guidance. While margins are appropriately used, or even required, for certain intended purposes, margins are inappropriate and not used for other intended purposes.

2. "Hold-out data" in predictive modeling was defined and added to the list of items that may be included in the model output validation in section 3.6.2(b).

3. The term "parameter" was eliminated from section 3 of the ASOP, referencing it only within the definition of "assumption" because the two terms often are synonymous and the guidance often was identical.

As a next step, the ASB will review the previously approved but pending ASOP No. 38, *Catastrophe Modeling (for All Practice Areas)*, for any changes necessitated by this ASOP and take appropriate action.

The ASB thanks everyone who took the time to contribute comments and suggestions on the exposure drafts.

The ASB also thanks former task force member Aaron R. Weindling for his assistance during the earlier drafting of this standard.

The ASB voted in December 2019 to adopt this standard.

ASOP No. 56—Doc. No. 195

Modeling Task Force

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Julie H. Fried	Judy K. Stromback
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The Actuarial Standards Board (ASB) sets standards for appropriate actuarial practice in the United States through the development and promulgation of Actuarial Standards of Practice (ASOPs). These ASOPs describe the procedures an actuary should follow when performing actuarial services and identify what the actuary should disclose when communicating the results of those services.

ASOP No. 56—Doc. No. 195

ACTUARIAL STANDARD OF PRACTICE NO. 56

MODELING

STANDARD OF PRACTICE

Section 1. Purpose, Scope, Cross References, and Effective Date

1.1 Purpose—This actuarial standard of practice (ASOP or standard) provides guidance to actuaries when performing actuarial services with respect to designing, developing, selecting, modifying, using, reviewing, or evaluating **models**.

1.2 Scope—This standard applies to actuaries in any practice area when performing actuarial services with respect to designing, developing, selecting, modifying, or using all types of **models**. For example, an actuary using a **model** developed by others in which the actuary is responsible for the **model output** is subject to this standard.

If the actuary's actuarial services involve reviewing or evaluating **models**, the reviewing or evaluating actuary should be reasonably satisfied that the actuarial services were performed in accordance with this standard. The reviewing or evaluating actuary should apply the guidance in this standard to the extent practicable within the scope of the actuary's assignment.

The guidance in this ASOP applies to the actuary when, in the actuary's professional judgment, reliance by the **intended user** on the **model output** has a material effect for the **intended user**. This judgment should be made within the context of the use of the **model output** and the needs of the **intended user**, based on facts known by the actuary at the time the actuarial services are performed. For example, actuarial services performed in relation to pension plan contribution and cost projection **models**, insurance pricing **models**, predictive **models**, reserving **models**, and insurance company financial planning **models** may require application of the guidance in this ASOP. In assessing materiality, the actuary should be guided by ASOP No. 1, *Introductory Actuarial Standard of Practice*, section 2.6.

The guidance in this ASOP does not apply to the actuary when performing services with respect to individual pension benefit calculations and nondiscrimination testing, as described in section 1.2 of ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions.*

This standard only applies to the extent of the actuary's responsibilities. The actuary's responsibilities may extend to performing actuarial services related to an entire **model** or to only a small portion of a **model**.

Other ASOPs may provide guidance for actuarial services that involve **models**. If the actuary determines that the guidance from another ASOP conflicts with the guidance of this ASOP, the guidance of the other ASOP will govern.

If the actuary departs from the guidance set forth in this ASOP in order to comply with applicable law (statutes, regulations, and other legally binding authority), or for any other reason, the actuary should refer to section 4. If a conflict exists between this standard and applicable law, the actuary should comply with applicable law.

1.3 Cross References—When this ASOP refers to the provisions of other documents, the reference includes the referenced documents as they may be amended or restated in the future, and any successor to them, by whatever name called. If any amended or restated document differs materially from the originally referenced document, the actuary should consider the guidance in this ASOP to the extent it is applicable and appropriate.

1.4 Effective Date—This ASOP is effective for work performed on or after October 1, 2020.

Section 2. Definitions

The terms below are defined for use in this actuarial standard of practice and appear in bold throughout the ASOP.

2.1 Assumption—A type of explicit **input** to a **model** that is derived from **data**, represents possibilities based on professional judgment, or may be prescribed by law or by others. When derived from **data**, an **assumption** may be statistical, financial, economic, mathematical, or scientific in nature, and may be described as a **parameter**.

2.2 Data—Facts or information that are either direct **input** to a **model** or inform the selection of **input**. **Data** may be collected from sources such as records, experience, experiments, surveys, observations, benefit plan or policy provisions, or **output** from other **models**.

2.3 Governance and Controls—The application of a set of procedures and an organizational structure designed to reduce the risk that the **model output** is not reliably calculated or not utilized as intended.

2.4 Hold-out Data—A subset of **data** that is withheld intentionally when developing a predictive **model** so that the **model** may be validated later with **data** that were not used to develop the **model**.

2.5 Input—**Data** or **assumptions** used in a **model** to produce **output**.

2.6 Intended Purpose—The goal or question, whether generalized or specific, addressed by the **model** within the context of the assignment.

2.7 Intended User—Any person whom the actuary identifies as able to rely on the **model output**.

2.8 Model—A simplified representation of relationships among real world variables, entities, or events using statistical, financial, economic, mathematical, non-quantitative, or scientific concepts and equations. A **model** consists of three components: an information **input** component, which delivers **data** and **assumptions** to the **model**; a processing component, which transforms **input** into **output**; and a results component, which translates the **output** into useful business information.

2.9 Model Risk—The risk of adverse consequences resulting from reliance on a **model** that does not adequately represent that which is being modeled, or the risk of misuse or misinterpretation.

2.10 Model Run—The process of transforming a particular set of **input** to a particular set of **output** in a **model**. A **model run** could include the whole transformation process or part of the process, as applicable.

2.11 Output—The results of a **model** including, but not limited to, point estimates, likely or possible ranges, **data** or **assumptions** (as **input** for other **models**), behavioral expectations, or qualitative criteria on which decisions could be made.

2.12 Overfitting—A situation where a **model** fits the **data** used to develop the **model** so closely that prediction accuracy materially decreases when the **model** is applied to different **data**.

2.13 Parameter—A type of statistical, financial, economic, mathematical, or scientific value that is used as **input** to certain types of **models**. Examples of **parameters** include expected values in probability distributions and coefficients of formula variables. Some types of **models**, such as predictive or statistical **models**, produce estimates of **parameters** as **output**, which may be used as **input** to other **models**.

Section 3. Analysis of Issues and Recommended Practices

3.1 Model Meeting the Intended Purpose—The actuary should understand the **model's intended purpose**.

3.1.1 Designing, Developing, or Modifying the Model—When the actuary designs, develops, or modifies the **model,** the actuary should confirm, in the actuary's professional judgment, that the capability of the **model** is consistent with the **intended purpose**. Items the actuary should consider, if applicable, include but are not limited to the following:

a. the level of detail built into a **model**;

b. the dependencies recognized; and

c. the **model's** ability to identify possible volatility of **output**, such as volatility around expected values.

3.1.2 Selecting, Reviewing, or Evaluating the Model—When selecting, reviewing, or evaluating the **model**, the actuary should confirm that, in the actuary's professional judgment, the **model** reasonably meets the **intended purpose**.

3.1.3 Using the Model—When using the **model**, the actuary should make reasonable efforts to confirm that the model structure, **data**, **assumptions**, **governance and controls**, and **model** testing and **output** validation are consistent with the **intended purpose**.

3.1.4 Model Structure—The actuary should assess whether the structure of the **model** (including judgments reflected in the **model**) is appropriate for the **intended purpose**. The actuary should consider the following, as applicable, for a particular **model**:

a. which provisions and risks specific to a business segment, contract, or plan, if any, or interactions more broadly, are material and appropriate to reflect in the **model**;

b. whether the form of the **model** is appropriate, such as a projection **model** (deterministic or stochastic), statistical **model**, or predictive **model**;

c. whether the use of the **model** dictates a particular level of detail, for example, whether grouping **inputs** will produce reasonable **output**, or whether a certain level of detail in the **output** is needed to meet the **intended purpose**;

d. whether there is a material risk of the **model overfitting** the **data**; and

e. whether the **model** appropriately represents options, if any, that could be reasonably expected to have a material effect on the **output** of the **model**. Examples include call options on fixed income assets, policyholder surrender options, and early retirement options.

3.1.5 Data—The actuary should use, or confirm use of, **data** appropriate for the **model's intended purpose** and should refer, as applicable, to ASOP No. 23, *Data Quality*, when selecting, reviewing, or evaluating **data** used in the **model**, either directly or as the basis for deriving, estimating, or testing **assumptions** used in the **model**.

3.1.6 Assumptions Used As Input—For **models** that use **assumptions** as **input**, the actuary should use, or confirm use of, **assumptions** that are appropriate given the

model's intended purpose. The following guidance applies for **models** that use **assumptions** as **input**:

a. Setting Assumptions—When setting **assumptions** for which the actuary is taking responsibility, the actuary should consider using the following **data** or information:

   1. actual experience properly modified to reflect the circumstances being modeled, to the extent actual experience is available, relevant, and sufficiently reliable;

   2. other relevant and sufficiently reliable experience, such as industry experience that is properly modified to reflect the circumstances being modeled, if actual experience is not available, relevant, or sufficiently reliable;

   3. future expectations or estimates, including those derived from market **data**, when available and appropriate; and

   4. other relevant sources of **data** or information.

b. Range of Assumptions—The actuary may consider using a range of **assumptions** and, if so, whether the number of **model runs** analyzed reflects a set of conditions consistent with the **intended purpose**.

c. Consistency—Where appropriate, the actuary should use, or confirm use of, **assumptions** for the **model** that are reasonably consistent with one another for a given **model run**.

   If the actuary is aware of material inconsistencies among **assumptions** used by the actuary in the **model**, the actuary should disclose the inconsistencies and known reasons for the inconsistencies. In the case of **assumptions** prescribed by applicable law, the actuary's disclosure may be limited to identifying the possibility of an inconsistency with other **assumptions**.

d. Appropriateness of Input in Current Model Run—Where practical and appropriate, the actuary reusing an existing **model** should evaluate whether **input** unchanged from a prior **model run** is still appropriate for use in the current **model run**. For example, **models** used in financial reporting may offer opportunities to compare **assumptions** to emerging experience in the aggregate.

e. Reasonable Model in the Aggregate—The actuary should assess the reasonability of the **model output** when determining whether the **assumptions** are reasonable in the aggregate. While **assumptions** might

appear to be reasonable individually, conservativism or optimism in multiple **assumptions** may result in unreasonable **output**.

3.2 Understanding the Model—When expressing an opinion on or communicating results of the **model**, the actuary should understand the following:

a. important aspects of the **model** being used, including but not limited to, basic operations, important dependencies, and major sensitivities;

b. known weaknesses in **assumptions** used as **input**, known weaknesses in methods or other known limitations of the **model** that have material implications; and

c. limitations of **data** or information, time constraints, or other practical considerations that could materially impact the **model's** ability to meet its **intended purpose**.

3.3 Reliance on Data or Other Information Supplied by Others—When relying on **data** or other information supplied by others, the actuary should refer to ASOP No. 23 and ASOP No. 41, *Actuarial Communications*, for guidance.

3.4 Reliance on Models Developed by Others—If the actuary relies on a **model** designed, developed, or modified by others, such as a vendor or colleague, and the actuary has a limited ability either to obtain information about the **model** or to understand the underlying workings of the **model**, the actuary should disclose the extent of such reliance. In addition, the actuary should make a reasonable attempt to have a basic understanding of the **model**, including the following, as appropriate:

a. the designer's or developer's original **intended purpose** for the **model**;

b. the general operation of the **model**;

c. major sensitivities and dependencies within the **model**; and

d. key strengths and limitations of the **model**.

When relying on **models** developed by others, the actuary should make practical efforts to comply with other applicable sections of this standard.

3.5 Reliance on Experts—The actuary may rely on experts in the fields of knowledge used in the development of the **model**. In determining the appropriate level of reliance, the actuary may consider the following:

a. whether the individual or individuals upon whom the actuary is relying are experts in the applicable field;

b. the extent to which the **model** has been reviewed or validated by experts in the applicable field, including known material differences of opinion among experts concerning aspects of the **model** that could be material to the actuary's use of the **model**;

c. whether there are industry or regulatory standards that apply to the **model** or to the testing or validation of the **model**, and whether the **model** has been certified as having met such standards; and

d. whether the science underlying the expertise is likely to produce useful **models** for the **intended purpose**.

When relying on experts, the actuary should disclose the extent of such reliance.

3.6 Evaluation and Mitigation of Model Risk—The actuary should evaluate **model risk** and, if appropriate, take reasonable steps to mitigate **model risk**. The type and degree of **model risk** mitigation that is reasonable and appropriate may depend on the following:

a. the **model's intended purpose**;

b. the nature and complexity of the **model**;

c. the operating environment and **governance and controls** related to the **model**;

d. whether there have been changes to the **model** or its operating environment; and

e. the balance between the cost of the mitigation efforts and the reduction in potential **model risk**.

3.6.1 Model Testing—For a **model run** or set of **model runs** generated at one time or over time that is to be relied upon by the **intended user**, the actuary should perform sufficient testing to ensure that the **model** reasonably represents that which is intended to be modeled. **Model** testing may include the following:

a. reconciling relevant **input** values to the relevant system, study, or other source of information, addressing and documenting the differences appearing in the reconciliation, if material;

b. checking formulas, logic, and table references;

c. running tests of variations on key **assumptions** used as **input** to test that changes in the **output** are consistent with expectations given the changes in the **input** (i.e., sensitivity testing); and

d. reconciling the **output** of a **model run** to prior **model runs**, given changes in **data**, **assumptions**, formulas, or other aspects of the **model** since the prior **model run**.

3.6.2 Model Output Validation—The actuary should validate that the **model output** reasonably represents that which is being modeled. Depending on the **intended purpose**, **model output** validation may include the following:

a. testing, where applicable, preliminary **model output** against historical actual results to verify that modeled **output** would bear a reasonable relationship to actual results over a given time period if **input** to the **model** were set to be consistent with the conditions prevailing during such period;

b. evaluating whether the **model** applied to **hold-out data** produces **model output** that is reasonably consistent with **model output** developed without the **hold-out data**, as may be used for predictive **models**;

c. performing statistical or analytical tests on **model output** to assess their reasonableness;

d. running tests of variations on key **assumptions** to test that changes in the **output** are consistent with the expectations given the changes in the **input**; and

e. comparing **model output** to those of an alternative **model**(s), where appropriate.

3.6.3 Review by Another Professional—The actuary may consider obtaining a review by another qualified professional, depending upon the nature and complexity of the **model**.

3.6.4 Reasonable Governance and Controls—The actuary should use, or, if appropriate, may rely on others to use, reasonable **governance and controls** to mitigate **model risk**.

3.6.5 Mitigating Misuse and Misinterpretation—The actuary should refer to the guidance in ASOP No. 41, in particular sections 3.4.1 and 3.7, to mitigate possible misuse and misinterpretation of the **model**.

3.7 Documentation—The actuary should consider preparing and retaining documentation to support compliance with the requirements of section 3 and the disclosure requirements of section 4. If preparing documentation, the actuary should prepare such documentation in a form such that another actuary qualified in the same practice area could assess the reasonableness of the actuary's work. The degree of such documentation should be based on the professional judgment of the actuary and may vary with the complexity and purpose

of the actuarial services. In addition, the actuary should refer to ASOP No. 41, section 3.8, for guidance related to the retention of file material other than that which is to be disclosed under section 4.

Section 4. Communications and Disclosures

4.1 Required Disclosures in an Actuarial Report—When issuing an actuarial report under this standard, the actuary should refer to ASOP Nos. 23 and 41. In addition, the actuary should disclose the following in such actuarial reports:

a. the **intended purpose** of the **model**, as discussed in section 3.1;

b. material inconsistencies, if any, among **assumptions**, and known reasons for such inconsistencies, as discussed in section 3.1.6(c);

c. unreasonable **output** resulting from the aggregation of **assumptions**, if material, as discussed in section 3.1.6(e);

d. material limitations and known weaknesses, as discussed in section 3.2;

e. extent of reliance on **models** developed by others, if any, as discussed in section 3.4; and

f. extent of reliance on experts, if any, as discussed in section 3.5.

4.2 Additional Disclosures in an Actuarial Report—The actuary should include the following, as applicable, in an actuarial report:

a. the disclosure in ASOP No. 41, section 4.2, if any material **assumption** or method was prescribed by applicable law;

b. the disclosure in ASOP No. 41, section 4.3, if the actuary states reliance on other sources and thereby disclaims responsibility for any material **assumption** or method selected by a party other than the actuary; and

c. the disclosure in ASOP No. 41, section 4.4, if, in the actuary's professional judgment, the actuary has otherwise deviated materially from the guidance of this ASOP.

4.3 Confidential Information—Nothing in this ASOP is intended to require the actuary to disclose confidential information.

Appendix 1

Background and Current Practices

Note: This appendix is provided for informational purposes and is not part of the standard of practice.

Background

Actuaries frequently use models to analyze uncertain outcomes, with every discipline relying on a broad range of modeling applications, ranging from simple spreadsheets to complex capital models. Actuaries have used models for a variety of purposes including to help explain a system, to study the effects of different parts of a system, to predict the behavior of a system, to predict the behavior of people, to derive estimates, or to inform decisions. The importance of modeling in actuarial science has continued to increase, with results of models sometimes being reflected in financial statements.

A model is only an approximation of reality, however, and not reality itself. Therefore, even a model that is prudently developed and carefully used does not eliminate inherent uncertainty and variability, and actual results may differ, sometimes significantly, from outcomes suggested by the model.

Current Practices

Actuaries use many types of models, ranging from projection models to statistical models and predictive models. Some models evolve through a life cycle consisting of: (1) a specification phase, (2) an implementation phase, and (3) a production phase, which consists of one or more model runs. Other models evolve through a life cycle of: (1) a specification phase, (2) an iterative, assumptions estimation phase, and (3) an output evaluation, validation, and selection phase. For other models, combinations of functionally similar phases may exist.

Appropriate model governance and controls are important when using models. Examples of model governance and controls include the following:

- limitations on access to use and modify the model (that is, restricting access to model input, model programming code and calculations, and model output);
- confirmation that model output is reproducible upon rerun (if the model allows for such reproducibility);
- implementing a model change management process;
- specification, documentation, and programming standards for the model;

- procedures for secure back-up of the media storing the programming code and data;
- appropriate staff training or cross-training for continuity of use and mitigation of key-person risk;
- plans for periodic consideration of the organization's continued ability to access and maintain the model, including data, software, staff, hardware, and any vendor relationships; and
- plans for periodic review of the assumptions, functionality, and methodology.

Appendix 2

Comments on the Fourth Exposure Draft and Responses

The fourth exposure draft titled *Modeling* was approved by the ASB in December 2018 with a comment deadline of May 15, 2019. Twenty-six comment letters were received, some of which were submitted on behalf of multiple commentators, such as by firms or committees. For purposes of this appendix, the term "commentator" may refer to more than one person associated with a particular comment letter. The Task Force and General Committee carefully considered all comments received, and the ASB reviewed (and modified, where appropriate) the changes proposed by the General Committee.

Summarized below are the significant issues and questions contained in the comment letters and the responses to each. Minor wording or punctuation changes that were suggested but not significant are not reflected in the appendix, although they may have been adopted.

The term "reviewers" includes the Task Force, General Committee, and the ASB. Unless otherwise noted, the section numbers and titles used below refer to those in the fourth exposure draft, which are then cross referenced with those in the final ASOP.

GENERAL COMMENTS	
Comment	One commentator suggested that the uses of "any" when in the context of what an actuary should do or should consider, and other similar references, may be onerous to actuaries in practice, and recommended their elimination.
Response	The reviewers agree and made the change.
Comment	One commentator suggested retaining a definition of "simple model" conceptually similar to what was included in the third exposure, with the suggested enhancement of modifying "transparent and can be predicted" to "transparent or can be predicted" to improve its usefulness and clarity.
Response	The reviewers note the concept of "simple model" has been previously addressed and made no change.
Comment	One commentator suggested that the standard include a definition of and guidance for ongoing model performance monitoring.
Response	While the reviewers agree with the concept of ongoing performance monitoring within a formalized model risk management program, the reviewers disagree with the suggestion for this ASOP and therefore did not make the change.
SECTION 1. PURPOSE, SCOPE, CROSS REFERENCES, AND EFFECTIVE DATE	
Section 1.1, Purpose	
Comment	One commentator suggested that sections 1.1, Purpose, and 1.2, Scope, should include explicit reference to mitigating model risk since it is a key area of focus on the modeling process and there is an explicit section of the ASOP exposure draft dedicated to this practice.
Response	The reviewers believe the guidance is appropriate and therefore made no change.

Section 1.2, Scope	
Comment	One commentator suggested that "responsible" should be replaced by "accountable" since it implies ownership – and the use of this term is more consistent with that used in the insurance industry to indicate appropriate ownership.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator recommended the use of the words "rely" and "reliance" be clarified as the terms are rather subtle given that some users of models consider the use of a model as reliance even when it is the user's own model.
Response	The reviewers believe the guidance is appropriate and therefore made no change.
Comment	One commentator suggested that the standard be applied only to financial reporting models and perhaps enterprise risk models.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested that the guidance for an actuary reviewing or evaluating models is not clear as to whether it is the model itself that is being reviewed or evaluated (which is what the text seems to literally suggest), or whether it is the use of the model that is being reviewed.
Response	The reviewers clarified the guidance.
Comment	One commentator disagreed with the exclusion of the concept of a "simple model" from the fourth exposure draft and recommended that the scope explicitly exclude simple calculations.
Response	The reviewers disagree with the suggestion and, therefore, did not make the change. The reviewers refer the commentator to section 1.2, Scope, including the definition of "model," when considering the applicability of the guidance in the ASOP.
Comment	One commentator suggested certain references to "use" might be confusing, in particular: 1) When the actuary's "use" of a model is not for the purpose of reviewing the model itself but only for the purpose of reviewing or using the output. In this instance, the standard should explicitly state that the actuary should not be charged with applying this standard, and 2) in the second paragraph that states the reviewing or evaluating actuary should "use the guidance in this standard to the extent practicable within the scope of the actuary's assignment" and in third paragraph that appears to use "rely" and "use" interchangeably.
Response	The reviewers agree with the potential confusion that might arise with the word "use" in the second and third paragraphs, and replaced these two references to "use" in section 1.2, Scope to improve clarity. However, the reviewers believe the guidance in the second paragraph is appropriate and therefore made no change in response to that part of the comment.
Comment	Two commentators suggested that the first sentence in the fifth paragraph seems unnecessary and suggested eliminating that sentence. One commentator also suggested beginning the paragraph with the current third sentence.
Response	The reviewers agree and made the change.

Comment	One commentator thought the example, "For example, actuarial services performed in relation to pension plan contribution and cost projection models…may require application of the guidance in this ASOP" was confusing.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 1.4, Effective Date	
Comment	Once commentator believes that the effective date language needs to be more descriptive because as written, it leaves many questions related to when the model was run, selected, developed, or when model results were communicated.
Response	The reviewers note that ASOPs apply to the actuary performing the actuarial services, and the effective date applies to "work performed [by the actuary] on or after...." Therefore, the reviewers made no change in response to this comment.
SECTION 2. DEFINITIONS	
Comment	One commentator suggested adding definitions for "testing," "validation," and "limitations."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 2.1, Assumption	
Comment	One commentator suggested that the definition of section 2.1, Assumption, be changed to note that an assumption can be produced as output from another model. Alternatively, the definitions of data and parameter in sections 2.2 and 2.12, respectively, could be changed to remove any reference to these items being produced from other models.
Response	The reviewers agree, made changes to the definitions of "assumption," "parameter," "input," and "output," and removed references to "parameter" within section 3 of the ASOP to improve clarity.
Comment	One commentator question whether assumptions are always input into a model versus incorporated into the model operations or methodology.
Response	In an effort to improve clarity and in response to this comment, the reviewers revised the definition of "assumption" to "a type of explicit input…" thus differentiating between explicit and implicit assumptions.
Section 2.2, Data	
Comment	One commentator requested examples of data that can be input to a model in the same way that examples of parameters are provided in that section since data are often refreshed with each model run while parameters and assumptions often remain unchanged from one run to the next.
Response	While the reviewers did not make the specific recommended edit, the reviewers made changes to the definitions of "assumption," "parameter," "input," and "output," and removed references to "parameter" within section 3 of the ASOP to improve clarity.
Comment	One commentator suggested that the drafted definition is too vague and general with respect to the kinds of data the ASOP addresses and suggested the definition be limited to quantitative or numerical data.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 2.3, Governance and Controls	
Comment	One commentator suggested that a more descriptive definition would be "The application of a set of procedures and an organizational structure designed so that intended users can have confidence that the model output is reliably calculated and utilized as intended."
Response	The reviewers clarified the language.

Comment	One commentator suggested defining "governance" and "controls" separately since they have different meaning.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 2.4, Input (now section 2.5)	
Comment	One commentator suggested the definition of input is very broad, and that input to a model can be in the form of 1) assumptions, 2) data, or 3) parameters. While each term is defined separately later in the document, the user must glean that they are not overlapping elements of input.
Response	The reviewers agree, made changes to the definitions of "assumption," "parameter," "input," and "output," and removed references to "parameter" within section 3 of the ASOP to improve clarity.
Comment	One commentator suggested adding the following sentence after the current sentence: "Input may include assumptions, data, and parameters."
Response	The reviewers agree in part, made changes to the definitions of "assumption," "parameter," "input," and "output," and removed references to "parameter" within section 3 of the ASOP to improve clarity.
Section 2.5, Intended Purpose (now section 2.6)	
Comment	One commentator suggested clarifying whether a model can have more than one intended purpose, perhaps treating each intended purpose as a separate model, even where they have a common processing component. This approach will reinforce the need to assess the appropriateness of a combination of specific processing components, data, assumptions, parameters and output for each intended purpose.
Response	The reviewers believe the guidance is appropriate and therefore made no change.
Comment	One commentator understood the definition for all roles other than when the actuary is the model developer and suggested that there should be a consideration of other purposes to be efficient with modeling efforts and less siloed in approach.
Response	The reviewers disagree and therefore made no change.
Section 2.6, Intended User (now section 2.7)	
Comment	Three commentators suggested replacing "actuarial findings" with "model's output" (which is defined in this ASOP while "findings" are not).
Response	The reviewers agree and made the change.
Comment	One commentator suggested replacing the word "actuarial findings" with "output of an actuarial model."
Response	The reviewers agree in part and replaced "actuarial findings" with "model output."
Comment	One commentator noted the definition is too broad as it describes an actuary as "able" to rely, and suggested alternatives of "likely" or "expected."
Response	The reviewers disagree and therefore made no change.
Comment	One commentator suggested that, while the definition is identical to that contained within ASOP No. 41, *Actuarial Communications*, the use of "able" and "identifies" in the definition may cause confusion, and suggested the alternative "Any person whom the actuary has indicated is permitted to rely on the actuarial findings."
Response	The reviewers disagree and therefore made no change.
Section 2.7, Model (now section 2.8)	
Comment	One commentator sought feedback regarding the definition of "model" in the context of several examples.
Response	The reviewers note that the ASOPs are principle-based and believe the current language covers these issues at the appropriate level of detail. Therefore, no change was made in response to this comment.

Comment	One commentator suggested adding the caveat from the background section of appendix 1 to the definition of a "model" to emphasize that a model is not bad or inaccurate just because a model did not match actual experience, namely: "A model is only an approximation of reality, not the reality itself, and the differences between the model and actual experience, by themselves, do not indicate a flawed model or noncompliance with standards."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested that the definition of a "model" is very broad and recommended defining the "processing component" to enable differentiation between simple calculations and a "model."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested removing the reference to "simplified" as it seems unnecessarily restrictive.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested that the definition is too broad as it could be interpreted to include any actuarial service other than individual benefit calculations and recommended that the definition should also describe what is not a model, such as nondiscrimination testing.
Response	The reviewers believe the definition of "model" is appropriate but note that section 1.2 was modified to exclude nondiscrimination testing.
Comment	One commentator suggested that the definition be changed to include "contractual" as a type of input and suggested adding "actuarial" to the list. In addition, the commentator suggesting adding a new definition for "system" as referenced in the definition.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested separating the "results component" from the model definition because the use of "results" in section 2.10, Output, appears to be inconsistent with the "results component" as described in this definition and the definition of output allows that such output could be used as input to other models.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested changing "to predict the behavior of a system, or to derive estimates and guide decisions" to "to predict the behavior of a system, to derive estimates of a system, or to guide decisions," because the former could imply "guiding decisions" and "deriving estimates" should always be considered together.
Response	The reviewers note that the last sentence in the definition was removed.
Comment	One commentator suggested that the definition and section 1.2, Scope, were unclear, and thus it was difficult to evaluate the remainder of the exposure draft.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

Comment	One commentator suggested the definition was unclear as to what types of models were addressed by the ASOP, and recommended that the ASOP specifically refer to quantitative or numerical models with respect to data, parameters, input and output, and that the scope of the "models" covered by the ASOP should be limited to quantitative models (for example, estimates) or perhaps other types of models based directly on quantitative values and explicitly exclude algorithmic decision making and other forms of artificial intelligence.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 2.8, Model Risk (now section 2.9)	
Comment	One commentator suggested that the definition include specific guidance on the use of the term, namely that "model risk" is not intended to include the likelihood that actual results of most all models will often differ, perhaps materially, from that produced by the Model's output, and recommended that, at a minimum, the sentence from the second paragraph (if not, the entire paragraph) in the "Background" section of this ASOP be made an integral part of the ASOP: "Even a model that is prudently developed and carefully used does not eliminate inherent uncertainty and variability, and actual experience may differ, sometimes significantly, from the estimates derived from the model results," ideally, within this definition. As an alternative, the ASOP could add an additional definition for "model outcome risk."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggesting adding the consequence of model risk to the definition, namely that "Model risk can lead to financial loss, poor business and strategic decision making, or damage to ... reputation."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested rewording for better clarity as follows: "The risk of adverse consequences resulting from reliance on a model that does not adequately represent that which is being modeled or the risk of misuse or misinterpretation."
Response	The reviewers agree and made the change in response to this comment.
Section 2.9, Model Run (now section 2.10)	
Comment	Two commentators sought clarification on what a model run constitutes, with one commentator recommending calling the collection of all simulations for a stochastic model as one model run to improve clarity.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggesting replacing "selection of input" with "set of input."
Response	The reviewers agree and made the change.
Section 2.10, Output (now section 2.11)	
Comment	One commentator suggested that the four possible uses of output (i.e., point estimates, ranges, parameters for other models, or qualitative criteria for making decisions) fail to capture the use of a model for explaining a system or predicting its behavior.
Response	The reviewers agree and added "behavioral expectations" to the definition.

Comment	One commentator noted that section 2.10, Output, only mentions parameters as output that might be used as input to other models, while different sections of the proposed ASOP also mention data and assumptions as possible model outputs that can be used as input to other models.
Response	The reviewers agree, made changes to the definitions of "assumption," "parameter," "input," and "output," and removed references to "parameter" within section 3 of the ASOP to improve clarity.
Comment	One commentator suggested eliminating "qualitative criteria on which decisions could be made," which is vague and may include unintended application of the ASOP.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 2.11, Overfitting (now section 2.12)	
Comment	Three commentators suggested adding "materially" to the phrase "prediction accuracy decreased" to allow for the actuary to determine whether that decrease is large enough to cause concern.
Response	The reviewers agree and made the change.
Comment	One commentator suggested that including "may decrease" in place of "decrease" seems more appropriate since the guidance in section 3.14 uses the words "should consider."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested including a definition of underfitting as well as adding more descriptive examples for both overfitting and underfitting.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 2.12, Parameter (now section 2.13)	
Comment	One commentator suggested that to further distinguish parameter from data, it would be helpful to state, "Parameters often consist of product features that are used to configure a model for specific blocks of business. Unlike data, they typically remain constant from run to run, unless the model's scope is expanded to include new products."
Response	While the reviewers did not make the specific recommended edit, the reviewers made changes to the definitions of "assumption," "parameter," "input," and "output," and removed references to "parameter" within section 3 of the ASOP to improve clarity.
Comment	One commentator recommended further differentiating between a parameter used as an input to a model and that used as output from a model (for example, "input parameter" and "output parameter").
Response	While the reviewers did not make the specific recommended edit, the reviewers made changes to the definitions of "assumption," "parameter," "input," and "output," and removed references to "parameter" within section 3 of the ASOP to improve clarity.
Comment	One commentator suggested adding the phrase "that is not data or assumptions" after "contractual input" in the first sentence.
Response	The reviewers removed the reference to the term "contractual" within the definition of "parameter," and revised the definitions of "assumptions," "input," and "output" to improve clarity.
Comment	One commentator shared an analysis of the definitions and use of the terms "parameter," "assumptions," "input" and "output," and stated that it is not clear how "parameters" are distinguishable from other "assumptions" or "data."
Response	The reviewers agree, made changes to the definitions of "assumption," "parameter," "input," and "output," and removed references to "parameter" within section 3 of the ASOP to improve clarity.

Comment	One commentator observed that the definition of parameter appeared to be a subset of assumptions and recommended considering language to highlight that assumptions/methods may be used to develop the parameters used in the model.
Response	The reviewers agree in part, made changes to the definitions of "assumption," "parameter," "input," and "output," and removed references to "parameter" within section 3 of the ASOP to improve clarity.
Comment	One commentator suggested adjusting the definition to restrict it to quantitative values.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
SECTION 3. ANALYSIS OF ISSUES AND RECOMMENDED PRACTICES	
Section 3.1, Model Meeting the Intended Purpose	
Comment	One commentator noted that actuaries will often "repurpose" models for different intended purposes and suggested that the ASOP explicitly require the actuary developing, selecting, or evaluating the model to identify and document the specific purposes or ranges of parameters/inputs, etc., for which the model is valid/applicable and require actuaries to identify what aspects of the model would need to be adjusted to eliminate model limitations. The commentator also suggested that actuaries developing models should anticipate modeling changes that will develop in the near future to avoid having rigid models.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 3.1.1, Designing, Developing, or Modifying the Model	
Comment	One commentator suggested that this section should speak directly to modeling choices. Where the design of a model includes significant modeling choices (for example, simplifications, approximations), the actuary should understand the rationale and/or justification for the choices made. Where an actuary is responsible for designing, developing, or modifying a model, the actuary should consider whether developmental testing is needed to assess the appropriateness of significant modeling choices.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator noted that the meaning of "dependencies recognized" is not clear and requires additional explanation.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator noted that it may not be clear what the actuary is looking for in terms of "consistency with the intended purpose" when discussing the volatility of the expected values and that it's not clear what "dependencies" are, in particular whether the term is referencing the dependencies among models or consistency of the model with its data, assumptions & parameters (A&P), and methods. In addition, the commentator suggested that a definition of dependencies would be helpful.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested replacing the phrase "include but are not limited to" with "for example" since such a replacement would reduce the chance of misinterpretation of the guidance in terms of what the actuary is obliged to do.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

Section 3.1.2, Selecting, Using, Reviewing, or Evaluating the Model (now titled, Selecting, Reviewing, or Evaluating the Model). ***Note: Changes to old section 3.1.2 have been incorporated into new section 3.1.3, Using the Model, as referenced below.***	
Comment	One commentator noted that the initial input as well as revisions to input need to be consistent with the intended purpose, and therefore recommended removing the words "any revisions to."
Response	The reviewers agree and made the change, which appears in new section 3.1.3.
Comment	One commentator noted general agreement, with the exception of "governance and controls," which in many situations will be set at a firm-wide level and are not available for an actuary's review (for instance, when an actuary uses its firm's actuarial valuation software). Further, although the commentator agrees that governance and controls may affect the actuary's ability to rely on the model, the commentator does not believe these factors would affect the model's inherent consistency with its intended purpose, and suggested the ASOP should contain a separate section describing what an actuary should consider with respect to governance and controls for models.
Response	The reviewers believe the guidance, which now appears in new section 3.1.3, is appropriate and therefore made no change in response to this comment.
Comment	One commentator noted confusion with the use of "output are consistent with the intended purpose," and that the use of "consistent" might result in confusion between sections 3.1.1 and 3.1.2. Further, the commentator suggested the word "validation" should be replaced with "testing" given that the term "validation" is a very particular word for many companies and usually corresponds to Independent Model Validation.
Response	The reviewers believe the guidance, which now appears in new section 3.1.3, is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested replacing "confirm the model reasonably meets the intended purpose ..." with "review that the model is reasonable with respect to meeting the intended purpose ..." In addition, the commentator suggested replacing "to ensure that any revisions to the input and ... are consistent with the intended purpose." with "to consider whether the revisions to the input and ... are consistent with the intended purpose."
Response	The reviewers clarified the guidance.
Comment	One commentator suggested replacing the word "ensure" with "validate" and sought an example for what "the standard require(s) with respect to the determination of reasonability."
Response	The reviewers clarified the guidance and replaced the word "ensure" with "use or confirm" in new section 3.1.3.
Section 3.1.3, Understanding the Model (now section 3.2)	
Comment	One commentator suggested replacing "results of the model," with "output" as defined in section 2, requested clarification of "methods" in paragraph b, and suggested removing "time constraints" in paragraph c.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to these comments.
Comment	One commentator asked whether the actuary should also understand the appropriate use of the model.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator did not think this paragraph should be limited to when the actuary is expressing an opinion on or communicating results of the model and suggested "rewording would be helpful here."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

Comment	One commentator expressed uncertainty regarding the meaning of "dependencies," and questioned whether "methods" meant the model "methodology" or whether it meant the methods used to develop the A&P.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested replacing section 3.1.3 with the following: "When providing actuarial services which depend significantly on the use of one or more models, the actuary should understand the important aspects of each model being used, such as: a. basic operation of the model, significant dependencies and sensitivities among variables or parameters, input and output, in the model; b. significant known limitations with respect to assumptions and parameters used as input, with respect to the data, information or methods used to build, calibrate, test or validate the model, or with respect to other considerations known to pose material implications when using the model or interpreting model output; and c. significant limitations with respect to a material impact affecting the ability of the model to meet its intended purpose due to other practical considerations, such as data issues, incomplete information, time constraints, etc."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 3.1.4, Model Structure	
Comment	One commentator recommended removing the examples in 3.1.4(e), suggesting that they are not "useful or necessary."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested that this section should clarify when the actuary should make this assessment, such as when designing, developing, modifying, selecting, using, reviewing, or evaluating a model, or only when doing some of those actions. In addition, the commentator requested further clarification on the meaning of "judgments reflected in the model" and recommended the removal of "the structure of" from the stem as it would not change the guidance and could prevent confusion/misinterpretation.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator questioned why only overfitting is considered, and suggested consideration of parsimony, identifiability, goodness of fit, theoretical consistency and predictive power given that overfitting is just one of many types of error that would result in deteriorating a model's predictive power.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested including definitions for "projection model," "statistical model," and "predictive model."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested replacing the current statement "whether the model is overfitting the data" with "whether the model is overfitting or underfitting the data" to fully capture the bias/variance tradeoff instead of focusing solely on overfitting.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

Comment	One commentator suggested using "structure" instead of "form" for consistency with the title of 3.1.4, Model Structure.
Response	The reviewers disagree and therefore made no change.
Comment	One commentator suggested replacing should "consider" in section 3.1.4 with "evaluate and document," and suggested adding wording that requires actuary to indicate how, if at all, modeling of these provisions, risks and interactions are simplified and therefore appropriate only in certain situations.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested adding the word "product" to the list in section 3.1.4(a), adding "or type" after "whether the form" to better reflect the reference to projection, statistical, predictive models, and whether "model requirements" may be necessary in section 3.1.4(c).
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested rewording of section 3.1.4, subsections a, d, e as follows: "(a) whether there are specific provisions and risks reflected in the model which are material and appropriate to the use of the model, for example, differences by business segment, contract or plan; (d) whether there is a significant and material risk of overfitting the model with the available data; (e) whether the model appropriately reflects the existence of significant options or features, which may apply, that could be reasonably expected to have a material effect on the output of the model. Examples include call options on fixed income assets, policyholder surrender options, and early retirement options."
Response	The reviewers clarified the language regarding overfitting the model but made no change in response to the other comments.
Section 3.1.5, Data	
Comment	One commentator suggested that the actuary should consider what transformations of input data and assumptions, if any, are required and how these affect results.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 3.1.6, Assumptions and Parameters Used As Input (now section 3.1.6, Assumptions Used As Input)	
Comment	One commentator believes that it is "unnecessary, confusing and burdensome to include assumptions setting guidance in this standard, given the Assumptions ASOP currently under development, and given the many other ASOPs that provide assumption setting guidance for certain activities."
Response	The reviewers believe the guidance is appropriate and therefore made no change related to this comment. This ASOP may not reference another ASOP that continues to be within the exposure process.
Comment	One commentator suggested adding "As" to the beginning of the stem of section 3.1.6, to read, "As for models that use assumptions and parameters as input...." In addition, the commentator noted that assumption setting and parameterization of assumptions should be mentioned separately for clarity as they are different activities and imply different risks.
Response	While the reviewers did not make the specific recommended edit, the reviewers made changes to the definitions of "assumption," "parameter," "input," and "output," and removed references to "parameter" within section 3 of the ASOP to improve clarity.
Comment	One commentator suggested the addition of an example of a model that does not use assumptions or parameters as input.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

Section 3.1.6(a), Setting Assumptions and Parameters (now section 3.1.6[a], Setting Assumptions)	
Comment	One commentator stated that it should be a criterion that the actuary document assumptions appropriately or ensure that assumptions provided by others are documented as such.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested referring to ASOP No. 25, *Credibility Procedures*, when discussing using actual experience to the extent it is "relevant and sufficiently reliable" within section 3.1.6(a)(1).
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested adding a fifth line item to section 3.1.6(a), namely "prescribed assumptions set by law" and "prescribed assumptions set by another party" (as used in ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, and ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*) (for example, accounting assumptions), and assumptions developed with the opinion of experts. In addition, the commentator does not believe that the actuary should be required to assess whether assumptions that include prescribed assumptions set by law or prescribed assumptions set by another party are reasonable in the aggregate.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested changing the title of section 3.1.6(a) from "Setting Assumptions and Parameters" to "Setting Assumptions or Parameters" because the former could imply both are required, and adding reasonableness of individual assumptions or parameters that could have a material impact on model results to section 3.1.6(a) since reasonableness in aggregate is mentioned in 3.1.6(f).
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggesting rewording section 3.1.6(a)(1) to be "actual experience adjusted to current conditions where applicable, to the extent that adjustments to the data are considered to be available, relevant, and sufficiently reliable;" and requested a definition of "market data."
Response	While the reviewers did not make the specific changes suggested, the reviewers replaced "It" with "actual experience" in section 3.1.6(a), Setting Assumptions, to improve clarity.
Section 3.1.6(b), Margins	
Comment	Several comments were received on the guidance or necessity of section 3.1.6(b), Margins.
Response	In response, the reviewers removed section 3.1.6(b), Margins.
Section 3.1.6(c), Range of Assumptions and Parameters (now Section 3.1.6[b], Range of Assumptions)	
Comment	One commentator suggested that it is not clear what is meant by a range of assumptions and parameters in section 3.1.6(c) and offered a number of alternative of the meaning of the phrase.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator questioned why the number of model runs was relevant to the range of assumptions and parameters.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

Section 3.1.6(d), Consistency (now section 3.1.6[c], Consistency)	
Comment	One commentator suggested changing the phrase "…possibility of an inconsistency…" to "…potential of an inconsistency…"
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested that just requiring the actuary to "use or confirm use" is very weak guidance, and that the standard should use "not unreasonably inconsistent" in order to indicate that consistency in this context is subject to considerable judgment.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 3.1.6(e), Appropriateness of Input in Current Model Run (now section 3.1.6[d], Appropriateness of Input in Current Model Run)	
Comment	One commentator stated agreement with 3.1.6(e), and suggested the addition, perhaps in a separate paragraph, that the model itself (not just the input) should be evaluated.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested clarifying the following "… reusing an existing model…" given that the term "reusing" can also be interpreted as using an existing model for a different purpose while the intention here seems to be around using a model with updated data.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 3.1.6(f) Reasonable Model in the Aggregate (now section 3.1.6[e] Reasonable Model in the Aggregate)	
Comment	One commentator suggested that it would be helpful to provide an example of a situation where assumptions which are reasonable individually can produce output which is unreasonable in the aggregate, and recommended adding guidance around appropriate potential actions if the actuary determines this to be the case.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator noted that the determination on the reasonability of a model in the aggregate as well as the assumptions and parameters in the aggregate would typically involve examining the reasonability of the output of the model in making such a determination, and suggested articulating the importance of considering the reasonability of the output in making the determination of the reasonability of the model in the aggregate as well as the reasonability of the parameters and assumptions in the aggregate.
Response	The reviewers agree and added "the reasonability of the model output when determining" after "assess."
Comment	One commentator suggested rewording section 3.1.6(f) as follows: "The actuary should assess whether the assumptions and parameters are reasonable in the aggregate. The actuary should consider those assumptions and parameters which might appear to be reasonable individually, but would produce unreasonable output, due to conservatism or optimism in multiple assumptions and parameters."
Response	The reviewers agree and made changes similar to those suggested to improve clarity.
Section 3.2, Reliance on Data or Other Information Supplied by Others (now section 3.3, Reliance on Data or Other Information Supplied by Others)	
Comment	One commentator suggested adding the title of ASOP No. 23 consistent with the title of ASOP No. 41.
Response	The reviewers note that the ASOP follows an approved style guide. Since the title of ASOP No. 23, *Data Quality*, had been previously mentioned, no further reference is required for subsequent mentions.

Section 3.3, Reliance on Models Developed by Others (now section 3.4, Reliance on Models Developed by Others)	
Comment	One commentator suggested that the actuary also consider the experience and qualifications of the colleague/vendor.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested that to the extent the actuary relies on testing performed by others, the actuary should also make a reasonable attempt to understand testing that has been performed on the model, i.e., implementation testing as well as any developmental testing. In addition, the commentator suggested that actuary who relies on a model built by a vendor or other developer is still responsible for ensuring the model is appropriate given its intended purpose and that results of any ongoing performance monitoring processes should be added to the list items to examine and understand.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested that this section would lead to a tremendous amount of additional, unnecessary work, and potential litigation risk if the work is not performed, such as when relying upon centralized valuation systems implemented and tested by others.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested removing the last sentence in the section as it is somewhat ambiguous and could leave open to interpretation which sections of the standard are applicable, and that the detailed sub-bullets 3.3(a)-(d) seem sufficient.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator noted that it isn't clear whether the intent is that the actuary should disclose reliance if they can do neither, or if they can do one but not the other, and that it is not clear whether "a limited ability … to understand the underlying workings of the model" would include a situation where the actuary cannot review programming but can understand what the model is intended to produce and can verify reasonableness and recommended clarification.
Response	The reviewers agree with the suggestion that the actuary may have a limited ability to either "obtain information about the model or to understand the underlying workings of the model" or both. The reviewers added "either" to improve clarity. Otherwise, the reviewers believe the guidance is appropriate and made no further change.
Comment	One commentator recommended that a new sentence be added after the listing, "The actuary should continually evaluate model results in light of emerging experience to determine that the model is still appropriate for its intended purpose."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator objected to permitting actuaries to rely upon models which they do not fully understand and feels this violates Precept 1 of the *Code of Professional Conduct* and diminishes our profession.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

Section 3.4, Reliance on Experts (now section 3.5, Reliance on Experts)	
Comment	One commentator expressed no significant concerns with section 3.4, however noted that it will become cumbersome, confusing, and misleading in certain circumstances when the expert is employed by the same firm as the actuary. As a result, the commentator recommended that the requirement to disclose the extent of any reliance be limited to situations where the experts were not employed by the actuarial firm issuing the report.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested removing the last sentence, "The actuary should disclose the extent of any such reliance," because section 4.1(f) already lists the disclosure requirement for 3.4.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 3.5, Mitigation of Model Risk (now section 3.6, Evaluation and Mitigation of Model Risk)	
Comment	One commentator recommended including a statement that model materiality is an important consideration in actions the actuary should take to mitigate model risk. The more material the impacts of a model can have on the company financial statements, capital positions, or management action, the more actions the actuary should take to mitigate the model risk.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator stated that the actuary should use judgment when assessing mitigation efforts as compared to model risk, and that the level of model risk mitigation should be commensurate with the perceived or actual level of risk associated with the use of the model.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator believes that "evaluate" implies a quantitative process and recommended replacing "evaluate" with a term such as "understand."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested changing the title of section 3.5 from "Mitigation of Model Risk" to "Evaluation and Mitigation of Model Risk" given the guidance.
Response	The reviewers agree and made the change.
Comment	One commentator suggested changing 3.5(d) to read "whether there have been any changes to the model or its operating environment" for consistency.
Response	The reviewers agree and made the change.
Comment	One commentator recommended the inclusion of guidance related to when and how often the actuary should an actuary evaluate model risk.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested replacing 3.5(d) with the following: "(d) whether there have been significant changes to the model or to the underlying environment, conditions, experience, or process for which the model was designed; and"
Response	While the reviewers did not make the specific changes suggested, the reviewers replaced "modeling" with "operating" environment to improve clarity.

Section 3.5.1, Model Testing (now section 3.6.1, Model Testing)	
Comment	One commentator suggested that section 3.5.1, Model Testing, should include reference to sensitivity testing given that it is an important part of model testing.
Response	The reviewers agree and added "running tests of variation on key assumptions used as input to test that changes in the output are consistent with expectations given the changes in the input (sensitivity testing)."
Comment	One commentator suggested that it should be clearer that "reconciling," means that the values are input correctly in to the model or modeling software, and not just that the input data before it is loaded in to the model reconciles to the source data given that if someone reconciles that initial data before it is loaded in to a model reconciles with the admin system, but then loads it in to the model incorrectly, it is a source of model risk.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested that section 3.5.1(b) deserves more attention as this is often the most time-consuming element of model testing and recommended stating that the actuary should consider what the major modeling methodology choices and simplifications are, as well as determine the best way to appropriately test formulas.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested adding in a new section 3.5.1(c): "Performing sample runs of individual model points to validate application of model logic and inputs" and shifting the existing 3.5.1(c) to 3.5.1(d).
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator sought clarification on how the actuary's responsibility for testing the model would differ between a "model run" and a "set of model runs generated at one time or over time." In addition, the commentator suggested moving "data" to appear before "input," and changing the definition of "model" to reference "formula" instead of "processing component" given that the term is more intuitive.
Response	The reviewers agreed with moving the reference to "data" to be before "assumptions" but did not make other changes in response to this comment.
Comment	One commentator suggested renaming these sections 3.5.1 and 3.5.2 to "model integrity testing" and "model output validation."
Response	The reviewers agree that section 3.5.2, Model Validation, should be renamed to Model Output Validation, but did not change the title of section 3.5.1.
Comment	One commentator sought clarification on the determination of materiality in section 3.5.1(a), and on the difference between testing and validation.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator noted that sections 3.5.1 (a)-(c) could be considered model controls and governance, and not necessarily model testing.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

Section 3.5.2, Model Validation (now section 3.6.2, Model Output Validation)	
Comment	One commentator sought clarification on the term "Model Validation," and how the use of term in the ASOP differs from the use of that same term under SR 11-7: Guidance on Model Risk Management.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested that section 3.5.2 should include and reference the concept of an "effective challenge," and that the intensity and effort of the challenge should be commensurate with the risk and materiality of the model.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested adding an additional item under 3.5.2 related to predictive models, namely, "For predictive models, testing should include running the developed model against a hold-out dataset, not used to develop the model, to verify that modeled output would bear a reasonable relationship to actual results from the hold-out data." In addition, the commentator suggested adding a definition of "hold-out data" such as: "Hold-out data – typically a random subset of the data being modeled. Hold-out data is not used to create the model itself, but rather, used to validate that the model that was built is truly predictive when applied to a previously unseen set of data."
Response	The reviewers agree that changes were appropriate and modified the language in this section and added a definition of "hold-out data."
Comment	One commentator suggested changing "The actuary should take appropriate steps to validate" to "The actuary should validate" for greater clarity.
Response	The reviewers agree and made the change.
Comment	One commentator suggested that section 3.5.2 be called Model Testing, given that Validation has a specific connotation to many companies that is not meant by what is being described.
Response	The reviewers modified the title of section 3.5.2 from Model Validation to Model Output Validation.
Section 3.5.3, Review by Another Professional (now section 3.6.3, Review by Another Professional)	
Comment	One commentator recommended striking section 3.5.3 since actuaries can always consider having another professional review their work and the section provides no guidance and is not needed.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator questioned when it would be appropriate to not obtain such a review and suggested that the word "may" be replaced by "should" or removing the sentence altogether.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested replacing section 3.5.3 with the following: The actuary may consider obtaining a review by a second, qualified professional. Use of another review would increase depending upon the nature and complexity of the model as well as with the materiality of the intended use(s)."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Section 3.5.5, Mitigating Misuse and Misinterpretation (now section 3.6.5, Mitigating Misuse and Misinterpretation)	
Comment	One commentator suggested that section 3.5.5 is already handled in the stem of 3.5 and recommended that this section be removed.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

Comment	One commentator noted the reference in section 3.5.5 to sections 3.4.1 in ASOP No. 41 but noted there is no section 3.4.1 in ASOP No. 41.
Response	The reviewers note that section 3.4.1 in ASOP No. 41 is titled "Uncertainty or Risk."
Comment	One commentator suggested mentioning the headings/titles of the section in other ASOPs in addition to the section numbers when they are being used as reference in case that the section numbers got changed in another ASOP for any reason.
Response	The reviewers note the standard follows an approved style guide and made no change in response to this comment.
Section 3.6, Documentation (now section 3.7, Documentation)	
Comment	One commentator suggested that the section should be more specific about what to document, with documentation best practices including the documentation of inputs, calculations – including key methodology choices (including simplifications and approximations), outputs, intended purpose, use limitations, and ongoing performance monitoring processes, model testing (including any developmental testing) and validation.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	Three commentators suggested strengthening the guidance by replacing "should consider" with "should."
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested that the provision that the documentation could allow that another actuary qualified in the same practice area "assume the assignment if necessary" could be onerous in many cases and recommended that the ASOP should not expand upon general documentation requirements as the provision in the draft ASOP - that "another actuary qualified in the same practice area could assess the reasonableness of the actuary's work"- is sufficient.
Response	The reviewers agree and deleted "or could assume the assignment if necessary."
SECTION 4. COMMUNICATIONS AND DISCLOSURES	
Section 4.1, Required Disclosures in an Actuarial Report	
Comment	One commentator recommended changing the section name to "Disclosures in an Actuarial Report" since the use of "required" in the title is confusing given the guidance that the actuary "should disclose," and recommended adding any unreasonable, unexplained variances from recent ongoing performance monitoring processes (addressed in a recommended new section 3.5.6) should be added to the list of items that should be disclosed.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator suggested replacing 4.1(d) with "d. unreasonable output resulting from the aggregation of assumptions and parameters used as input, if material, as discussed in section 3.1.6(f)."
Response	The reviewers agree with the concept and modified the language accordingly.
Comment	One commentator recommended changing "material limitations" to "material limitations, important aspects and weaknesses" to ensure disclosures cover all related items discussed in section 3.1.3.
Response	The reviewers agree in part and added "and known weaknesses" after "material limitations."
Comment	One commentator suggested adding a clarification as to whether the "experts" in section 4.1(f) refer to outside experts or both outside and in-house experts.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

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Comment	One commentator noted that not all items in section 3.3 are covered by the disclosures in section 4.1, namely key methods and A&P and model testing (sensitivities).
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator recommended that it be made clear that the ASOP does not require an actuarial report with respect to the models used by the actuary.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.
Comment	One commentator proposed removing section 4.2 as section 4.1 already requires compliance with the disclosure standards of ASOP No. 41.
Response	The reviewers believe the guidance is appropriate and therefore made no change in response to this comment.

ACTUARIAL STANDARDS BOARD

Actuarial Standard of Practice No. 57

Statements of Actuarial Opinion Not Based on an Asset Adequacy Analysis for Life Insurance, Annuity, or Health Insurance Reserves and Related Actuarial Items

Developed by the
Actuarial Compliance Guideline No. 4 Task Force of the
Life Committee of the
Actuarial Standards Board

Adopted by the
Actuarial Standards Board
January 2023

Doc. No. 208

ASOP No. 57—Doc. No. 208

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January 2023

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Statements of Actuarial Opinion Not Based on an Asset Adequacy Analysis for Life Insurance, Annuity, or Health Insurance Reserves and Related Actuarial Items

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 57, Statements of Actuarial Opinion Not Based on an Asset Adequacy Analysis for Life Insurance, Annuity, or Health Insurance Reserves and Related Actuarial Items

This document contains ASOP No. 57, *Statements of Actuarial Opinion Not Based on an Asset Adequacy Analysis for Life Insurance, Annuity, or Health Insurance Reserves and Related Actuarial Items*.

History of the Standard

The ASB voted in April 1992 to expose a proposed actuarial standard of practice titled *Statutory Statements of Opinion by Appointed Actuaries for Life or Health Insurers*. The exposure draft covered both types of actuarial opinions required by the *Standard Valuation Law* and the 1991 version of the Actuarial Opinion Memorandum Regulation (Model Regulation): (1) the opinion under section 8 of the Model Regulation, which required an analysis of and an opinion about the adequacy of those assets that support the reserves to meet the company's obligations; and (2) the opinion under section 7, which did not require an asset adequacy analysis.

Letters of comment received, and discussions at an ASB public hearing on the draft in June 1992, focused largely on the issue of whether the proposed standard appeared to impose an asset adequacy analysis or cash flow testing on the smaller companies exempted from such analysis under section 7. Some commentators expressed the view that such analyses could be imposed on the appointed actuaries for the exempted companies because of ASOP No. 14, *When to Do Cash Flow Testing for Life and Health Insurance Companies*.

In 1993, the ASB adopted ASOP No. 22, *Statutory Statements of Opinion Based on Asset Adequacy Analysis by Appointed Actuaries for Life or Health Insurers*, which replaced Financial Reporting Recommendation No. 7, *Statement of Actuarial Opinion for Life Insurance Company Statutory Annual Statements,* and No. 11, *Statement of Actuarial Opinion for Interest-Indexed Universal Life Insurance Contracts*, as guidance for opinions under section 8 of the Model Regulation.

Prior to the adoption, there had been discussions about whether ASOP No. 22 should cover opinions under both section 7 and section 8 of the Model Regulation. The ASB decided to limit ASOP No. 22 to cover opinions required under only section 8 and adopted Actuarial Compliance Guideline (ACG) No. 4, *Statutory Statements of Opinion Not Including an Asset Adequacy*

Analysis by Appointed Actuaries for Life or Health Insurers, in October 1993 to provide guidance on opinions required under section 7.

In the late 1990s and early 2000s, the ASB reviewed all standards of practice related to cash flow testing. Portions of ASOP No. 14, *When to Do Cash Flow Testing for Life and Health Insurance Companies*, were incorporated into ASOP No. 7, *Analysis of Life, Health, or Property/Casualty Insurer Cash Flows*, and ASOP No. 22. In 2001, the ASB adopted the revised ASOP No. 7 and ASOP No. 22 and repealed ASOP No. 14.

In December 2012, the National Association of Insurance Commissioners (NAIC) initially adopted the *Valuation Manual*, which sets forth the minimum reserve and related requirements for jurisdictions where the *Standard Valuation Law*, as amended by the NAIC in 2009, has been enacted. The *Valuation Manual* took effect on January 1, 2017, pursuant to section 11 of the *Standard Valuation Law*. Requirements for the annual actuarial opinion and memorandum pursuant to section 3 of the *Standard Valuation Law* are provided in "VM-30, Actuarial Opinion and Memorandum Requirements."

In response to these and other NAIC activities, the ASB decided to revise ASOP No. 22 in 2021. As ACG No. 4, the last remaining Actuarial Compliance Guideline, remained relevant for actuaries working for companies that receive an exemption from asset adequacy analysis, the ASB decided to convert ACG No. 4 into the standard format of an ASOP.

Exposure Draft

The exposure draft was issued in September 2022 with a comment deadline of January 15, 2023. No comment letters were received. Accordingly, no changes were made from the exposure draft to the final standard.

The ASB voted in January 2023 to adopt this standard.

Actuarial Compliance Guideline (ACG) No. 4 Task Force

Janice A. Duff, Chairperson
Ashlee M. Borcan
Alice M. Fontaine
Aaron J. Hodges
Julian B. Levin
Eddie A. Mire
Cande J. Olsen

Life Committee of the ASB

Gabriel Schiminovich, Chairperson
Lisa S. Kuklinski
Donna C. Megregian
Matthew A. Monson
Jeremy Starr

Actuarial Standards Board

Robert M. Damler, Chairperson
Elizabeth K. Brill
Kevin M. Dyke
Laura A. Hanson
Richard A. Lassow
David E. Neve
Christopher F. Noble
Judy K. Stromback
Patrick B. Woods

The Actuarial Standards Board (ASB) sets standards for appropriate actuarial practice in the United States through the development and promulgation of Actuarial Standards of Practice (ASOPs). These ASOPs describe the procedures an actuary should follow when performing actuarial services and identify what the actuary should disclose when communicating the results of those services.

ASOP No. 57—Doc. No. 208

PROPOSED ACTUARIAL STANDARD OF PRACTICE

STATEMENTS OF ACTUARIAL OPINION NOT BASED ON AN ASSET ADEQUACY ANALYSIS FOR LIFE INSURANCE, ANNUITY, OR HEALTH INSURANCE RESERVES AND RELATED ACTUARIAL ITEMS

STANDARD OF PRACTICE

Section 1. Purpose, Scope, Cross References, and Effective Date

1.1 Purpose—This actuarial standard of practice (ASOP or standard) provides guidance to actuaries when performing actuarial services with respect to providing a statement of actuarial opinion not based on an asset adequacy analysis for life insurance, annuity, or health insurance reserves and related actuarial items, pursuant to applicable law (statutes, regulations, and other legally binding authority).

1.2 Scope—This standard applies to actuaries when performing actuarial services with respect to providing a statement of actuarial opinion for life insurance, annuity, or health insurance reserves and related actuarial items that are within the scope of the Statement of Actuarial Opinion, NAIC Life and Accident & Health/Fraternal Annual Statement (Blue Book), when the statement is prepared to comply with applicable law and is not based on an asset adequacy analysis because of an exemption.

If the statement of actuarial opinion encompasses health insurance liabilities, ASOP No. 28, *Statements of Actuarial Opinion Regarding Health Insurance Assets and Liabilities*, may also apply. If the statement of actuarial opinion includes reinsurance, ASOP No. 11, *Treatment of Reinsurance or Similar Risk Transfer Programs Involving Life Insurance, Annuities, or Health Benefit Plans in Financial Reports*, may also apply.

This standard does not apply to actuaries when performing services with respect to providing statements of actuarial opinion based on asset adequacy analysis that are subject to ASOP No. 22, *Statements of Actuarial Opinion Based on Asset Adequacy Analysis for Life Insurance, Annuity, or Health Insurance Reserves and Other Liabilities*.

If a conflict exists between this standard and applicable law, the actuary should comply with applicable law. If the actuary departs from the guidance set forth in this standard in order to comply with applicable law, or for any other reason the actuary deems appropriate, the actuary should refer to section 4.

1.3 Cross References—When this standard refers to the provisions of other documents, the reference includes the referenced documents as they may be amended or restated in the future, and any successor to them, by whatever name called. If any amended or restated document differs materially from the originally referenced document, the actuary should consider the guidance in this standard to the extent it is applicable and appropriate.

1.4 Effective Date—This standard is effective for all statements of actuarial opinion covered by the scope of this ASOP issued on or after **June 15, 2023**.

Section 2. Definitions

The definition below is defined for use in this actuarial standard of practice and appears in bold throughout the ASOP.

2.1 Subsequent Events—Material events that occur after the valuation date and before the date the statement of actuarial opinion is signed.

Section 3. Analysis of Issues and Recommended Practices

3.1 Intended Purpose and Intended Users of the Statement of Actuarial Opinion—The actuary should identify the intended purpose and intended users of the statement of actuarial opinion. For example, the intended purpose may be to satisfy the requirements for such an opinion under the NAIC Life and Accident & Health/Fraternal Annual Statement (Blue Book), and the intended users may be the company and its regulators.

3.2 Exemption from Asset Adequacy Analysis—Eligibility for an exemption from submitting a statement of actuarial opinion based on an asset adequacy analysis is determined using criteria specified in applicable law. The actuary should confirm that the eligibility criteria have been met. Such confirmation may include a dialogue with the state regulator. The actuary should maintain appropriate documentation indicating eligibility for the exemption. In addition, the actuary should make reasonable efforts to determine that no requirement for an asset adequacy analysis has been triggered by a specific request from the domiciliary insurance department. A written statement from a responsible officer of the company confirming that no specific request has been received will be deemed to satisfy this requirement.

3.3 Statement of Opinion—The actuary should include in the opinion a statement that the reserves and related actuarial items meet the minimum standards of the state in which the opinion is filed. The actuary should include in the opinion whether the opinion is qualified, adverse, or inconclusive and provide the underlying reasons.

The actuary should list in the statement of actuarial opinion the reserves and related actuarial items on which the actuary expresses an opinion. The form, content, and recommended language of the statement of actuarial opinion may be specified by applicable law.

The actuary should be familiar and comply with the requirements for reserves and related actuarial items of the insurance laws of each state in which the opinion is filed. The actuary should maintain documentation concerning compliance with the requirements.

3.4 Policy and Contract Provisions Affecting Reserves and Related Actuarial Items—The actuary should confirm that the policy and contract provisions affecting the reserves and related actuarial items have been taken into account. For example, these policy and contract provisions may include any guarantees, conversion and other rights, and nonforfeiture and other benefits.

3.5 Determination of Reserves and Related Actuarial Items—When the determination of reserves and related actuarial items is prescribed by law, the actuary should confirm that the prescribed methods and assumptions are taken into account.

When the determination of reserves and related actuarial items is not prescribed by law (such as the estimation of life and health unpaid claim liabilities), the actuary should confirm that appropriate methods and assumptions were used to establish reserves and related actuarial items. For example, such assumptions may include mortality or morbidity improvement, the level of any margins needed to reflect provision for uncertainty in an estimate, and appropriate discount rates.

3.6 Reinsurance—When taking into account the effect of reinsurance on the statement of actuarial opinion, the actuary should refer to ASOP No. 11. In the case where a company has ceded all of a particular block of business, the actuary should determine whether provisions for any residual or contingent obligations of the ceding company should be established.

3.7 Use of Data Predating the Valuation Date—When reserves and other actuarial items are based on data predating the valuation date, the actuary should take into account the reasonableness of the use of such prior period data and whether any material events have occurred prior to the valuation date that would invalidate that use.

3.8 Subsequent Events—The actuary should make a reasonable effort to be informed about **subsequent events**.

3.9 Changes in Methods, Models, or Assumptions—If the methods, models, or assumptions supporting the reserves and related actuarial items differ from those in the prior statement of actuarial opinion, the actuary should consider quantifying the impacts of these changes. The actuary should determine whether regulatory approval is required prior to changing methods or assumptions for any reserves and related actuarial items.

The use of new methods, models, or assumptions for new segments of reserves and related actuarial items (for example, a new line of business or product) is not a change within the meaning of this section.

310 Reliance on Data or Other Information Supplied by Others—When relying on data or other information supplied by others, the actuary should refer to ASOP No. 23, *Data Quality*, and ASOP No. 41, *Actuarial Communications*, for guidance.

3.11 Opinions of Other Actuaries— The opining actuary should form an overall opinion without claiming reliance on the opinions of other actuaries.

3.12 Documentation—In addition to the documentation requirements in section 3, the actuary should prepare and retain documentation to support compliance with the requirements of section 3 and the disclosure requirements of section 4. The actuary should prepare such documentation in a form such that another actuary qualified in the same practice area could assess the reasonableness of the actuary's work. The amount, form, and detail of such documentation should be based on the professional judgment of the actuary and may vary with the complexity and purpose of the actuarial services. In addition, the actuary should refer to ASOP No. 41 for guidance related to the retention of file material other than that which is to be disclosed under section 4.

Section 4. Communications and Disclosures

4.1 Required Disclosures in an Actuarial Report—When issuing any actuarial report within the scope of this standard, including statements of actuarial opinion, the actuary should refer to ASOP Nos. 11, 23, 28, and 41, as applicable. In particular, consistent with the intended purpose and intended users of the actuarial report, the actuary should disclose the following, as applicable:

a. the intended purpose and intended users (see section 3.1);

b. the basis for determining eligibility for an exemption from submitting a statement of actuarial opinion based on an asset adequacy analysis (see section 3.2);

c. a statement that the reserves and related actuarial items meet the minimum standards of the state in which the opinion is filed, or whether the opinion is qualified, adverse, or inconclusive (see section 3.3);

d. the methods and assumptions for determining reserves and related actuarial items (see section 3.5);

e. the impact of reinsurance on the statement of actuarial opinion (see section 3.6);

f. the use of any prior period data underlying the reserves and related actuarial items and whether any material events have occurred prior to the valuation date that would invalidate the use of that data (see section 3.7);

g. any **subsequent events** of which the actuary is aware (see section 3.8).

h. any material changes in the methods, models, or assumptions from those used in the prior statement of actuarial opinion or if the methods, models, or assumptions used in the prior statement of actuarial opinion are unknown (see section 3.9);

i. the extent of reliance on data or other information supplied by others (see section 3.10); and

4.2 Additional Disclosures in an Actuarial Report—The actuary should also include disclosures in accordance with ASOP No. 41 in an actuarial report for the following circumstances:

a. if any material assumption or method was prescribed by applicable law;

b. if the actuary states reliance on other sources and thereby disclaims responsibility for any material assumption or method selected by a party other than the actuary; and

c. if in the actuary's professional judgment, the actuary has deviated materially from the guidance of this standard.

Appendix 1

Background and Current Practices

Note: This appendix is provided for informational purposes and is not part of the standard of practice.

Background

In 1975, the National Association of Insurance Commissioners (NAIC) began requiring that a statement of actuarial opinion on reserves and related actuarial items be included in the annual statement filed by life and health insurance companies. In response to this requirement, the American Academy of Actuaries promulgated Financial Reporting Recommendation No. 7, *Statement of Actuarial Opinion for Life Insurance Company Statutory Annual Statements*, setting forth the actuary's professional responsibilities in providing such an opinion.

The form and content of this actuarial opinion, as specified in the instructions to the annual statement, dealt specifically with reserves and did not explicitly address the adequacy of the assets supporting these reserves and other liabilities to meet the obligations of the company. Although not explicitly required to do so by the opinion or by existing professional standards, some actuaries began to analyze the adequacy of assets in forming their opinions. In addition, when the state of New York adopted the 1980 amendments to the *Standard Valuation Law*, it established an optional valuation basis for annuities, permitting lower reserves provided that an asset adequacy analysis supported the actuarial opinion with respect to such reserves.

The type of asset adequacy analysis most widely used by actuaries is multi-scenario cash flow testing. To guide actuaries choosing to use this technique, the Actuarial Standards Board (ASB) adopted ASOP No. 7, then titled *Performing Cash Flow Testing for Insurers*, in October 1988. In addition, in July 1990, the ASB adopted ASOP No. 14, *When to Do Cash Flow Testing for Life and Health Insurance Companies*, to provide guidance in determining whether to do cash flow testing in forming a professional opinion or recommendation.

In December 1990, the NAIC amended the *Standard Valuation Law*, and, in June 1991, the NAIC adopted the *Actuarial Opinion and Memorandum Regulation (AOMR)*. These actions had the effect of moving the requirement for the statement of actuarial opinion from the annual statement instructions into the model law itself and provided detailed instructions for the form and content of the opinion and the newly required supporting memorandum. The most significant changes made by the NAIC in the 1991 *AOMR* were that companies were required to name an appointed actuary, and, for companies subject to section 8 of the *AOMR*, statements of actuarial opinion on reserve and other liability adequacy were required to be based on an asset adequacy analysis described in the supporting memorandum. The asset adequacy analysis required by the regulation had to conform to the standards of practice promulgated by the ASB.

For companies subject to section 7, an actuarial opinion stating that the reserves and related actuarial items had been calculated in accordance with the *Standard Valuation Law* and

supporting regulations was required by the 1991 AOMR. Section 7 of the 1991 AOMR did not require an opinion on reserve adequacy.

In 1993, the ASB adopted ASOP No. 22, *Statutory Statements of Opinion Based on Asset Adequacy Analysis by Appointed Actuaries for Life or Health Insurers*, which replaced Financial Reporting Recommendation No. 7 and No. 11, *Statement of Actuarial Opinion for Interest-Indexed Universal Life Insurance Contracts*, as guidance for section 8 opinions.

The ASB also adopted Actuarial Compliance Guideline (ACG) No. 4, *Statutory Statements of Opinion Not Including an Asset Adequacy Analysis by Appointed Actuaries for Life or Health Insurers*, in late 1993 to provide guidance for section 7 opinions.

In the late 1990s and early 2000s, the ASB reviewed all standards of practice related to cash flow testing. Portions of ASOP No. 14 were incorporated into ASOP Nos. 7 and 22. In 2001, the ASB adopted the revised ASOP Nos. 7 and 22 and repealed ASOP No. 14.

Starting in 2001, the model *AOMR* adopted by the NAIC required all actuarial opinions to be based on asset adequacy analysis. Several states allowed for single-state exemptions in their adoption of the *AOMR*. As a result, ACG No. 4 remains relevant.

In December 2012, the NAIC initially adopted the *Valuation Manual*, which sets forth the minimum reserve and related requirements for jurisdictions where the *Standard Valuation Law*, as amended by the NAIC in 2009, has been enacted. The *Valuation Manual* took effect on January 1, 2017, pursuant to section 11 of the *Standard Valuation Law*. Requirements for the annual actuarial opinion and memorandum pursuant to section 3 of the *Standard Valuation Law* are provided in "VM-30: Actuarial Opinion and Memorandum Requirements." VM-30 also recognizes the existence of single-state exemptions from asset adequacy analysis.

In response to these and other NAIC activities, the ASB decided to revise ASOP No. 22 in 2021. As ACG No. 4, the last remaining Actuarial Compliance Guideline, remained relevant for actuaries working for companies that receive an exemption from asset adequacy analysis, the ASB decided to convert ACG No. 4 into the standard format of an ASOP.

Current Practices

Statements of actuarial opinion on reserves and related items have been provided since 1975, and practice regarding the basic elements of the opinion is well established. However, exemptions from asset adequacy analysis are no longer the norm in issuing actuarial opinions. Most exemptions from asset adequacy analysis are for companies licensed in a single state.

Eligibility for an exemption from submitting a statement of actuarial opinion based on an asset adequacy analysis is determined using criteria specified in applicable state law or stipulated by the state regulator. Typically, the actuary ensures that the eligibility criteria have been met by having a dialogue with the state regulator. In addition, the actuary typically makes reasonable

efforts to determine that no requirement for an asset adequacy analysis has been triggered by a specific request from the domiciliary insurance department.

Appendix 2

Comments on the Exposure Draft and Responses

An exposure draft of the proposed new ASOP on *Statements of Actuarial Opinion Not Based on an Asset Adequacy Analysis for Life Insurance, Annuity, or Health Insurance Reserves and Related Actuarial Items*, was issued in September 2022 with a comment deadline of January 15, 2023. No comment letters were received.