

October 18, 2006

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Alberta Insurance Rate Board (AIRB) Submission

Dear Mr. Kelly,

Automobile Insurance ratemaking is an actuarial process leading to the derivation of a rate structure determining the price an individual policyholder should pay for the protection afforded. In several provinces in Canada the use of a particular rate structure is subject to pre approval by the regulators.

The Insurance Bureau of Canada (IBC) has engaged us to provide a report discussing the following:

1. Rules and Standards governing the actuarial profession in Canada;
2. Considerations addressed in the process of ratemaking;
3. Discuss alternative approach to rate regulation.

The purpose of the report is to assist the AIRB in its deliberations. This report will be distributed to the AIRB as part of IBC submission to the Board.

In this report we focus our view on private passenger automobile insurance. We offer comments based on our experience of the Canadian industry.

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The automobile insurance product can be defined in a number of ways. Some define it as the insurance policy protection. As the protection afforded by the insurance policy is the same for all policy holders, this view implies that the product is a uniform product across all policy holders.

We prefer to look at the insurance product as the “Payment of Claims”. Under this definition the product is not uniform across all policyholders because the product is the intersection of the policy wording (the protection) and the expected risk associated with a given policyholder. Under this definition one can say that there are as many products as policyholders.

1 Professional Rules and Standards

An Actuary is defined by the Insurance Companies Act of Canada as a Fellow of the Canadian Institute of Actuaries (FCIA). In order to become an actuary an individual must study an extensive curriculum covering:

1. Mathematics;
2. Statistics;
3. Finance;
4. Insurance Law
5. Underwriting and claim management

as they pertain to the insurance field. The individual is tested on its comprehension of the curriculum by an examination process supervised by the actuarial profession. In general an individual requires 5 to 10 years of study to complete the curriculum after graduation from a university degree.

Once the designation of FCIA is obtained the individual must follow the Rules of Professional Conducts and the Standard of Practice established by the Canadian Institute of Actuaries (CIA) and adheres to a monitored continuing education process.

The CIA collaborates with several American actuarial associations such as the American Academy of Actuaries and the Actuarial Standard Board (ASB). As a result of this collaboration several standards of practice on ratemaking published by the ASB are pertinent and cannot be ignored by the Canadian actuary. We list below the more useful:

1. Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations (Doc. No. 027; January 1991)
2. Risk Classification (for All Practice Areas) (Doc. No. 101; December 2005)
3. Trending Procedures in Property/Casualty Insurance Ratemaking (Doc. No. 021; July 1990)

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4. Data Quality (Doc. No. 097; December 2004)
5. Credibility Procedures Applicable to Accident and Health, Group Term Life, and Property/Casualty Coverages (Doc. No. 051; October 1996)
6. Expense Provisions in Property/Casualty Insurance Ratemaking (Doc. No. 056; July 1997)
7. Treatment of Profit and Contingency Provisions and the Cost of Capital in Property/Casualty Insurance Ratemaking (Doc. No. 057; July 1997)
8. Treatment of Catastrophe Losses in Property/Casualty Insurance Ratemaking (Doc. No. 072; June 2000)

Appendix A contains a full copy of each. We will refer to some of those documents in the following section of this report.

The purpose of this documentation is to demonstrate the existence of professional actuarial standards for the actuarial work of ratemaking.

2 Ratemaking Considerations

The ratemaking process is simple in aggregate but complex in its detailed application. In aggregate ratemaking consists of:

1. estimating the expected losses on the policies to be issued
2. add the expenses associated with the management and distribution of the product
3. add the profit provision
4. subtract the impact of investment revenue

The process above can take various forms often referred as pure premium or loss cost approach or loss ratio approach. There are a number of considerations that impact each of those elements. Note that the definition of consideration in this context is broad. We will address here the principal ones.

2.1 Trends

Trends are applied to the historical experience. They modify the historical experience such that it reflects the conditions expected to be experienced during the period for which the rates are to apply. In general we see two types of trend: frequency and severity.

As stated in “Actuarial Standard of Practice No. 13: Trending Procedures in Property/Casualty Insurance Ratemaking”:

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“Any trending procedure requires the actuary to exercise informed judgment, using information on historical insurance data and the impact of relevant economic and social factors, as well as statistical validation and testing procedures.”

As the use of judgment is necessary, it is evident that the possibility of two actuaries applying different judgment to the same set of facts exists. In our experience, this can lead to significant differences in sets of rates both being actuarially sound. Only the passage of time can confirm which was more right than the other.

2.2 Expenses

The expenses required to deliver the product varies by distribution channels, efficiency level and size of companies. The expenses include loss adjustment expenses; commission and brokerage fees; other acquisition expenses; general administrative expenses; and taxes, licenses, and fees that are appropriate for the policies to be written during the time the rates are expected to be in effect.

There is no single expense provision applicable to all insurers because each insurer operates differently. If an average provision is selected or imposed, certain insurers will be overcompensated for expenses and other under compensated.

In the long term this may lead to a shortage of insurance providers.

2.3 Profit Provision

Two related items impacts the profit provision imbedded in a rate. The first one is the return on equity (ROE) demanded by the shareholder or policyholder in the case of a mutual. The second is the amount of capital required to support the insurance operation. This requirement is usually expressed as a premium to equity ratio or premium to surplus ratio.

As in any investment, the market decides the required ROE for a given venture. The ROE is determined by the cost of capital for a given level of risk. One fundamental rule is that the higher the risk the higher the return required.

The “Actuarial Standard of Practice No. 30: Treatment of Profit and Contingency Provisions and the Cost of Capital in Property/Casualty Insurance Ratemaking” states:

“In estimating the cost of capital, the actuary should consider the relationship between risk and return. The methods used for estimating the cost of capital should reflect the risks involved in the risk transfer under consideration. These

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risks may include insurance, investment, inflation, and regulatory risks, as well as diversification, debt structure, leverage, reinsurance, market structure, and other appropriate aspects of the social, economic, and legal environment. Thus, the cost of capital is likely to vary from one insurer to another.”

The same can be said at the product level. Certain coverages such as third party liability auto, uninsured motorists or underinsured motorists are inherently more risky than automobile collision or comprehensive. As such the formers must demand higher ROE and/or more capital to support the higher level of risk.

This is supported by the regulatory minimum capital demanded by Superintendent of Insurance of Alberta. This minimum regulatory capital formula requires higher level of capital to support third party liability or accident benefits coverages than other coverages.

Each insurer and each coverage offered by an insurer requires the use of different ROE or premium to Surplus ratio.

2.4 Investment Revenue

The insurance transaction generates significant cash floats as the premiums are paid upfront and the product delivered later in the form of claim payments. This is recognized in the ratemaking process. Several general approaches may be used by the actuary to estimate investment income. The investment yield rates used should be appropriate for the cash flow patterns associated with the coverages under consideration. It is important that the yield rate selected be representative of future expected yield as opposed to historical ones.

There are two elements of investment income that the actuary should consider: investment income from insurance operations (policyholder's fund) and investment income on capital. In general risk free returns are used on fund generated from insurance operations.

It is not, in my view, appropriate to associate a return on policyholder's fund greater than risk free. To do so would increase the overall risk of the insurance transaction leading to a demand for a higher ROE from the investors to compensate for the larger risk. The impact of each is in opposite directions.

2.5 Comment

The ratemaking process requires the application of actuarial judgement in several areas. As the process is essentially an estimation of future events, several right answers exist at the time the rates are estimated. To reduce those answers to a single point for an entire market by

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forcing the adoption of a single set of assumption increases risk and therefore increase the required ROE on the capital supporting the market.

A classification plan identifies broad risk characteristics but fail to fully identify the risk characteristic of a given policyholder. Insurers distribute their product in a number of ways and market their product through different strategies. Therefore the risk portfolio of an insurer is the product of the application of the classification plan and their distribution/marketing strategy. As a result insurers using the same classification plan will end up with significantly different portfolio of policyholders with significantly different expected loss. The premium charged by each insurer should fully reflect this reality.

3 Alternative Approach

Automobile Insurance is a mandated product. It is therefore normal that the regulator is interested in the pricing of the product and wishes to monitor the behaviour of the market participants.

The Alberta insurance market is a competitive market serviced by a large number of insurers with different distribution and marketing approaches. Each insurer has a distinct portfolio of risks demanding a distinct level of premium.

The spectrum of average rate across insurer is wide. The consumer has an obligation to shop if he is not satisfied with the level of service or premium charged by its insurer.

On that basis we suggest the following approach to rate monitoring.

Each insurer is free to charge the level of premium it requires as long as it is supported by sound actuarial methodologies and assumptions. Prior to being used the rates must be approved by the Board which insures that the actuarial methods underlying the rates are sound, the assumptions reasonable and the classification system in accordance with public policy.

The Board insures the reasonableness of assumptions by comparing the assumptions used across companies and to its own opinion on same. Since the actuarial methods can vary significantly but the assumptions to be made are consistently defined and applied this process is simple.

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For example, the Board compiles from the insurer submissions the proposed ROE of each. It then assesses the average ROE requested by the insurers to its own view and the relative placement of each insurer to the average ROE requested. First, if the average is too high in the Board's view, each insurer's request is reduced until the average selected is reached. Secondly, the risk profile of each insurer is reviewed. If the profile is more risky than the average then a higher than average ROE is accepted; conversely if the profile is less risky than a lower than average ROE is ordered.

A second example is severity trend. Again a compilation of the trends imbedded in each filing is made, an average derived and a range of reasonable values identified. If an insurer uses a trend outside that range then it can be questioned for rational or asked to revise its submission.

The same can be done with premium to surplus ratio, trends, expense load and other parameters.

The result of this process is an overall market with appropriate ROE that varies by insurer according to a consistently applied rationale. A market where each insurer charges according to its own experience and where each insured pays a premium commensurate with its risk profile.

Furthermore as the Board has the benefits of dozens of actuarial studies imbedded in each rate application, it reduces its reliance on a single party view and permits decisions to be made with the benefit of a broader view. This in turn reduces risk to the Board, the public and the insurers.

Sincerely,

PricewaterhouseCoopers LLP



Richard Gauthier FCIA, FCAS, MAAA
Audit and Assurance Group

Appendix A

Actuarial Standards of Practice pertinent to ratemaking published by the Actuarial Standard Board

- 9. Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations (Doc. No. 027; January 1991)
- 12. Risk Classification (for All Practice Areas) (Doc. No. 101; December 2005)
- 13. Trending Procedures in Property/Casualty Insurance Ratemaking (Doc. No. 021; July 1990)
- 20. Discounting of Property and Casualty Loss and Loss Adjustment Expense Reserves (Doc. No. 037; April 1992)
- 23. Data Quality (Doc. No. 097; December 2004)
- 25. Credibility Procedures Applicable to Accident and Health, Group Term Life, and Property/Casualty Coverages (Doc. No. 051; October 1996)
- 29. Expense Provisions in Property/Casualty Insurance Ratemaking (Doc. No. 056; July 1997)
- 30. Treatment of Profit and Contingency Provisions and the Cost of Capital in Property/Casualty Insurance Ratemaking (Doc. No. 057; July 1997)
- 39. Treatment of Catastrophe Losses in Property/Casualty Insurance Ratemaking (Doc. No. 072; June 2000)



ACTUARIAL STANDARDS BOARD

**Actuarial Standard
of Practice
No. 9**

**Documentation and Disclosure
in Property and Casualty Insurance
Ratemaking, Loss Reserving, and Valuations**

Revised Edition

**Developed by the
Casualty Committee of the
Actuarial Standards Board**

**Adopted by the
Actuarial Standards Board
January 1991**

(Doc. No. 027)

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January 1991

TO: Members of the American Academy of Actuaries (AAA) and Other Persons Interested in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice No. 9

This booklet contains the final version of Actuarial Standard of Practice (ASOP) No. 9, *Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations*.

Background

This booklet contains an actuarial standard of practice concerning documentation and disclosure in property and casualty insurance ratemaking, loss reserving, and valuations. This standard has been prepared jointly by the Subcommittee on Ratemaking, the Subcommittee on Loss Reserving, and the Subcommittee on Valuation of the Casualty Committee of the ASB, and it has been reviewed by the full Casualty Committee. The standard relies heavily on Interpretative Opinion 3 of the *Guides and Interpretative Opinions as to Professional Conduct* of the AAA.

The Casualty Committee is one of six operating committees of the ASB; it is charged with drafting actuarial standards of practice relating to property and casualty insurance.

The Casualty Committee acknowledges that the professional practice of actuaries varies widely. In some property and casualty areas, there may be significant differences of opinion as to what is generally accepted actuarial practice. The enclosed standard sets forth recommended practices for documentation and disclosure that actuaries must consider in property and casualty ratemaking, reserving, and valuations. They are intended to guide actuaries in performing their professional responsibilities.

The standard was originally drafted to apply only to ratemaking and loss reserving. This draft was exposed to the members of the AAA and to other interested persons in August 1988; comments were received into October 1988. In addition, the standard was discussed at a session on this subject at the Casualty Actuarial Society (CAS) meeting in November 1988. The Casualty Committee considered these comments in preparing a revised standard for adoption by the ASB. A detailed report of comments received and the committee's disposition of them appears below.

Change in Format

After the exposure draft was distributed, the ASB adopted, at its October 1988 meeting, a new, uniform format for standards of practice. At the ASB's direction, this standard was reformatted to conform to the new format. In addition, the standard was given a number (9) in the standards of practice series, and was reprinted (Document No. 011).

Extension to Cover Valuations

In 1990, the standard was amended to apply to property and casualty insurance company valuation as well as to ratemaking and loss reserving. The amended version (Document No. 027) was approved by the Casualty Committee and by the ASB, effective May 1, 1991.

Responses to Comments on 1988 Exposure Draft

The Casualty Committee is grateful to the respondents who submitted comments in 1988 on the exposure draft. A total of nine individuals responded, and additional comments were made at a special session on this topic at the November CAS meeting. All comments were carefully considered by the Casualty Committee, and a number of changes were made to the exposure draft as a result.

Four respondents commented on the fact that this standard limited its application to ratemaking and loss reserving, rather than to all facets of actuarial work. The committee agreed in principle that disclosure and documentation are equally appropriate for other work products. However, the standard was designed to be in support of established statements of principles of the CAS. At the time of its original drafting, two such statements had been promulgated, in ratemaking and in loss reserving. The standard was, therefore, appropriate as written. In 1989, the CAS promulgated a *Statement of Principles Regarding Property and Casualty Valuations*, and the standard was subsequently amended to be in support of that statement as well.

One respondent to the exposure draft commented that the loss reserving principles do not specifically refer to documentation and disclosure. The committee believed that this standard of practice is equally applicable to those principles and that the principles need not be revised. Also, the last sentence of the first paragraph under section 3 (Background and Historical Issues) was revised to make clear that this standard, not the statements of principles, states the criteria for documentation and disclosure.

Several other respondents raised a question as to whether this standard requires actuaries to take positive action if they believe their work is being relied upon inappropriately. This question was raised in response to appendix 1 in the exposure draft containing "Casualty Committee Comments," which specifically stated that this responsibility exists. The standard requires that actuaries take reasonable steps to ensure that actuarial work products are presented fairly in order

to minimize the risk of misquotation, misinterpretation, or other misuse of the product’s actuarial aspects. The standard does not in and of itself require positive action on the actuary’s part if the actuary is aware of any such misuse. Such an intent is beyond the purpose of this standard. Rather, it is more an issue related to the guides to professional conduct, or normal work ethics. The appendix containing the comments was not included with the final standard of practice. The committee also added wording at the end of section 5.3 (Prevention of Misuse) to clarify what was intended by the phrase, *presented fairly*.

In section 4 (Current Practices and Alternatives), last sentence, the clause, “as there have been no formal standards of practice,” was deleted, since it would be inappropriate to imply causality in this statement.

In section 5.2 (Extent of Documentation), the standard was revised to incorporate a “minimal” criterion. This was done by moving the word *appropriate* to modify records, worksheets, and other documentation, and by specifying that documentation should be sufficient for another actuary practicing in the same field to evaluate the work. Documentation is required—whether or not there is a legal or regulatory requirement for documentation—and the standard defines what that documentation should entail.

One respondent questioned whether the word *must* should have been used instead of *should* in several instances. The committee did not make this change because it believed that the word *should* expresses obligation and propriety, but also allows for deviation, in some cases. (See section 6.)

One respondent commented on the roles of standards of practice, relative to the *Guides and Interpretative Opinions as to Professional Conduct*, which are standards of professional conduct. He commented that this standard could raise questions and perhaps cause confusion unless guidance is provided as to whether the standard of practice or the standard of professional conduct applies. The committee has written this standard to be complete and sufficient, so that the standard will provide specific guidance on documentation and disclosure in ratemaking, loss reserving, and valuations, within the general framework provided by Interpretative Opinion 3.

Other changes of a grammatical or editorial nature were adopted, many in response to comments received.

Casualty Committee of the ASB

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Michael J. Miller, Chairperson 1989–

Subcommittee on Ratemaking

LeRoy A. Boison Jr., Chairperson

Subcommittee on Reserving

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ACTUARIAL STANDARD OF PRACTICE NO. 9

DOCUMENTATION AND DISCLOSURE IN PROPERTY AND CASUALTY INSURANCE RATEMAKING, LOSS RESERVING, AND VALUATIONS

PREAMBLE

Section 1. Purpose, Scope, and Effective Date

- 1.1 Purpose—The purpose of this standard of practice is to define the documentation and disclosure required of an actuary in property and casualty insurance ratemaking, loss reserving, and valuations.
- 1.2 Scope—This standard of practice is limited to the practices that relate to the *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*, the *Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves*, and the *Statement of Principles Regarding Property and Casualty Valuations* as adopted by the Casualty Actuarial Society (CAS).
- 1.3 Effective Date—This standard became effective July 14, 1989, for documentation and disclosure in ratemaking and loss reserving. Its effective date for valuations was May 1, 1991.

Section 2. Definitions

- 2.1 Actuarial Report—A document, or other presentation, prepared as a formal means of conveying the actuary's professional conclusions and recommendations, of recording and communicating the methods and procedures, and of ensuring that the parties addressed are aware of the significance of the actuary's opinion or findings.
- 2.2 Actuarial Work Product—The result of an actuary's work. The term applies to the following actuarial communications, whether written or oral: statements of actuarial opinion, actuarial reports, statements of actuarial review, and required actuarial documents.
- 2.3 Required Actuarial Document—An actuarial communication of which the formal content is prescribed by law or regulation.

- 2.4 Statement of Actuarial Opinion—A formal statement of the actuary’s professional opinion on a defined subject. It outlines the scope of the work but normally does not include descriptive details.
- 2.5 Statement of Actuarial Review—A formally communicated appraisal of actuarial work done by another person.

Section 3. Background and Historical Issues

Professional documentation and communication are essential components of actuarial practice. In the absence of specific standards of practice, the amount of documentation and disclosure has varied. As the nature of casualty actuarial work has become more complex and more open to and available for public review, the need to formalize standards has increased. The CAS has adopted a *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*, a *Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves*, and a *Statement of Principles Regarding Property and Casualty Valuations*. Those statements serve as guides to this standard. This standard states that the methodology and material assumptions utilized in ratemaking, reserving, and valuations should be documented and, in some cases, available for disclosure.

This standard addresses the following issues:

1. the extent to which an actuarial work product should be documented,
2. the persons to whom that documentation should be available,
3. the extent to which deviations from standards of practice should be documented,
4. the requirement that actuaries sign work products within their responsibility, and
5. the requirement that actuaries disclose the names of others upon whose work they have relied.

Section 4. Current Practices and Alternatives

Current practices have been governed by the *Guides and Interpretative Opinions as to Professional Conduct* promulgated by the American Academy of Actuaries, the CAS, the Conference of Actuaries in Public Practice, and the Society of Actuaries. Current practices have varied with individual interpretations of those *Guides and Opinions*.

STANDARD OF PRACTICE

Section 5. Analysis of Issues and Recommended Practices

- 5.1 Introduction—Ratemaking, loss reserving, and valuations take place in a variety of settings depending upon the legal and regulatory environment involved. The form and content of any actuarial communication should meet the needs of the particular circumstances, taking into account the knowledge and understanding of the users and the actuary's relationship to the users. Users may be either direct or indirect. A client or employer is the direct user of the actuary's service, as distinguished from an indirect user. The direct user selects the actuary and communicates directly with the actuary about qualifications, work, and recommendations.
- 5.2 Extent of Documentation—This standard requires documentation of an actuarial work product whether or not there is a legal or regulatory requirement for the documentation. Appropriate records, worksheets, and other documentation of the actuary's work should be maintained by the actuary and retained for a reasonable period of time. Documentation should be sufficient for another actuary practicing in the same field to evaluate the work. The documentation should describe clearly the sources of data, material assumptions, and methods. Any material changes in sources of data, assumptions, or methods from the last analysis should be documented. The actuary should explain the reason(s) for and describe the impact of the changes.
- 5.3 Prevention of Misuse—Information prepared by an actuary may be used by another person in a way that may influence the actions of a third party. If someone other than an actuary might convey such information to any such indirect users, the actuary should recognize the risk of misquotation, misinterpretation, or other misuse of its actuarial aspects. The actuary should take reasonable steps to ensure that an actuarial work product is presented fairly, that the presentation as a whole is clear in its actuarial aspects, and that the actuary is identified as the source of the actuarial aspects and as the individual who is available to answer questions. An actuarial report is customarily considered to be presented fairly if it describes the data, material assumptions, methods, and material changes in these with sufficient clarity that another actuary practicing in the same field could make an appraisal of the reasonableness and validity of the report.
- 5.4 Disclosure of Conflict with Professional Judgment, and of Advocacy—If the service requested by a client or employer produces a result that conflicts materially with the actuary's professional judgment, the actuary should advise the client or employer of the conflict and should include appropriate qualifications or disclosures in any related actuarial communication. When an actuary acts, or may seem to be acting, as advocate for a client or employer, the nature of that relationship should be disclosed to directly interested parties.

- 5.5 Availability of Documentation—Documentation should be available to the actuary’s client or employer, and it should be made available to other persons when the client or employer so requests, assuming appropriate compensation, and provided such availability is not otherwise improper. Ownership of documentation is normally established by the actuary and the client or employer, in accordance with law.
- 5.6 Conflicting Interests—The actuary does not normally have an obligation to communicate with any person other than the client or employer. If aware of any significant conflict between the interests of indirect users and the interests of the client or employer, the actuary should advise the client or employer of the conflict and should include appropriate qualifications or disclosures in any related actuarial communication.
- 5.7 Signature on Work Product—When required by law or regulation or when called upon by the client or employer to provide documentation of work, the actuary should provide such disclosure in writing. Any such disclosure must be signed with the name of the actuary responsible for the work. The name of an organization with which the actuary is affiliated may be incorporated into the signature. The actuary’s responsibilities to comply with this standard are not affected by the form of the signature.
- 5.8 Reliance on Another—An actuary who makes an actuarial communication assumes responsibility for it, except to the extent the actuary disclaims responsibility by stating reliance on another person. Reliance on another person means using that person’s work without assuming responsibility therefor. A communication should define the extent of any such reliance.
- 5.9 Waiver of Fee—The waiving of a fee for professional services, either partially or totally, does not relieve the actuary of the need to observe professional standards.

Section 6. Communications and Disclosures

- 6.1 Deviation from Standard—An actuary who uses a procedure which differs from this standard must include, in the actuarial communication disclosing the result of the procedure, an appropriate and explicit statement with respect to the nature, rationale, and effect of such use.

Appendix 1

Statement of Principles Regarding Property and Casualty Insurance Ratemaking

(Adopted by the Board of Directors of the CAS May 1988)

The purpose of this Statement is to identify and describe principles applicable to the determination and review of property and casualty insurance rates. The principles in this Statement are limited to that portion of the ratemaking process involving the estimation of costs associated with the transfer of risk. This Statement consists of four parts:

- I. DEFINITIONS
- II. PRINCIPLES
- III. CONSIDERATIONS
- IV. CONCLUSION

The principles contained in this Statement provide the foundation for the development of actuarial procedures and standards of practice. It is important that proper actuarial procedures be employed to derive rates that protect the insurance system's financial soundness and promote equity and availability for insurance consumers.

Although this Statement addresses property and casualty insurance ratemaking, the principles contained in this Statement apply to other risk transfer mechanisms.

I. DEFINITIONS

Ratemaking is the process of establishing rates used in insurance or other risk transfer mechanisms. This process involves a number of considerations including marketing goals, competition and legal restrictions to the extent they affect the estimation of future costs associated with the transfer of risk. This Statement is limited to principles applicable to the estimation of these costs. Such costs include claims, claim settlement expenses, operational and administrative expenses, and the cost of capital. Summary descriptions of these costs are as follows:

—*Incurred losses* are the cost of claims insured.

—*Allocated loss adjustment expenses* are claims settlement costs directly assignable to specific claims.

—*Unallocated loss adjustment expenses* are all costs associated with the claim settlement function not directly assignable to specific claims.

—*Commission and brokerage expenses* are compensation to agents and brokers.

—*Other acquisition expenses* are all costs, except commission and brokerage, associated with the acquisition of business.

—*Taxes, licenses and fees* are all taxes and miscellaneous fees except federal income taxes.

—*Policyholder dividends* are a non-guaranteed return of premium charged to operations as an expense.

—*General administrative expenses* are all other operational and administrative costs.

—The *underwriting profit and contingency provisions* are the amounts that, when considered with net investment and other income, provide an appropriate total after-tax return.

II. PRINCIPLES

Ratemaking is prospective because the property and casualty insurance rate must be developed prior to the transfer of risk.

Principle 1: A *rate* is an estimate of the expected value of future costs.

Ratemaking should provide for all costs so that the insurance system is financially sound.

Principle 2: A rate provides for all costs associated with the transfer of risk.

Ratemaking should provide for the costs of an individual risk transfer so that equity among insureds is maintained. When the experience of an individual risk does not provide a credible basis for estimating these costs, it is appropriate to consider the aggregate experience of similar risks. A rate estimated from such experience is an estimate of the costs of the risk transfer for each individual in the class.

Principle 3: A rate provides for the costs associated with an individual risk transfer.

Ratemaking produces cost estimates that are actuarially sound if the estimation is based on Principles 1, 2, and 3. Such rates comply with four criteria commonly used by actuaries: reasonable, not excessive, not inadequate, and not unfairly discriminatory.

Principle 4: A rate is reasonable and not excessive, inadequate, or unfairly discriminatory if it is an actuarially sound estimate of the expected value of all future costs associated with an individual risk transfer.

III. CONSIDERATIONS

A number of ratemaking methodologies have been established by precedent or common usage within the actuarial profession. Since it is desirable to encourage experimentation and innovation in ratemaking, the actuary need not be completely bound by these precedents. Regardless of the ratemaking methodology utilized, the material assumptions should be documented and available for disclosure. While no ratemaking methodology is appropriate in all cases, a number of considerations commonly apply. Some of these considerations are listed below with summary descriptions. These considerations are intended to provide a foundation for the development of actuarial procedures and standards of practice.

Exposure Unit—The determination of an appropriate exposure unit or premium basis is essential. It is desirable that the exposure unit vary with the hazard and be practical and verifiable.

Data—Historical premium, exposure, loss and expense experience is usually the starting point of ratemaking. This experience is relevant if it provides a basis for developing a reasonable indication of the future. Other relevant data may supplement historical experience. These other data may be external to the company or to the insurance industry and may indicate the general direction of trends in insurance claim costs, claim frequencies, expenses and premiums.

Organization of Data—There are several acceptable methods of organizing data including calendar year, accident year, report year and policy year. Each presents certain advantages and disadvantages; but, if handled properly, each may be used to produce rates. Data availability, clarity, simplicity, and the nature of the insurance coverage affect the choice.

Homogeneity—Ratemaking accuracy often is improved by subdividing experience into groups exhibiting similar characteristics. For a heterogeneous product, consideration should be given to segregating the experience into more homogeneous groupings. Additionally, subdividing or combining the data so as to minimize the distorting effects of operational or procedural changes should be fully explored.

Credibility—*Credibility* is a measure of the predictive value that the actuary attaches to a particular body of data. Credibility is increased by making groupings more homogeneous or by increasing the size of the group analyzed. A group should be large enough to be statistically reliable. Obtaining homogeneous groupings requires refinement and partitioning of the data. There is a point at which partitioning divides data into groups too small to provide credible patterns. Each situation requires balancing homogeneity and the volume of data.

Loss Development—When incurred losses and loss adjustment expenses are estimated, the development of each should be considered. The determination of the expected loss development is subject to the principles set forth in the Casualty Actuarial Society's *Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves*.

Trends—Consideration should be given to past and prospective changes in claim costs, claim frequencies, exposures, expenses and premiums.

Catastrophes—Consideration should be given to the impact of catastrophes on the experience and procedures should be developed to include an allowance for the catastrophe exposure in the rate.

Policy Provisions—Consideration should be given to the effect of salvage and subrogation, coinsurance, coverage limits, deductibles, coordination of benefits, second injury fund recoveries and other policy provisions.

Mix of Business—Consideration should be given to distributional changes in deductibles, coverage limitations or type of risks that may affect the frequency or severity of claims.

Reinsurance—Consideration should be given to the effect of reinsurance arrangements.

Operational Changes—Consideration should be given to operational changes such as changes in the underwriting process, claim handling, case reserving and marketing practices that affect the continuity of the experience.

Other Influences—The impact of external influences on the expected future experience should be considered. Considerations include the judicial environment, regulatory and legislative changes, guaranty funds, economic variable, and residual market mechanisms including subsidies of residual market rate deficiencies.

Classification Plans—A properly defined classification plan enables the development of actuarially sound rates.

Individual Risk Rating—When an individual risk's experience is sufficiently credible, the premium for that risk should be modified to reflect the individual experience. Consideration should be given to the impact of individual risk rating plans on the overall experience.

Risk—The rate should include a charge for the risk of random variation from the expected costs. This risk charge should be reflected in the determination of the appropriate total return consistent with the cost of capital and, therefore, influences the underwriting profit provision. The rate should also include a charge for any systematic variation of the estimated costs from the expected costs. This charge should be reflected in the determination of the contingency provision.

Investment and Other Income—The contribution of net investment and other income should be considered.

Actuarial Judgment—Informed actuarial judgments can be used effectively in ratemaking. Such judgments may be applied throughout the ratemaking process and should be documented and available for disclosure.

IV. CONCLUSION

The actuary, by applying the ratemaking principles in this Statement, will derive an estimation of the future costs associated with the transfer of risk. Other business considerations are also a part of ratemaking. By interacting with professionals from various fields including underwriting, marketing, law, claims, and finance, the actuary has a key role in the ratemaking process.

Appendix 2

Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves

(Adopted by the Board of Directors of the CAS, May 1988)

The purpose of this Statement is to identify and describe principles applicable to the evaluation and review of loss and loss adjustment expense reserves. Because of their size and the uncertainties in the estimation process, the evaluation of these reserves requires the use of proper actuarial and statistical procedures. The financial condition of a property and casualty insurer cannot be assessed accurately without sound reserve estimates.

This Statement consists of three parts:

- I. DEFINITIONS
- II. PRINCIPLES
- III. CONSIDERATIONS

The definitions in the next section apply to both loss reserves and loss adjustment expense reserves. For the purpose of this statement the terms *loss* and *claim* are used interchangeably, and the term *insurer* is meant to represent any risk bearer for property and casualty exposures, whether an insurance company, self-insured entity, or other.

I. DEFINITIONS

A *loss reserve* is a provision for its related liability. A total loss reserve is composed of five elements, although the five elements may not necessarily be individually quantified:

- case reserve
- provision for future development on known claims
- reopened claims reserve
- provision for claims incurred but not reported

—provision for claims in transit (incurred and reported but not recorded)

Before these five elements are discussed, certain key dates and terms need to be defined.

—The *accounting date* is the date that defines the group of claims for which liability may exist, namely all insured claims incurred on or before the accounting date. The accounting date may be any date selected for a statistical or financial reporting purpose.

—The *valuation date* is the date through which transactions are included in the data base used in the evaluation of the liability, regardless of when the analysis is performed. For a defined group of claims as of a given accounting date, reevaluation of the same liability may be made as of successive valuation dates. A valuation date may be prior to, coincident with or subsequent to the accounting date.

—The *carried loss reserve* is the amount shown in a published statement or in an internal statement of financial condition.

—An *indicated loss reserve* is the result of the application of a particular loss reserving evaluation procedure. An indicated loss reserve for a given accounting date likely will change from one valuation date to another.

—A *division* is often required between reserves for known claims and reserves for claims which have been incurred but not reported (IBNR). The *reserve for known claims* represents the amount, estimated as of the valuation date, that will be required for future payments on claims that already have been reported to the insurer. (The *reserve for known claims* is also sometimes referred to by other labels such as the *reported reserve*, the *reserve for claims adjusted or in the process of adjustment*, or the *reserve for unpaid losses excluding IBNR*.) The *IBNR reserve* represents the amount that must be provided for future payments on insured losses that have occurred but that have not been reported.

—The *case reserve* is defined as the sum of the values assigned to specific known claims whether determined by claims adjusters or set by formula. (The term *case reserve* is sometimes used in place of the reserve for known claims. However, as defined, the case reserve does not include the provision for future development on known claims.) *Adjusters' estimates* are the aggregate of the estimates made by claims personnel for individual claims, based on the facts of the particular claims. *Formula reserves* are reserves established for groups of claims for which certain classifying information is provided. Formula reserving may be applied to individual claims or to aggregations of claims with similar characteristics through use of average claim values or factors applied to representative statistics (for example, premiums in force or earned premiums).

—*Development* is defined as the change between valuation dates in the observed values of certain fundamental quantities that may be used in the loss reserve estimation process. For example, the observed number of reported claims associated with losses occurring within a particular calendar period often will be seen to increase from one valuation date to the next until

all claims have been reported. The pattern of accumulating claims represents the development of the number of claims.

In a similar fashion, the amount of claim payments for losses occurring within a specific calendar period also will be seen to increase at succeeding valuation dates. In this case the pattern of accumulating payments represents the development of claim costs and is usually referred to by the term *paid development*. The concept of development also applies to incurred losses. *Incurred development* is defined as the difference between estimates of incurred costs at two valuation dates for a defined group of claims.

—The *provision for future development on known claims* relates to incurred development on those claims reported to an insurer on or before a specific accounting date that are still open on that accounting date. Incurred development on such claims can be either increasing or decreasing.

—The *reopened claims reserve* is a provision for future payments on claims closed as of the accounting date that may be reopened due to circumstances not foreseen at the time the claims were closed. In some instances, post-closing payments or recoveries for claims not actually reopened may be included with the development on known claims.

For many insurers a claim is considered to be reported when it is first recorded in the accounting records of the insurer. Conceptually, two elements form the IBNR reserve. The first of these elements is the provision for claims incurred but not reported, referred to as the “pure” IBNR. This provision results from the normal delay that occurs in reporting losses. The second element is the provision for claims in transit, which are incurred and reported but not recorded. This provision represents the additional time consumed by the insurer’s recording procedures. As a practical matter it is not always feasible to measure these two elements separately, but it is important to understand the effect reporting procedures can have on the amount of IBNR reserve. For some insurers claims in transit are considered known claims. The IBNR reserve must provide for the ultimate value of IBNR claims including the development which is expected to occur on these claims after reporting.

—*Loss adjustment expenses* include allocated loss adjustment expenses and unallocated loss adjustment expenses. *Allocated loss adjustment expenses* are those expenses, such as attorneys’ fees and other legal costs, that are incurred in connection with and are assigned to specific claims. *Unallocated loss adjustment expenses* are all other claim adjustment expenses and include salaries, utilities and rent apportioned to the claim adjustment function but not readily assignable to specific claims. The definition of *allocated and unallocated loss adjustment expenses* for reserving purposes varies among insurers, and an individual insurer’s practice for reserving may not always conform to its definition for statistical reporting or ratemaking purposes.

Since allocated expenses are assigned to specific claims, all of the analyses performed on loss data can also be performed on allocated loss expense data. Thus, the allocated loss adjustment expense reserve can be divided into known and IBNR components. All of the concepts discussed

in the preceding paragraphs, as well as each of the five elements of the loss reserve, have similar meanings with regard to the allocated loss adjustment expense reserve.

Although the same statistical procedures normally do not apply to unallocated expenses, the unallocated loss adjustment expense reserve can still be divided into known reserve and IBNR components, and the concept of a particular valuation date is meaningful.

II. PRINCIPLES

1. An actuarially sound loss reserve for a defined group of claims as of a given valuation date is a provision, based on estimates derived from reasonable assumptions and appropriate actuarial methods for the unpaid amount required to settle all claims, whether reported or not, for which liability exists on a particular accounting date.
2. An actuarially sound loss adjustment expense reserve for a defined group of claims as of a given valuation date is a provision, based on estimates derived from reasonable assumptions and appropriate actuarial methods, for the unpaid amount required to investigate, defend, and effect the settlement of all claims, whether reported or not, for which loss adjustment expense liability exists on a particular accounting date.
3. The uncertainty inherent in the estimation of required provisions for unpaid losses or loss adjustment expenses implies that a range of reserves can be actuarially sound. The true value of the liability for losses or loss adjustment expenses at any accounting date can be known only when all attendant claims have been settled.
4. The most appropriate reserve within a range of actuarially sound estimates depends on both the relative likelihood of estimates within the range and the financial reporting context in which the reserve will be presented.

Although specific reserve requirements may vary, the same basic principles apply in each context in which the reserves are stated, including statutory balance sheets, statements of opinion on loss reserves, and reports to shareholders or securities regulators. Guidance in the application of these principles is provided in the Considerations section of this statement.

III. CONSIDERATIONS

Understanding the trends and changes affecting the data base is a prerequisite to the application of actuarially sound reserving methods. A knowledge of changes in underwriting, claims handling, data processing and accounting, as well as changes in the legal and social environment, affecting the experience is essential to the accurate interpretation and evaluation of observed data and the choice of reserving methods.

A knowledge of the general characteristics of the insurance portfolio for which reserves are to be established also is important. Such knowledge would include familiarity with policy provisions

that may have a bearing on reserving, as well as deductibles, salvage and subrogation, policy limits, and reinsurance.

Data Organization—The categorization of claims by time unit is extremely important. The successful organization of a data base for reserving revolves around five key dates:

—*accident date*, which is the date on which the loss occurred, or for those losses that cannot be identified with a single isolated event, the date on which the loss is deemed to have occurred

—*report date*, which is the date on which the loss is first reported to the insurer (in practice it is often taken to be the recorded date)

—*recorded date*, which is the date on which the loss is first entered in the statistical records of the insurer

—*accounting date*

—*valuation date*

Commonly, insurers compile claim data by accident periods (accident year, accident quarter, accident month, etc.), which group together all claims with accident dates falling within particular fiscal periods; or by policy periods, which group all claims relating to policies written during particular fiscal periods. Claim information by accident year is required for various financial reporting schedules. Many insurers also compile claim data by report periods, which group together all claims with report dates falling within specified fiscal periods.

Claims with report dates equal to or prior to a particular accounting date would be classified as known or reported claims with respect to the accounting date, but claims with report dates later than a particular accounting date and with accident dates equal to or earlier than the accounting date would be classified as IBNR with respect to the accounting date.

The preceding paragraph gives the precise definition of IBNR claims. In practice a broader definition is sometimes used in which the IBNR reserve denotes the provision for late reported claims, development on known claims, and a provision for reopened claims.

The ambiguity regarding the definition of IBNR can result from the differing strategies insurers may employ in approaching loss reserving. The two common strategies are the report period approach and the accident period approach. In the report period approach the adequacy of existing reserves on reported claims is estimated on the basis of the historical results. Further analysis is required in order to measure the emergence of IBNR claim. In a pure accident period approach, the ultimate cost of all claims, both reported and unreported, arising from each accident period is estimated. This approach results in an estimate of the loss reserve without segregation of claims incurred but not reported. The estimated loss reserve is then apportioned between reserves for IBNR and known claims on a suitable basis. Because accident period

techniques do not necessarily require separate treatment of reported and unreported claims, their use can lead to a broader definition IBNR as mentioned above.

The method of assigning report dates to reopened claims can also affect the IBNR reserve. Because reopened claims are generated from claims previously reported and closed, there is general agreement that the provision for this liability should be included in the reserve for known claims. Some insurers, however, establish new report dates for reopened claims and thereby consider the provision for these claims as a component of the IBNR reserve.

Homogeneity—Loss reserving accuracy often is improved by subdividing experience into groups exhibiting similar characteristics, such as comparable claim experience patterns, settlement patterns or size of loss distributions. For a heterogeneous product, such as commercial multi-peril or miscellaneous liability insurance, consideration should be given to segregating the experience into more homogeneous groupings. Other example applications concern the distinctions between personal and commercial risks and between primary and excess coverage. Additionally, subdividing or combining the data so as to minimize the distorting effects of operational or procedural changes should be fully explored.

Credibility—Credibility is a measure of the predictive value that the actuary attaches to a body of data. The degree to which consideration is given to homogeneity is related to the consideration of credibility. Credibility is increased by making groupings more homogeneous or by increasing the number of claims analyzed within each group. A group of claims should be large enough to be statistically reliable. Obtaining homogeneous groupings requires refinement and partitioning of the total data base. There is a point at which partitioning divides data into cells too small to provide credible development patterns. Each situation requires a balancing of the homogeneity and amount of data in each grouping. Thus, line and coverage definitions suitable for the establishment of reserves for large insurers can be in much finer detail than in the case of small insurers. Where a very small group of claims is involved, use of external information such as industry aggregates may be necessary.

Data Availability—Data should meet requirements for the proper evaluation of reserves. Existing information systems may impose constraints while more suitable data are being developed. Whatever data are used in analysis of reserves, they must reconcile to the insurer's financial records. If reserves are established in less detail than necessary for reporting requirements, procedures for properly assigning the reserves to required categories must be developed.

Emergence Patterns—The delay between the occurrence of claims and the recording of claims depends upon both the line of business and the insurer's practices. In general, property claims are reported quickly, whereas the reporting of liability claims may be substantially delayed.

A review of the insurer's claims practices should be made to assure that assumptions regarding the claims process are appropriate. If a change in claims procedures is identified, its impact on emergence patterns should be evaluated.

Settlement Patterns—The length of time that it normally takes for reported claims to be settled will affect the choice of the loss reserving methods. Lines of business for which claims settle quickly generally are less subject to reserve uncertainty. A claim arising under collision coverage, for example, tends to be settled quickly, and the amount of settlement is usually close to the original estimate. Conversely, a bodily injury liability claim often requires a long time to settle. Moreover, the amount of settlement often varies considerably from the original estimate, since it depends on the interaction of complex variables such as the type and severity of the injury and the intricacies of the judicial process.

Development Patterns—The pattern of development on known claims should be carefully reviewed. An insurer's claims procedures will affect the manner in which the case reserves develop for any group of claims, and changes in claims practices may affect the consistency of historical developments. Further, the length of time to settlement may affect the observed development.

If reserves have been established at present values, the payments of claims, by themselves, cause an appearance of upward development apart from development due to other factors. To interpret development patterns correctly, the development history should be restated to remove the effect of discounting.

Frequency and Severity—The same total dollars of losses may arise from a few very large claims or from many small claims. Reserve estimates will tend to be more accurate for losses resulting from a high frequency/low severity group of claims than from a low frequency/high severity group of claims. Therefore, the evaluation of reserves for low frequency/high severity groups of claims will ordinarily require more extensive analysis. If the exposure for the group of claims being considered includes the potential for claims of a magnitude not present in historical data, adjustments should be made to reflect the expectation of such claims.

Reopened Claims Potential—The tendency for closed claims to reopen varies substantially among lines of business. Judicial opinions and legislation can affect the reopening of claims, as can changes in an insurer's procedures.

Claims-Made—Some coverages may be provided on a policy form covering claims reported during a certain period rather than claims arising out of occurrences during that period. Claims-made data should be segregated from experience on occurrence policies. It may be necessary to augment claims-made statistics with appropriate report period statistics generated under occurrence programs.

Certain provisions may modify the claims-made policy upon fulfillment of conditions stipulated in the contract. Review of the contract wording is necessary to determine the appropriate reserve, if any, for occurrences prior to the policy effective date or claims reported after the policy expiration.

Aggregate Limits—For certain insurance coverages, such as products and professional liability, aggregate policy limits may act to restrict total potential incurred losses and therefore reserve requirements. In the review of groups of claims where aggregate limits apply, modeling techniques or audit tests of the data will reveal to what extent limit ceilings have been reached and assist in determining how reserve projections may have to be modified.

Salvage, Subrogation, and Collateral Sources—For a proper evaluation of an insurer's total reserve position, the potential impact of salvage and subrogation on the group of claims under consideration should be evaluated even though statutory accounting may prohibit a deduction from loss reserves. In addition, the impact of coinsurance, deductibles, coordination of benefits, second injury fund recoveries, as well as any other collateral sources, should be considered.

Generally Accepted Accounting Principles—Reports to shareholders and to securities regulators are governed by generally accepted accounting principles (GAAP). GAAP reserves may be defined differently from statutory reserves. For example, GAAP reserves are ordinarily reduced by anticipated salvage and subrogation. The same principles of analysis used for statutory estimates can be applied to GAAP reserve estimates.

Reinsurance—Reserves are affected by the types of reinsurance plans and retentions that were and are in force, and the impact of changes in net retentions should be evaluated. To determine the effect of reinsurance it may be appropriate to analyze direct and ceded experience separately. The recoverability of ceded reinsurance is a further consideration; generally, it is addressed separately from the reserve evaluation process.

Portfolio Transfers, Commutations, and Structured Settlements—Portfolio transfers, commutations, and structured settlements generally recognize the time value of money. Such transactions should be evaluated for their impact on the loss reserves and the development patterns.

Pools and Associations—The loss liabilities of an insurer depend to some degree on forces beyond its control, such as business obtained through participation in voluntary and non-voluntary underwriting pools and associations. The operating and reserving policies of these organizations vary, and adjustments to reserves reported by the pools and associations may be warranted.

Operational Changes—The installation of a new computer system, an accounting change, a reorganization of claims responsibility or changes in claims handling practices or underwriting programs are examples of operational changes that can affect the continuity of the loss experience. The computation of the reserves should reflect the impact of such changes.

Changes in Contracts—Changes in contract provisions, such as policy limits, deductibles, or coverage attachment points, may alter the amounts of claims against an insurer. Such contractual changes may affect both the frequency and severity of claims.

External Influences—Due regard should be given to the impact of external influences. External influences include the judicial environment, regulatory and legislative changes, residual or involuntary market mechanisms, and economic variables such as inflation.

Discounting—There are circumstances where loss reserves are stated on a present value basis. To calculate or evaluate such reserves, it is generally appropriate to perform an analysis on an undiscounted basis and then apply the effect of discounting.

Provision for Uncertainty—A reserve estimate should take into account the degree of uncertainty inherent in its projections. A reserve stated at its ultimate value may include an implicit provision for uncertainty due to the time value of money. If a reserve is to be stated at a present value, it may be appropriate to include an explicit provision for uncertainty in its undiscounted amount. Further, an explicit provision for uncertainty may be warranted when the indicated ultimate reserve value is subject to a high degree of variability.

Reasonableness—The incurred losses implied by the reserves should be measured for reasonableness against relevant indicators, such as premiums, exposures, or numbers of policies, and expressed wherever possible in terms of frequencies, severities, and loss ratios. No material departure from expected results should be accepted without attempting to find an explanation for the variation.

Loss-Related Balance Sheet Items—The loss reserve analysis may have implications for other loss-related balance sheet items. These include contingent commissions, retrospective premium adjustments, policyholder dividends, premium deficiency reserves, minimum statutory reserves and the deduction for unauthorized reinsurance.

Loss Reserving Methods—Detailed discussion of the technology and applicability of current loss reserving practices is beyond the scope of this statement. Selection of the most appropriate method of reserve estimation is the responsibility of the actuary. Ordinarily the actuary will examine the indications of more than one method when estimating the loss and loss adjustment expense liability for a specific group of claims.

Standards of Practice—This statement provides the principles of loss reserving. The actuary should also be familiar with standards of practice, which address the application of these principles.

Appendix 3

Statement of Principles Regarding Property and Casualty Valuations

(Adopted by the Board of Directors of the CAS September 22, 1989)

The purpose of this Statement is to identify and describe principles applicable to property and casualty valuations. The Statement establishes fundamental concepts for research and education regarding valuation techniques. The principles in this Statement provide the foundation for actuarial procedures and standards of practice regarding valuations. These principles apply to valuations regarding any risk bearer of property and casualty contingencies.

This Statement consists of three parts:

- I. DEFINITIONS
- II. PRINCIPLES
- III. DISCUSSION

I. DEFINITIONS

—*Valuation* is the process of determining and comparing, for the purpose of assessing a risk bearer's financial condition as of a given date, called the valuation date, the values of part or all of a risk bearer's obligations and the assets and considerations designated as supporting those obligations.

A valuation is carried out in accordance with specified rules or assumptions selected or prescribed in accordance with the purpose of the valuation.

—A *risk bearer* is a person or other entity that is exposed to the risk of financial losses that may arise out of specified contingent events during a specified period of exposure.

—*Cash flows* are receipts or disbursements of cash.

—An *asset* is cash held or any other resource that can generate receipts or reduce disbursements.

—An *obligation* is a commitment by or requirement of a risk bearer to make disbursements with respect to financial losses arising out of specified contingent events or with respect to any type of other expense or investment commitment.

—A *consideration* is a receipt or a reduction in disbursements in exchange for accepting the risk of financial losses that may arise out of specified contingent events during a specified period of exposure.

II. PRINCIPLES

1. Every obligation, consideration or asset, with the exception of cash held, is associated with one or more items of cash flow.
2. The value of every item of cash flow depends upon the following valuation variables, each of which may involve uncertainty:
 - a. the occurrence of the item of cash flow,
 - b. the amount of the item of cash flow,
 - c. the interval of time between the valuation date and the date of occurrence of the item of cash flow, and
 - d. a rate of interest related to the interval of time between the valuation date and the date of occurrence of the cash flow.
3. The degree of uncertainty affecting each valuation variable for any item of cash flow associated with a given asset, obligation or consideration depends upon:
 - a. the nature of the asset, obligation or consideration,
 - b. the various environments (e.g. regulatory, judicial, social, financial and economic environments) within which the valuation is being performed, and
 - c. the predictive value of the data used to estimate the valuation variables associated with each item of cash flow.
4. In general, the values of items of cash flow associated with a given asset, obligation or consideration, and the values of assets, obligations and considerations themselves are not only uncertain, they are also not independent of each other. Consequently, the degree of uncertainty relative to the combined value of items of cash flow or of assets, obligations and considerations reflects the uncertainties affecting the underlying valuation variables and arising out of the interaction of those variables in the process of combination.
5. The value of an asset, obligation or consideration is equal to the combined values of its constituent items of cash flow.

6. The result of a valuation is the combined value of the assets, obligations and considerations involved in the valuation with due recognition of the offsetting characteristics of receipts and disbursements.
7. These valuation principles apply to any valuation whether it involves a risk bearer's total assets, obligations and considerations as of a given valuation date or only identified segments of the risk bearer's assets, obligations and considerations including:
 - a. commitments made on or before the valuation date, or
 - b. the commitments in (a) and commitments projected to be made after the valuation date,
or
 - c. only those commitments projected to be made after the valuation date.

III. DISCUSSION

Although no valuation methodology is appropriate in all situations, a number of considerations commonly apply. Some of these considerations are discussed in this section. These discussions are intended to provide a foundation for the development of actuarial procedures and standards of practice.

Data—Data to be used in valuation include descriptions of the characteristics of the risk bearer's assets, obligations and considerations. The descriptions should be sufficiently detailed to permit reasonable projections of cash flows from these assets, obligations and considerations.

The actuary may use a risk bearer's own experience relative to its assets, obligations and considerations if this provides a basis for developing a reasonable indication of the future. Moreover, the actuary may use external data drawn from relevant experience of the insurance industry, other financial institutions or surrounding environments.

Organization of Data—Organization of data for valuation is affected by the characteristics of the assets, obligations and considerations involved and the characteristics of the valuation variables connected with them.

Much of the data organizational work relative to obligations and considerations begins with data used in connection with the reserving and ratemaking processes. However, it may be necessary to adjust the results of those processes so as to take into account differences between cash flow dates and the various dates used in those processes. It may also be necessary to identify any relevant expenses that fall outside the data used in the reserving and ratemaking processes and reflect them in the valuation process. It is important, too, to identify potential adjustments to considerations like retrospective premiums or audit premiums that may be received or paid in the future.

If a valuation deals with detailed analyses of cash flows, data organization relative to assets involves principally the work of classifying the assets and developing projections of contractual or anticipated cash flows from them. It is also often necessary to divide assets into classes of investment by such things as time to maturity or quality and to project flows of anticipated receipts into particular classes of investment in accordance with an assumed investment strategy.

Homogeneity—Valuation accuracy is often improved by dividing the data on assets, obligations and considerations into groups exhibiting similar characteristics. Homogeneous groupings recognize, when appropriate, the interrelationships between those assets, obligations and considerations.

Credibility—Credibility is a measure of the predictive value attached to a body of data. Credibility is increased by defining groups of assets, obligations or considerations so as to increase their homogeneity or to increase the volume of data relative to the groups. Increasing homogeneity may fragment the groups to such an extent that their predictive value is reduced to an unacceptable level. Each situation requires balancing homogeneity and the volume of data.

Operating Conditions—Operating conditions should be reflected in valuation. Operating conditions include mix of business, underwriting, claims handling, marketing, accounting, premium processing, portfolio of investments, investment strategy, and reinsurance programs.

Environmental Conditions—Environmental conditions should be reflected in valuation. The regulatory, judicial, social, financial, and economic environments are some of the major ones to be considered.

Losses and Loss Adjustment Expenses—The major obligations of a risk bearer are usually those relating to the future payment of losses and loss adjustment expenses. When these obligations are estimated for purposes of a valuation, their future development may be a factor for consideration. Development of losses and loss adjustment expenses is defined in the Casualty Actuarial Society's Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves.

Rules and Assumptions—The objective of a valuation is to produce an assessment of a risk bearer's financial condition that will be useful for the purpose for which the valuation is performed. The purpose of the valuation affects the rules and assumptions used.

Cash flow analyses produce projections of receipts and disbursements. These analyses are conceptually the most fundamental of the forms of valuation. The other forms of valuation can be derived from cash flow analysis by suitable selection of rules and assumptions relative to the valuation variables.

Balance sheets and income statements are often produced internally by a risk bearer using rules and assumptions established by its management to assess financial strength and earning performance.

Appraisals are intended to help determine the value of all or a part of a risk bearer's assets, obligations and considerations related to property and casualty contingencies, taking into account not only financial statement items but also off-balance-sheet items such as investment in staff, leases and so on. Appraisals are usually made in connection with mergers and acquisitions and the sale of parts of a risk bearer's business.

GAAP accounting rules or assumptions are intended to produce financial statements that the financial community believes are useful for assessing a risk bearer's earning capacity.

Statutory accounting rules or assumptions are intended to produce financial statements that regulators believe are useful for assessing whether an insurer's financial condition warrants its being allowed to write insurance.

The value of any of the valuation variables with respect to a given set of items of cash flow may be determined on the basis of any set of rules and assumptions that is appropriate to the purpose of the valuation. Rules and assumptions relative to different classes of assets, obligations or considerations need not necessarily be consistent with each other as long as the differences are consistent with the purpose of the valuation, or the effect of the inconsistencies is not great enough to invalidate the valuation.

Assumptions are based on a reasonable review of whatever appropriate facts are available supplemented by the actuary's experience and judgement as necessary. Rules are helpful to the assurance of appropriately consistent treatment of facts and assumptions in valuation. Both rules and assumptions can be helpful to achieving a result with a degree of refinement consistent with the purpose of the valuation. Anticipated changes in operating and environmental conditions should be reflected in the rules and assumptions applied to a valuation.

Valuation Variables—The valuation variables of occurrence, amount, interval of time and rate of interest describe the quantitative characteristics of all cash flows for purposes of financial analysis. All of the valuation variables are conceptually involved in the determination of the values of all assets, obligations and considerations. The roles of the valuation variables in the determination of values may be limited by the selection of rules or assumptions.

The value of any item of cash flow changes with the passage of time. This implies that valuations of the same sets of items of cash flow performed at different valuation dates will in general produce different results. It further implies that a valuation of one set of items of cash flow performed as of a given valuation date will produce a result that is not directly comparable with that of a second valuation of the same or a different set of items of cash flow performed as of a different date.

Uncertainty—The result of a valuation involves uncertainty because of the uncertainty connected with the valuation variables themselves and because the result of combining valuation variables is affected by whatever relationships may exist among them.

Valuation Risks—The risks associated with valuation can be summarized into the following three broad classes:

1. **Asset Risk**—The risk that the occurrence, amount or timing of items of cash flow connected with assets will differ from that anticipated as of the valuation date for reasons other than a change in the interest environment.

There are several factors that affect asset risk:

- a. **Type**—This factor relates to whether the asset is, for example, a bond, a mortgage, a preferred or common stock, an agent's balance, a recoverable reinsurance item or interest accrued but not paid. It also relates to such things as whether a bond is callable and, if so, at what premiums; whether a bond has a sinking fund provision; or whether prepayments can be made on a mortgage and, if so, what penalty may apply.
- b. **Quality**—This factor relates to the financial strength of the entity from which the cash flow is to be received and the relative standing of the type of asset in the hierarchy of financial instruments.

- c. Deferred Acquisition Expenses, Goodwill and Similar Assets—This factor relates to the valuation question of whether any asset of these or similar types involves cash flows that are not explicitly or implicitly recognized elsewhere in the valuation.
 - d. Investment Strategy—This factor relates to plans for investment of receipts in various types of security, taking into account such things as the insurer’s needs for funds to meet obligations as they mature, market conditions at the time the investments are made, and the overall condition of the insurer’s investment portfolio at the time the investments are made.
 - e. Trends—This factor relates to changes over time in the valuation variables other than interest, insofar as they affect assets, and in the degree of uncertainty affecting them.
2. Obligation and Consideration Risk—The risk that the occurrence, amount or timing of items of cash flow connected with obligations and considerations will differ from that anticipated as of the valuation date for reasons other than a change in the interest environment.

There are several factors that affect obligation and consideration risk:

- a. Coverage—This factor relates to the riskiness of the coverage involved.
- b. Type—This factor relates to whether the obligation is, for example, a loss or loss adjustment reserve, an unearned premium reserve, a contingent commission reserve, a retrospective premium adjustment reserve, a policyholder or shareholder dividend reserve, a premium deficiency reserve, an income tax liability, an investment commitment or an account payable for something such as expenses, taxes, licenses, fees and assessments.
- c. Commitment Provisions—This factor relates to the extent to which the range of the valuation variables may be effectively limited by terms of the commitments out of which the obligations arise. Examples of such commitment provisions are basic limits, increased limits, aggregate limits, claims made, salvage and subrogation, coinsurance, deductibles, coordination of benefits and second injury fund recoveries.
- d. Reinsurance Programs—This factor relates to the extent to which the range of the valuation variables may be effectively limited by the terms of reinsurance programs applicable to the commitments out of which the obligations arise. Examples of such programs are those involving surplus, excess of loss and catastrophe reinsurance. Frequency and severity of losses, attachment points and upper limits of reinsurance are features of the programs relating to their limiting effect. On the other hand, reinsurance programs also involve uncertainty as to whether reinsurance will be collectible.
- e. Exposure—This factor relates to the uncertainty involved in measuring or projecting levels of exposure, and for periods beginning after the valuation date, the

considerations for those periods and the obligations to arise out of them. Obligations and considerations related to these periods of exposure may be offset against each other in recognition of the fact that the obligations would not arise if the considerations were not received. Determination of whether obligations and considerations relative to such periods should be recognized in a valuation depends upon the timing relative to the valuation date of the commitments to accept risks for those periods.

- f. Loss Development—This factor relates to the uncertainty arising out of changes over time in patterns of emergence, development, reopening, settlement and payment of claims.
 - g. Trends—This factor relates to changes over time in the valuation variables other than interest, insofar as they affect obligations and considerations, and in the degree of uncertainty affecting them.
 - h. Large Latent Losses—This factor relates to the treatment of identifiable classes of very serious potential losses for which probable frequency and severity can not be reasonably estimated for a considerable period of time.
 - i. Off-Balance-Sheet Items Such as Long-Term Leases and Commitments to Buy Securities—This factor relates to the valuation question of whether any obligation of these or similar types involve cash flows that are not explicitly or implicitly recognized elsewhere in the valuation.
3. Interest Risk—The risk that different amounts of change in the anticipated values, and the degree of uncertainty therein, of obligations and of the assets and considerations with which the obligations are being compared will occur:
- i. simply because of a change in the interest environment, or
 - ii. because a change in the interest environment brings about a change from expected experience as to the occurrence, amount or timing of items of cash flow connected with assets, obligations or considerations.

There are several factors that affect interest risk:

- a. Mismatch of Asset and Obligation Cash Flows—This factor relates to the development of an excess of a risk bearer’s receipts over its required disbursements or vice versa.

If an excess of receipts over required disbursements develops, the risk bearer may not be able to invest the excess cash at yields that will produce future cash flows large enough to meet its obligations as they mature. This is “reinvestment” risk.

If an excess of required disbursements over receipts develops, the risk bearer may have to borrow or liquidate assets with yields below then current market rates to make up the difference. Borrowing at a relatively high interest rate, or inability to invest the difference at then current market rates produces a reduction in the risk bearer's future profits. This is "market" risk.

- b. Changes in the Timing of Receipts and Disbursements—This factor relates to the preference of borrowers to prepay debt carrying high rates of interest when rates go down and to defer repayments of debt carrying low rates of interest when rates go up. For risk bearers of property and casualty contingencies, this risk affects mainly their assets.
- c. General Economy—This factor relates to the way in which things such as liquidity, inflation, demand for cash to fund expansion, government debt, trade imbalances and distortions in the yield curve affect the general level of interest rates.
- d. Trends—This factor relates to changes over time in the interest valuation variable and in the degree of uncertainty affecting it and how those changes affect the other asset and obligation valuation variables.

Interaction with Other Professionals—The uncertainties that affect other actuarial fields, such as ratemaking and reserving, also affect valuation. In addition, valuation is affected by uncertainties met in other fields, such as marketing, underwriting, finance, regulation, risk management and so on. This implies that professionals working in other fields can be helpful in gathering information and developing rules and assumptions to be used in valuation.

Actuarial Judgment—It is important to apply actuarial judgment based on education and experience in selecting and organizing data and making rules and assumptions to be used in the valuation process and in assessing the reasonableness of the results.



ACTUARIAL STANDARDS BOARD

**Actuarial Standard
of Practice
No. 12**

Risk Classification (for All Practice Areas)

Revised Edition

**Developed by the
Task Force to Revise ASOP No. 12 of the
General Committee of the
Actuarial Standards Board**

**Adopted by the
Actuarial Standards Board
December 2005**

Doc. No. 101

ASOP No. 12—December 2005

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December 2005

TO: Members of the American Academy of Actuaries and Other Persons Interested in Risk Classification (for All Practice Areas)

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 12

This booklet contains the final version of a revision of ASOP No. 12, now titled *Risk Classification (for All Practice Areas)*.

Background

In 1989, the Actuarial Standards Board adopted the original ASOP No. 12, then titled *Concerning Risk Classification*. The original ASOP No. 12 was developed as the need for more formal guidance on risk classification increased as the selection process became more complex and more subject to public scrutiny. In light of the evolution in practice since then, as well as the adoption of a new format for standards, the ASB believed it was appropriate to revise this standard in order to reflect current generally accepted actuarial practice.

Exposure Draft

The exposure draft of this ASOP was approved for exposure in September 2004 with a comment deadline of March 15, 2005. Twenty-two comment letters were received and considered in developing the final standard. A summary of the substantive issues contained in the exposure draft comment letters and the responses are provided in appendix 2.

The most significant changes from the exposure draft were as follows:

1. The task force clarified language relating to the interaction of applicable law and this standard.
2. The task force revised the definition of “adverse selection.”
3. The task force reworded the definition of “financial or personal security system” and included examples.
4. The words “equitable” and “fair” were added in section 3.2.1 but defined in a very limited context that is applicable only to rates.

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5. With respect to the operation of the standard, the task force added language that clarifies that this standard in all respects applies only to professional services with respect to designing, reviewing, or changing risk classification systems.
6. Sections 4.1 and 4.2 were combined into a new section 4.1, Communications and Disclosures, which was revised for clarity. The placement of communication requirements throughout the proposed standard was examined, and a sentence regarding disclosure was removed from section 3.3.3 and incorporated into section 4.1. A similar change was made by adding a new sentence in section 4.1 to correspond to the guidance in section 3.4.1.

In addition, the disclosure requirement in section 4 for the actuary to consider providing quantitative analyses was removed and replaced by a new section 3.4.4, which guides the actuary to consider performing such analyses, depending on the purpose, nature, and scope of the assignment.

The task force thanks everyone who took the time to contribute comments on the exposure draft.

The ASB voted in December 2005 to adopt this standard.

Task Force to Revise ASOP No. 12

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ACTUARIAL STANDARD OF PRACTICE NO. 12

RISK CLASSIFICATION (FOR ALL PRACTICE AREAS)

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 professional services with respect to designing, reviewing, or changing risk classification systems.
- 1.2 **Scope**—This standard applies to all actuaries when performing professional services with respect to designing, reviewing, or changing risk classification systems used in connection with financial or personal security systems, as defined in section 2.4, regarding the classification of individuals or entities into groups intended to reflect the relative likelihood of expected outcomes. Such professional services may include expert testimony, regulatory activities, legislative activities, or statements concerning public policy, to the extent these activities involve designing, reviewing, or changing a risk classification system used in connection with a specific financial or personal security system.

Throughout this standard, any reference to performing professional services with respect to designing, reviewing, or changing a risk classification system also includes giving advice with respect to that risk classification system.

Risk classification can affect and be affected by many actuarial activities, such as the setting of rates, contributions, reserves, benefits, dividends, or experience refunds; the analysis or projection of quantitative or qualitative experience or results; underwriting actions; and developing assumptions, for example, for pension valuations or optional forms of benefits. This standard applies to actuaries when performing such activities to the extent such activities directly or indirectly involve designing, reviewing, or changing a risk classification system. This standard also applies to actuaries when performing such activities to the extent that such activities directly or indirectly are likely to have a material effect, in the actuary's professional judgment, on the intended purpose or expected outcome of the risk classification system.

The actuary should satisfy the requirements of applicable law (statutes, regulations, case law, and other legally binding authority) and this standard. However, to the extent applicable law conflicts with this standard, compliance with such applicable law shall not be deemed a deviation from this standard, provided the actuary discloses that the actuarial assignment was performed in accordance with the requirements of such applicable law.

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- 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 professional service commenced on or after May 1, 2006.

Section 2. Definitions

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

- 2.1 Advice—An actuary’s communication or other work product in oral, written, or electronic form setting forth the actuary’s professional opinion or recommendations concerning work that falls within the scope of this standard.
- 2.2 Adverse Selection—Actions taken by one party using risk characteristics or other information known to or suspected by that party that cause a financial disadvantage to the financial or personal security system (*sometimes referred to as antiselection*).
- 2.3 Credibility—A measure of the predictive value in a given application that the actuary attaches to a particular body of data (predictive is used here in the statistical sense and not in the sense of predicting the future).
- 2.4 Financial or Personal Security System—A private or governmental entity or program that is intended to mitigate the impact of unfavorable outcomes of contingent events. Examples of financial or personal security systems include auto insurance, homeowners insurance, life insurance, and pension plans, where the mitigation primarily takes the form of financial payments; prepaid health plans and continuing care retirement communities, where the mitigation primarily takes the form of direct service to the individual; and other systems, where the mitigation may be a combination of financial payments and direct services.
- 2.5 Homogeneity—The degree to which the expected outcomes within a risk class have comparable value.
- 2.6 Practical—Realistic in approach, given the purpose, nature, and scope of the assignment and any constraints, including cost and time considerations.
- 2.7 Risk(s)—Individuals or entities covered by financial or personal security systems.
- 2.8 Risk Characteristics—Measurable or observable factors or characteristics that are used to assign each risk to one of the risk classes of a risk classification system.

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- 2.9 Risk Class—A set of risks grouped together under a risk classification system.
- 2.10 Risk Classification System—A system used to assign risks to groups based upon the expected cost or benefit of the coverage or services provided.

Section 3. Analysis of Issues and Recommended Practices

- 3.1 Introduction—This section provides guidance for actuaries when performing professional services with respect to designing, reviewing, or changing a risk classification system. Approaches to risk classification can vary significantly and it is appropriate for the actuary to exercise considerable professional judgment when providing such services, including making appropriate use of statistical tools. Sections 3 and 4 are intended to provide guidance to assist the actuary in exercising professional judgment when applying various acceptable approaches.
- 3.2 Considerations in the Selection of Risk Characteristics—Risk characteristics are important structural components of a risk classification system. When selecting which risk characteristics to use in a risk classification system, the actuary should consider the following:

- 3.2.1 Relationship of Risk Characteristics and Expected Outcomes—The actuary should select risk characteristics that are related to expected outcomes. A relationship between a risk characteristic and an expected outcome, such as cost, is demonstrated if it can be shown that the variation in actual or reasonably anticipated experience correlates to the risk characteristic. In demonstrating a relationship, the actuary may use relevant information from any reliable source, including statistical or other mathematical analysis of available data. The actuary may also use clinical experience and expert opinion.

Rates within a risk classification system would be considered equitable if differences in rates reflect material differences in expected cost for risk characteristics. In the context of rates, the word *fair* is often used in place of the word *equitable*.

The actuary should consider the interdependence of risk characteristics. To the extent the actuary expects the interdependence to have a material impact on the operation of the risk classification system, the actuary should make appropriate adjustments.

Sometimes it is appropriate for the actuary to make inferences without specific demonstration. For example, it might not be necessary to demonstrate that persons with seriously impaired, uncorrected vision would represent higher risks as operators of motor vehicles.

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- 3.2.2 Causality—While the actuary should select risk characteristics that are related to expected outcomes, it is not necessary for the actuary to establish a cause and effect relationship between the risk characteristic and expected outcome in order to use a specific risk characteristic.
 - 3.2.3 Objectivity—The actuary should select risk characteristics that are capable of being objectively determined. A risk characteristic is objectively determinable if it is based on readily verifiable observable facts that cannot be easily manipulated. For example, a risk classification of “blindness” is not objective, whereas a risk classification of “vision corrected to no better than 20/100” is objective.
 - 3.2.4 Practicality—The actuary’s selection of a risk characteristic should reflect the tradeoffs between practical and other relevant considerations. Practical considerations that may be relevant include, but are not limited to, the cost, time, and effort needed to evaluate the risk characteristic, the ongoing cost of administration, the acceptability of the usage of the characteristic, and the potential usage of different characteristics that would produce equivalent results.
 - 3.2.5 Applicable Law—The actuary should consider whether compliance with applicable law creates significant limitations on the choice of risk characteristics.
 - 3.2.6 Industry Practices—When selecting risk characteristics, the actuary should consider usual and customary risk classification practices for the type of financial or personal security system under consideration.
 - 3.2.7 Business Practices—When selecting risk characteristics, the actuary should consider limitations created by business practices related to the financial or personal security system as known to the actuary and consider whether such limitations are likely to have a significant impact on the risk classification system.
- 3.3 Considerations in Establishing Risk Classes—A risk classification system assigns each risk to a risk class based on the results of measuring or observing its risk characteristics. When establishing risk classes for a financial or personal security system, the actuary should consider and document any known significant choices or judgments made, whether by the actuary or by others, with respect to the following:
- 3.3.1 Intended Use—The actuary should select a risk classification system that is appropriate for the intended use. Different sets of risk classes may be appropriate for different purposes. For example, when setting reserves for an insurance coverage, the actuary may choose to subdivide or combine some of the risk classes used as a basis for rates.

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- 3.3.2 Actuarial Considerations—When establishing risk classes, the actuary should consider the following, which are often interrelated:
- a. Adverse Selection—If the variation in expected outcomes within a risk class is too great, adverse selection is likely to occur. To the extent practical, the actuary should establish risk classes such that each has sufficient homogeneity with respect to expected outcomes to satisfy the purpose for which the risk classification system is intended.
 - b. Credibility—It is desirable that risk classes in a risk classification system be large enough to allow credible statistical inferences regarding expected outcomes. When the available data are not sufficient for this purpose, the actuary should balance considerations of predictability with considerations of homogeneity. The actuary should use professional judgment in achieving this balance.
 - c. Practicality—The actuary should use professional judgment in balancing the potentially conflicting objectives of accuracy and efficiency, as well as in minimizing the potential effects of adverse selection. The cost, time, and effort needed to assign risks to appropriate risk classes will increase with the number of risk classes.
- 3.3.3 Other Considerations—When establishing risk classes, the actuary should (a) comply with applicable law; (b) consider industry practices for that type of financial or personal security system as known to the actuary; and (c) consider limitations created by business practices of the financial or personal security system as known to the actuary.
- 3.3.4 Reasonableness of Results—When establishing risk classes, the actuary should consider the reasonableness of the results that proceed from the intended use of the risk classes (for example, the consistency of the patterns of rates, values, or factors among risk classes).
- 3.4 Testing the Risk Classification System—Upon the establishment of the risk classification system and upon subsequent review, the actuary should, if appropriate, test the long-term viability of the financial or personal security system. When performing such tests subsequent to the establishment of the risk classification system, the actuary should evaluate emerging experience and determine whether there is any significant need for change.
- 3.4.1 Effect of Adverse Selection—Adverse selection can potentially threaten the long-term viability of a financial or personal security system. The actuary should assess the potential effects of adverse selection that may result or have resulted from the design or implementation of the risk classification system. Whenever the effects of adverse selection are expected to be material, the actuary should, when

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practical, estimate the potential impact and recommend appropriate measures to mitigate the impact.

- 3.4.2 Risk Classes Used for Testing—The actuary should consider using a different set of risk classes for testing long-term viability than was used as the basis for determining the assigned values if this is likely to improve the meaningfulness of the tests. For example, if a risk classification system is gender-neutral, the actuary might separate the classes based on gender when performing a test of long-term viability.
- 3.4.3 Effect of Changes—If the risk classification system has changed, or if business or industry practices have changed, the actuary should consider testing the effects of such changes in accordance with the guidance of this standard.
- 3.4.4 Quantitative Analyses—Depending on the purpose, nature, and scope of the assignment, the actuary should consider performing quantitative analyses of the impact of the following to the extent they are generally known and reasonably available to the actuary:
- a. significant limitations due to compliance with applicable law;
 - b. significant departures from industry practices;
 - c. significant limitations created by business practices of the financial or personal security system;
 - d. any changes in the risk classes or the assigned values based upon the actuary's determination that experience indicates a significant need for a change; and
 - e. any expected material effects of adverse selection.
- 3.5 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.
- 3.6 Documentation—The actuary should document the assumptions and methodologies used in designing, reviewing, or changing a risk classification system 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.

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Section 4. Communications and Disclosures

- 4.1 Communications and Disclosures—When issuing actuarial communications under this standard, the actuary should refer to ASOP Nos. 23 and 41. In addition, the actuarial communications should disclose any known significant impact resulting from the following to the extent they are generally known and reasonably available to the actuary:
- a. significant limitations due to compliance with applicable law;
 - b. significant departures from industry practices;
 - c. significant limitations created by business practices related to the financial or personal security system;
 - d. a determination by the actuary that experience indicates a significant need for change, such as changes in the risk classes or the assigned values; and
 - e. expected material effects of adverse selection.

The actuarial communications should also disclose any recommendations developed by the actuary to mitigate the potential impact of adverse selection.

- 4.2 Prescribed Statement of Actuarial Opinion—This ASOP does not require a prescribed statement of actuarial opinion (PSAO) as described in the *Qualification Standards for Prescribed Statements of Actuarial Opinion* promulgated by the American Academy of Actuaries. However, law, regulation, or accounting requirements may also apply to an actuarial communication prepared under this standard, and as a result, such actuarial communication may be a PSAO.
- 4.3 Deviation from Standard—The actuary must be prepared to justify to the actuarial profession's disciplinary bodies, or to explain to a principal, another actuary, or other intended users of the actuary's work, the use of any procedures that depart materially from those set forth in this standard. If a conflict exists between this standard and applicable law or regulation, compliance with applicable law or regulation is not considered to be a deviation from this standard.

Appendix 1

Background and Current Practices

Note: The following appendix is provided for informational purposes but is not part of the standard of practice.

Background

Risk classification has been a fundamental part of actuarial practice since the beginning of the profession. The financial distress and inequity that can result from ignoring the impact of differences in risk characteristics was dramatically illustrated by the failure of the nineteenth-century assessment societies, where life insurance was provided at rates that disregarded age. Failure to adhere to actuarial principles regarding risk classification for voluntary coverages can result in underutilization of the financial or personal security system by, and thus lack of coverage for, lower risk individuals, and can result in coverage at insufficient rates for higher risk individuals, which threatens the viability of the entire system.

Adverse selection may result from the design of the classification system, or may be the result of externally mandated constraints on risk classification. Classes that are overly broad may produce unexpected changes in the distribution of risk characteristics. For example, if an insurer chooses not to screen for a specific risk characteristic, or a jurisdiction precludes screening for that characteristic, this may result in individuals with the characteristic applying for coverage in greater numbers and/or amounts, leading to increased overall costs.

Risk classification is generally used to treat participants with similar risk characteristics in a consistent manner, to permit economic incentives to operate and thereby encourage widespread availability of coverage, and to protect the soundness of the system.

The following actuarial literature provides additional background and context with respect to risk classification:

1. In 1957, the Society of Actuaries published *Selection of Risks* by Pearce Shepherd and Andrew Webster, which educated several generations of actuaries and is still a useful reference.
2. In 1980, the American Academy of Actuaries published the *Risk Classification Statement of Principles*, which has enjoyed widespread acceptance in the actuarial profession. At the time of this revision of ASOP No. 12, the American Academy of Actuaries was developing a white paper regarding risk classification principles.
3. In 1992, the Committee on Actuarial Principles of the Society of Actuaries published “Principles of Actuarial Science,” which discusses risk classification in the context of the principles on which actuarial science is based.

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Current Practices

Over the years, a multitude of risk classification systems have been designed, put into use, and modified as a result of experience. Advances in medical science, economics, and other disciplines, as well as in actuarial science itself, are likely to result in continued evolution of these systems. While future developments cannot be foreseen with accuracy, practicing actuaries can take reasonable steps to keep abreast of emerging and current practices. These practices may vary significantly by area of practice. For example, the risk classes for voluntary life insurance may be subdivided to reflect the applicant's state of health, smoking habits, and occupation, while these factors are usually not considered in pension systems.

Innovations in risk classification systems may engender considerable controversy. The potential use of genetic tests to classify risks for life and health insurance is a current example. In some cases, such controversy results in legislation or regulation. The use of postal codes, for example, has been outlawed for some types of coverage. For the most part, however, the legal test for risk classification has remained unchanged for several decades; risk classification is allowed so long as it is "based on sound actuarial principles" and "related to actual or reasonably anticipated experience."

Risk classification issues in some instances may pose a dilemma for an actuary working in the public policy arena when political considerations support a system that contradicts to some degree practices called for in this ASOP. Also, when designing, reviewing, or changing a risk classification system, actuaries may perform professional services related to a designated set of specific assumptions that place certain restraints on the risk classification system.

In such situations, it is important for those requesting such professional services to have the benefit of professional actuarial advice.

This ASOP is not intended to prevent the actuary from performing professional services in the situations described above. In such situations, the communication and disclosure guidance in section 4.1 will be particularly pertinent, and current section 4.1(e), which requires disclosure of any known significant impact resulting from expected material effects of adverse deviation, may well apply. Section 4.1(a), which relates to applicable law, and section 4.1(b), which relates to industry practices, may also be pertinent.

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Appendix 2

Comments on the Exposure Draft and Responses

The exposure draft of this revision of ASOP No. 12, *Risk Classification for All Practice Areas*, was issued in September 2004 with a comment deadline of March 15, 2005. Twenty-two 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 carefully considered all comments received. Summarized below are the significant issues and questions contained in the comment letters and the responses, which may have resulted from ASB, General Committee, or task force discussion. Unless otherwise noted, the section numbers and titles used below refer to those in the exposure draft.

GENERAL COMMENTS	
Comment	Several commentators suggested various editorial changes in addition to those addressed specifically below.
Response	The task force implemented such suggestions if they enhanced clarity and did not alter the intent of the section.
Comment	One commentator noted that the ASOP should deal with the ability of an insured to misrepresent or manipulate its classification.
Response	The task force believed that the considerations raised by the commentator are adequately addressed by sections 3.2.3 and 3.2.4.
Comment	One commentator thought that a section on public and social policy considerations should be added to the standard.
Response	The task force believed that social and public policy considerations, while essential aspects of the way the public views the profession, did not belong in an ASOP dealing with the actuarial aspects of risk classification.
Comment	One commentator questioned whether the ASOP would apply to company selection criteria (tiering criteria) and schedule-rating criteria that may be part of a rating scheme.
Response	The task force believes that the ASOP applies to the extent the selection or schedule rating criteria, used by a company as part of the risk classification system, creates the potential for adverse selection.
Comment	One commentator believed that the ASOP could conflict with proposed state legislation to ban credit as a rating variable and suggested adding an additional consideration in section 3 that the actuary should select risk characteristics in order to avoid controversy or lawsuits.
Response	The task force believes it has addressed issues regarding applicable law, industry practices, business practices, and testing the risk classification system under various scenarios.
Comment	In the transmittal memorandum of the exposure draft, the task force asked whether the key changes from the previous standard were appropriate.
Response	Several commentators responded that the changes were appropriate and some suggested additional changes that are discussed in this appendix.

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Comment	One commentator expressed concern regarding the expansion of scope and the implications in actuarial work that would be otherwise unrelated to risk classification and the expansion of scope to the public policy arena in general.
Response	The task force has added modified wording in the standard to clarify that in all cases the standard applies only in respect to design, reviewing, or changing risk classification systems related to financial or personal security systems.
Comment	Two commentators believed that the revised standard should discuss the purposes of risk classification similar to the discussion in the previous standard. One commentator noted the discussion about encouraging “widespread availability of coverage” in particular.
Response	The task force retained a brief discussion of the purposes of risk classification in appendix 1 but did not believe it was appropriate for the ASOP to provide additional education about the purposes of risk classification. The task force noted that a white paper on risk classification that could contain such material is being developed.
Comment	Several commentators noted that the previous ASOP No. 12 had been very useful in court proceedings and recommended that the task force retain some of the wording in section 5 of the previous ASOP. One commentator suggested strengthening the revised standard so that actuarial testimony would be given greater weight by the courts in interpreting rate standards. Another commentator suggested strengthening the ASOP by adding an explicit statement that one objective during the development and use of risk classification systems is to minimize adverse selection.
Response	The task force reviewed the revised standard with these concerns in mind but concluded that the revised standard represents current generally accepted practice and provides an appropriate level of guidance. The task force considered the specific suggestions with respect to additional wording and incorporated some of the wording regarding adverse selection from the old section 5.5 into appendix 1.
Comment	In the transmittal memorandum of the exposure draft, the task force asked whether it was appropriate for the ASOP not to use the terms “equitable” and “fair.” Two commentators believed that the ASOP should use or define these concepts because they have been used in court proceedings, but the majority of commentators believed that it was appropriate not to define them and that the standard adequately addressed these concepts.
Response	The task force agreed that the ASOP should not define subjective qualities such as “equitable” and “fair.” As the result of ASB deliberation on this issue, language was added to section 3.2.1 to discuss what was meant by the terms “equitable” and “fair.” These terms are intended to apply to a risk classification system only to the extent the risk classification system applies to rates. As such, a formal definition was not added. Court decisions notwithstanding, there is no general agreement as to what characterizes “equitable” classification systems or “fair” discrimination. The task force also considered the possibility that further discussions about such issues might become part of the proposed white paper on risk classification that the American Academy of Actuaries is developing.
Comment	One commentator questioned why the standard offered separate guidance for “risk characteristics” (section 3.2) and “risk classes” (section 3.3). Another commentator believed there should be greater differentiation between the concepts of “risk characteristic” and “risk classification.”
Response	The task force believed that the ASOP uses these terms appropriately and made no change.
Comment	One commentator thought that section 3.3.2 should include guidance on appropriately matching the risk with the outcome when establishing a risk class.
Response	The task force believed that section 3.2.1 addressed this comment and noted that section 3.3.2(a) requires sufficient homogeneity with respect to outcomes.

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Section 1.2, Scope	
Comment	In the transmittal memorandum of the exposure draft, the task force asked whether it was appropriate to include the actuary’s advice within the scope of the standard. Several commentators agreed that including guidance on actuarial advice was appropriate. One commentator believed that the disclosure requirements in section 4 could be burdensome to an actuary who has provided brief oral advice.
Response	The task force kept actuarial advice within the scope of the standard and intended that the disclosure requirements in section 4 should apply to any actuarial advice that falls within the scope of the standard.
Comment	One commentator questioned what was meant by “legislative activities” as an example of a professional service.
Response	The task force intended that “legislative activities” could include drafting legislation, for example.
Comment	Several commentators questioned the meaning of “personal security system.” One commentator questioned whether the definition of “financial or personal security system” would exclude share-based payment systems from the scope of the standard. The commentator recommended that the standard be revised to include such systems.
Response	The task force intended that the ASOP should apply if share-based payment systems or stock options were part of a financial or personal security system, as defined in the section 2.5. If such plans were not part of a financial or personal security system, the ASOP would not apply. The task force chose not to expand the scope to include such plans in all situations but did clarify the definition of “financial or personal security system.”
SECTION 2. DEFINITIONS	
Comment	One commentator suggested that a definition of experience be included, citing the definition of “experience” in the previous ASOP (old section 2.5), which includes the wording, “Experience may include estimates where data are incomplete or insufficient.”
Response	The task force agreed that experience may include estimates where data are incomplete or insufficient but did not believe that the old definition was necessary in the revised ASOP.
Comment	One commentator suggested that a definition of “reasonable” be included.
Response	The task force disagreed and did not add a definition of “reasonable.”
Section 2.1, Advice	
Comment	One commentator suggested that “other work product” was not needed, since the standard already listed “an actuary’s oral, written, or electronic communication.”
Response	The task force revised the language to clarify that “communication or other work product” was intended.
Comment	One commentator believed that a definition for “advice” is not needed.
Response	The task force disagreed and retained the definition of advice.
Section 2.2, Adverse Selection	
Comment	In the transmittal memorandum of the exposure draft, the task force asked if the definition of “adverse selection” was appropriate or whether an alternative definition (included in the transmittal letter) would be preferable. Many commentators responded, some agreeing with the original, some with the alternative, and some suggested other wording. The other wording was most often to change the phrase, “take financial advantage of.”
Response	The task force believed that some of the reasoning on the part of the commentators who preferred the current version did not accurately describe adverse selection. The task force ultimately decided to use the alternative definition in the standard and believed that it better addressed some commentators’ concerns that the other definition could have a negative connotation with respect to motivation.

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Comment	One commentator suggested that “antiselection” is synonymous with adverse selection and that should be made clear in the definition.
Response	The task force agreed and added that reference.
Section 2.4, Credibility (now 2.3)	
Comment	Two commentators believed that within the definition of “credibility” the language concerning “predictive” was confusing.
Response	The task force retained the definition as it is used in several other ASOPs.
Section 2.5, Financial or Personal Security System (now 2.4)	
Comment	Several commentators questioned the meaning of “personal security system.”
Response	The task force clarified the definition.
Comment	One commentator suggested that “impact” be modified to read “financial impact.”
Response	The task force disagreed and revised the definition of “financial and security systems” to delineate the impacts.
Section 2.6, Homogeneity (now 2.5)	
Comment	One commentator believed the definition of “homogeneity” needed revisions to include the concept of grouping similar risks. Another commentator found the definition unclear.
Response	The task force believes that the current definition is appropriate for this ASOP.
Section 2.7, Practical (now 2.6)	
Comment	One commentator believed the definition of “practical” was much too broad and needed to be more actuarial in nature. Alternatively, the commentator suggested dropping it and relying on section 3.2.4.
Response	The task force believed the definition was appropriate and made no change. Section 3.2.4 addresses actuarial practice with respect to practicality. While “practical” is used there and in other places, it is always modified by its context.
Section 2.8, Risk(s) (now 2.7)	
Comment	One commentator suggested that the definition of risks as individuals or entities seemed too limiting and noted that covered risks can also include pieces of property or events.
Response	The task force disagreed, believing that “entity” could encompass property and events.
Comment	One commentator suggested that a unit of risk be defined at the basic unit of risk.
Response	The task force disagreed and made no change.
Section 2.9, Risk Characteristics (now 2.8)	
Comment	One commentator suggested defining risk characteristics as “measurable or observable factors or characteristics, each of which is measured by grouping similar risks into risk classes.”
Response	The task force disagreed and made no change.
Section 2.11, Risk Classification System (now 2.10)	
Comment	One commentator believes the definition of “risk classification system” is circular since “classify” is used in the definition.
Response	The task force agreed and revised the wording.
Comment	One commentator recommended that the term “risks” be changed to “similar risks” in this definition just as in the old definition of risk classification that used the phrase “grouping risks with similar risk characteristics.”
Response	The task force disagreed and made no change.
Comment	One commentator suggested replacing “groups” with “classes.”
Response	The task force disagreed and made no change.

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SECTION 3. ANALYSIS OF ISSUES AND RECOMMENDED PRACTICES	
Section 3.2.1, Relationship of Risk Characteristics and Expected Outcomes	
Comment	One commentator expressed concern with the standard’s differentiation between the section’s quantitative and subjective factors.
Response	The task force did not intend to be prescriptive as to how to quantify the ratings scheme and believed that the ASOP was sufficiently specific. The ASOP does not address rate adequacy. Selection is the focus, not quantification.
Comment	One commentator believed that “clinical” was not an appropriate adjective to describe the experience an actuary is allowed to use.
Response	The task force intentionally used the term “clinical.”
Comment	One commentator believed that if the classification cannot be measured by actual insurance data, then it is not really a risk classification system.
Response	The task force disagreed and made no change.
Comment	One commentator suggested that the three points addressing why risk classification is generally used be moved to background information.
Response	The task force agreed that such educational language was more appropriate in an appendix than in the body of the ASOP and has moved it.
Comment	One commentator believed that it may be difficult to deal with the process and procedures involved with considering the interdependence of risk characteristics and their potential impact on the operation of the risk classification system.
Response	The task force did not change the language to address this comment but notes that section 3.2.4 addresses considerations regarding practicality.
Section 3.2.2, Causality	
Comment	A number of commentators expressed concern with establishing a cause-and-effect relationship while others thought the standard did not go far enough in this regard.
Response	The task force agreed that, where there is a demonstrable cause-and-effect relationship between a risk characteristic and the expected outcome, it is appropriate for the actuary to include such a demonstration. However, the task force recognized that there can be significant relationships between risk characteristics and expected outcomes where a cause-and-effect relationship cannot be demonstrated.
Section 3.2.4, Practicality	
Comment	Two commentators suggested the use of examples of practical considerations.
Response	The task force revised the section to indicate that the language shows examples of practical considerations.
Comment	One commentator suggested that “theoretical,” as used in section 3.2.4, be defined.
Response	The task force replaced “theoretical” with “other relevant.”
Section 3.2.5, Applicable Law	
Comment	One commentator thought that the proposed language in this section was much too broad.
Response	The task force disagreed with the comment and made no change.

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Section 3.3, Considerations in Establishing Risk Classes	
Comment	One commentator expressed concern that the documentation requirements for these considerations represented an increase from the previous version.
Response	The task force thought the documentation requirements were appropriate and necessary and made no change.
Section 3.3.1, Intended Use	
Comment	One commentator noted that stratifying data sets in loss reserving is different from risk classification, which is done to price risks, and believed that loss reserving permits more flexibility. The commentator stated that the definition of a risk classification system does not apply to loss reserving.
Response	The task force agreed with the first concepts but disagreed with the final sentence and therefore made no change.
Section 3.3.2, Actuarial Considerations	
Comment	With respect to section 3.3.2(a), one commentator suggested replacing the word “for” in the first line with “within” for clarification.
Response	The task force agreed and made the suggested change.
Comment	With respect to section 3.3.2(b), two commentators questioned what was intended by the use of the term “large enough.”
Response	The task force believed the language was sufficiently clear and made no change.
Comment	One commentator pointed out that there are often classes that, individually, have associated experience with low statistical credibility and believed that alternatives to credibility should be included in section 3.3.2(b).
Response	While the task force agreed that there are situations in which actuarially sound classification plans will have individual classes where the experience has low statistical credibility, the task force believed that credibility is a desirable characteristic of risk classes within a risk classification system and that no expansion to include alternatives was necessary.
Comment	One commentator suggested replacing “statistical predictions” with “predictions” in section 3.3.2(b) to avoid the implication that underlying statistics were required. Another commentator suggested that the term “predictions” needed explanation.
Response	The task force agreed with these comments and replaced “predictions” with “inferences” and edited the language to improve its clarity.
Comment	One commentator suggested that the last sentence of section 3.3.2(b), while accurate, was irrelevant.
Response	The task force agreed and eliminated the sentence.
Comment	With respect to section 3.3.2(c), one commentator suggested the need for definitions of “accuracy” and “efficiency.”
Response	The task force believed that the existing language regarding the actuary’s professional judgment was sufficient in determining the meaning of “accuracy” and “efficiency” and did not add a definition of either word.

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Comment	Several commentators suggested that section 3.3.2(d) be eliminated. A number of those commentators also pointed out that the language was both inconsistent with current actuarial practice and inappropriate as an implied requirement.
Response	The task force agreed and deleted the section.
Section 3.3.3, Other Considerations	
Comment	Several commentators pointed out that the last sentence of the section was unclear and might inadvertently require a degree of testing and determination that was not intended.
Response	The task force deleted the last sentence of the section. In addition, section 4.1, Communications and Disclosures, was clarified as to what disclosures are appropriate.
Section 3.3.4, Reasonableness of Results	
Comment	One commentator found the parenthetical wording confusing.
Response	The task force believed the examples were appropriate and made no change.
Comment	One commentator found this section ambiguous in the context of establishing risk classes. Another commentator suggested that a cost-based definition of reasonable be added or that the section be deleted entirely.
Response	The task force retained the section but clarified the wording by mentioning the intended use of the risk classes. The task force did not believe additional clarification of “reasonableness” was necessary because reasonableness is a subjective concept that may depend on the actuary’s professional judgment. The task force also notes that the <i>Introduction to the Actuarial Standards of Practice</i> discusses this concept in further detail.
Section 3.4, Testing the Risk Classification System	
Comment	One commentator indicated that it may be preferable to substitute the word “or” for “and” on the second line so that the sentence reads, “Upon establishment of the risk classification system or upon subsequent review. . . .”
Response	The task force did not agree and believed the word “and” was appropriate because testing should be carried out both upon establishment and upon subsequent review.
Comment	One commentator wanted to substitute “continuing” for “long-term” viability in the second line. The commentator believed that the usual issue is the current and near-future viability of a system, not its long-term prognosis. Also, another commentator said that the requirement to “test long-term viability” is new and questioned its meaning.
Response	The task force considered alternative wording but ultimately decided that the existing wording best reflected that the actuary should check the risk classification system for viability both in the short-term and in the long-term.

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Comment	One commentator believed that testing the system is set out as something the actuary should do, if appropriate, rather than as something the actuary should consider. The commentator believed that the paragraph implied a duty to test in some situations, without describing explicitly what those situations would be (i.e., when testing would be “appropriate”). The commentator suspected that the situations described in sections 3.4.1–3.4.3 were the kind of situations that the task force had in mind as situations where long-term testing would be “appropriate.” However, as currently written, the commentator thought that a stronger duty could be implied. The commentator suggested that section 3.4 itself should read, “...the actuary should consider testing the long-term viability of the risk classification system. ...”
Response	The task force believed that the existing wording conveyed the concept that the actuary considers whether testing is appropriate and made no change.
Section 3.5, Reliance on Data Supplied by Others (now Reliance on Data or Other Information Supplied by Others)	
Comment	One commentator believed that the provision for reliance on data supplied by others was not needed in this ASOP because ASOP No. 23, <i>Data Quality</i> , addresses this.
Response	This task force agreed and revised the section to refer to ASOP No. 23, using wording consistent with other recently adopted ASOPs and exposure drafts.
SECTION 4. COMMUNICATIONS AND DISCLOSURES	
Section 4.1, Communications (now Communications and Disclosures)	
Comment	One commentator suggested changing the phrase “when issuing actuarial communications under this standard” to “when issuing actuarial communications that include elements of actuarial work within the scope of this standard.”
Response	The task force retained the original language to be consistent with other ASOPs.
Section 4.2, Disclosures (now 4.1, Communications and Disclosures)	
Comment	One commentator stated that some of the disclosures, notably section 4.2(a) and 4.2(c) (now 4.1(a) and 4.1(c)), are impractical, since they might require the actuary to begin with the universe and then disclose everything that is not utilized. The commentator suggested replacing these disclosure requirements with a communication that defends the choice of risk classification system and notes in that defense how compliance with applicable law and business practices affected the selection, rather than describing all the alternatives that would have been available in the absence of such constraints.
Response	The task force did not agree that the requirement to disclose significant limitations required a discussion of all alternatives that would have been available in the absence of legal or business constraints. The task force noted that the listed disclosures proceed from considerations required in section 3 and modified the wording of the disclosure requirements to be more consistent with that section, including revising the lead-in sentence to require disclosure of the significant impact of such considerations.
Comment	One commentator stated that the disclosure issue is heightened by the expansion of scope into the public policy arena and stated that excessive disclosure requirements may weaken the actuary’s ability to influence the discussion of public policy.
Response	The task force disagreed with the comment and noted that, while the scope of the standard now includes regulatory activities, legislative activities, and statements regarding public policy, the scope does so only in the context of the performance of professional services.

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Comment	One commentator suggested deleting section 4.2(a) (now 4.1(a)), which requires disclosure of significant limitations due to compliance with applicable law, noting that other ASOPs have tended not to include this requirement except where the limitations seriously distort the work product.
Response	The task force disagreed with this comment, noting that significant limitations on the choice of risk characteristics are likely to distort the risk classification system and therefore should be disclosed.
Comment	Several commentators expressed opinions regarding the requirement that the actuary should disclose whether quantitative analyses were performed relative to items being disclosed. One commentator expressed strong objection to this requirement, asserting that the requirement would be counter-productive and would reduce the number of quantitative analyses being done. Another commentator agreed and noted that the disclosure issue was heightened by the expansion of scope to the public policy arena, where an advocacy position may be taken. A third commentator objected to the requirement to disclose that quantitative analyses were <i>not</i> done but suggested requiring that any analyses that were done be summarized. A fourth commentator suggested exempting certain of the required disclosures from the requirement to consider quantification. A fifth commentator pointed out that, while the actuary was required to disclose whether quantitative analyses were performed, the actuary was only required to consider providing the results of those analyses in the disclosure.
Response	The disclosure requirement for the actuary to consider providing quantitative analyses of the impact of the items being disclosed was removed, and instead similar wording was added as a new section 3.4.4, Quantitative Analyses, which guides the actuary to consider performing such analyses, depending on the purpose, nature, and scope of the assignment.
Comment	In the transmittal letter for the exposure draft in request for comment #6, the task force asked whether there were any situations in which the requirement in section 4.2(c) (now 4.1(c)) to disclose any significant limitations created by business practices of the financial or personal security system would not be appropriate. Two comments were received, both agreeing with the appropriateness of the requirement.
Response	The task force retained the requirement.
Comment	Two commentators suggested substituting “indicates” for “creates” in section 4.2(d) (now 4.1(d)).
Response	The task force agreed, changed the wording as suggested, and made other revisions for clarity.
Comment	In the transmittal letter for the exposure draft in request for comment #7, the task force asked whether the requirement in 4.2(e) (now 4.1(e)) to disclose the effects of adverse selection was appropriate. Three commentators addressed this request for comment, and all agreed the requirement was appropriate. However, one commentator suggested that there be no requirement to quantify the impact.
Response	The task force retained the requirement in what is now 4.1(e) and also removed the requirement to consider providing quantitative analyses. Additionally, the task force deleted section 4.2(f) after determining that it was already covered by ASOP No. 41, Actuarial Communications, to which section 4.1 refers.
APPENDIX (now Appendix 1)	
Comment	One commentator expressed concern with the citing of the textbook <i>Selection of Risks</i> by Shepherd and Webster.
Response	The task force believed that citing the Shepherd and Webster book was appropriate but added a new lead-in sentence to the citation to indicate that the references cited provide additional background and context with respect to risk classification.



ACTUARIAL STANDARDS BOARD

**ACTUARIAL STANDARD
OF PRACTICE
NO. 13**

**TRENDING PROCEDURES IN
PROPERTY/CASUALTY
INSURANCE RATEMAKING**

**Developed by the
Subcommittee on Ratemaking of the
Casualty Committee of the
Actuarial Standards Board**

**Adopted by the
Actuarial Standards Board
July 1990**

(Doc. No. 021)

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July 1990

TO: Members of the American Academy of Actuaries and Other Persons Interested in Property/Casualty Insurance Ratemaking Trending Procedures

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice No. 13

Enclosed is the final version of Actuarial Standard of Practice (ASOP) No. 13, *Trending Procedures in Property/Casualty Insurance Ratemaking*. The purpose of the standard is to set forth generally accepted actuarial practices for estimating future expected values in ratemaking, based on analysis of historical data and other relevant information.

The standard was developed by the Subcommittee on Ratemaking of the Casualty Committee of the ASB. It was exposed for comment in July 1989. Twenty-two written responses to the exposure draft were received.

The Subcommittee on Ratemaking reviewed all the suggestions and concerns expressed by both members and nonmembers of the American Academy of Actuaries regarding the draft. As a result, several changes were made to the draft by the subcommittee. Specifically, some significant modifications were as follows:

1. The purpose of trending procedures was redefined in section 1.1 to emphasize the need to estimate future expected values by analyzing historical data and other relevant information. Also, the phrase *future cost levels*, which had caused some concern, was deleted.
2. The scope of the standard was broadened by eliminating the reference to *cost elements*. In addition, the scope was rewritten to make the standard explicitly applicable to all property and casualty lines of insurance.
3. Several concerns were expressed about the context in which the terms *internal data* and *external data* were being used. There appeared to be a potential for confusion, for example, as to whether *external data* encompassed data external to an insurance company or to the entire insurance industry. In the final version, the terms *internal* and *external* data have been replaced by the terms *insurance* and *non-insurance* data, respectively.
4. Various respondents felt that the draft's reference to regression and econometric analysis unduly restricted the actuary's use of modeling in trending procedures. Accordingly, specific references to regression and econometric analysis were omitted and a more general discussion of the selection of models was substituted.
5. It was suggested that the standard be more specific with regard to the manner in which the actuary should evaluate potential selected models, retrospectively and prospectively.

Section 5.2 was strengthened to require the actuary to be familiar with *and consider* various methods for measuring trends, including steps for evaluating the tentatively selected model and possibly revising the model.

6. One respondent suggested that an additional element in the criteria for determining the trending period is the length of the experience period. The final version includes this consideration, in section 5.7(a).
7. Several respondents expressed concern over the frequent use of the term *trend* in the exposure draft. They evidently felt that it was being used as shorthand for the entire trending process, or was inappropriate in some contexts. As a result, the term *trending procedure* replaced *trend* in many places in the standard, thereby also expanding the scope.
8. A wide range of concerns was expressed about the draft's communication and disclosure requirements in section 6. In the final version, the reference explicitly requiring disclosure of material changes was deleted, and so was the example of what would generally be considered a material change. However, the revised section 6.1 specifically notes that the provisions of Actuarial Standard of Practice No. 9, *Documentation and Disclosure in Property and Casualty Insurance Ratemaking and Loss Reserving*, apply to all aspects of ratemaking. Also, sections 6.2 and 6.3 were retained; these set forth communication requirements regarding trend selections and deviations from this standard.

Some respondents felt that definitions of *monetary* or *economic inflation*, as well as *social inflation*, were necessary. However, the subcommittee believed that monetary and economic inflation were terms that are commonly used and understood, whereas the impact of social inflation is not nearly as well known.

Finally, several respondents suggested that specific references be included in the standard relating to other important actuarial procedures such as the selection of a database, assignment of the complement of credibility, etc. These nuances are expected to be addressed by standards of practice relating to these other ratemaking procedures. Therefore, reference in this trending standard to such items has been limited.

Other changes of a grammatical or editorial nature have been made, many in response to comments received. The Casualty Committee approved the revised standard for submission to the ASB for adoption.

The standard was adopted by the ASB on July 13, 1990.

Subcommittee on Ratemaking

LeRoy A. Boison Jr., Chairperson

Richard S. Biondi	Eldon J. Klaassen
Daniel J. Flaherty	R. Michael Lamb
Robert W. Gossrow	Robert J. Lindquist
Gary Grant	Paul E. Wulterkens
Steven L. Groot	

Casualty Committee

Michael J. Miller, Chairperson

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ACTUARIAL STANDARD OF PRACTICE NO. 13

TRENDING PROCEDURES IN PROPERTY/CASUALTY INSURANCE RATEMAKING

PREAMBLE

Section 1. Purpose, Scope, and Effective Date

- 1.1 Purpose—This standard of practice provides a basis for assessing procedures appropriate for estimating future expected values by analyzing historical data and other relevant information. The historical data to be considered for analysis are those referred to in the *Statement of Principles Regarding Property and Casualty Insurance Ratemaking* of the Casualty Actuarial Society (CAS).
- 1.2 Scope—This standard of practice is applicable to all property and casualty lines of insurance.
- 1.3 Effective Date—This standard will be effective three months after its adoption by the Actuarial Standards Board.

Section 2. Definitions

- 2.1 Experience Period—The period of time to which historical data used for actuarial analysis pertain.
- 2.2 Forecast Period—The future time period to which the historical data are projected.
- 2.3 Social Inflation—The impact on insurance costs of societal changes such as changes in claim consciousness, court practices, and judicial attitudes, as well as in other noneconomic factors.
- 2.4 Trending Period—The time between the average date of writing, earning, or costs of the experience period and the corresponding projected date in the forecast period.
- 2.5 Trending Procedure—A process by which the actuary evaluates how changes over time affect such items as claim costs, claim frequencies, expenses, exposures, and premiums.

Section 3. Background and Historical Issues

- 3.1 Inflation—Economic and social inflation have led to a need for increasingly sophisticated trending procedures.
- 3.2 Alternative Procedures—The *Proceedings* and the *Syllabus of Examinations* of the CAS, and many other publications such as statistics and economics textbooks, provide extensive information on alternative procedures. The actuary may refer to these or develop other procedures, as appropriate for each situation.

Section 4. Current Practices and Alternatives

- 4.1 Historical Insurance Data—Trending procedures are used in ratemaking for most property/casualty insurance plans or policies. In such procedures, actuaries generally place reliance on (1) data generated by the book of business being priced, (2) other insurance data, and (3) non-insurance data, in that order of preference.
- 4.2 Models—Mathematical models are often used to smooth and extrapolate from historical data. In the absence of strong contrary indications, there is a reliance on extrapolations of historical insurance data from the mathematical models. Models based on non-insurance data are also used as trending procedures.
- 4.3 Actuarial Judgment—In trending procedures, judgmental considerations generally include, but are not limited to, the historical data used, the success of the model in making prior projections, the statistical goodness of fit of the model to the historical data, and the impact of any sudden, nonrecurring changes (e.g., tort reform) which had not yet been incorporated in the historical data.

STANDARD OF PRACTICE

Section 5. Analysis of Issues and Recommended Practices

- 5.1 Estimating Future Costs—Principle 1 of the CAS *Statement of Principles Regarding Property and Casualty Insurance Ratemaking* states that “a rate is an estimate of the expected value of future costs.” Accordingly, the application of appropriate trending procedures in the ratemaking process is essential to estimate those future costs.
- 5.2 Selection of Models—The actuary should be familiar with and consider various methods in statistics and numerical analysis for measuring trends. This process also involves steps for evaluating the tentatively selected model and possibly revising the model.
- 5.3 Purpose of Trending Procedures—The purpose of trending procedures is to estimate future expected values by analyzing historical data and other relevant information. Therefore, the actuary should apply trending procedures which appropriately reflect projected changes in such components as claim costs, claim frequencies, expenses, exposures, and premiums over the trending period.
- 5.4 Analysis of Historical Insurance Data—The actuary should select trending procedures with appropriate consideration given to the analysis of historical insurance data. This includes, but is not limited to, evaluation of:
- a. trending procedures established by precedent or common usage in the actuarial profession;
 - b. trending procedures used in previous analyses;
 - c. the choice of an appropriate data base and methodology, with particular emphasis given to the credibility of the data relied upon; and
 - d. the effect of known biases or distortions on the experience relied upon (e.g., impact of catastrophic influences, seasonality, coverage changes, nonrecurring events, and distributional changes in deductibles, types of risks, and policy limits).
- 5.5 Analysis of Non-Insurance Data—Relevant non-insurance data may supplement insurance data. These non-insurance data may indicate general trends in such components as claim costs, claim frequencies, expenses, exposures, and premiums.
- 5.6 Economic and Social Influences—Many economic and social influences can have an impact on trends. In selecting the appropriate trending procedure, the actuary

should consider those economic and social influences that may have an impact on trends. It is inappropriate to analyze only those factors that have an impact on trend in only one direction.

- 5.7 Criteria for Determining Trending Period—In determining the parameters (e.g., average dates of writing, earning, or costs) associated with the experience and forecast periods, criteria such as the following should be considered:
- a. the length of the experience period;
 - b. the expected length of the forecast period (e.g., 2 years);
 - c. the term of the policies (e.g., 1 year, 3 years) contributing to the experience and forecast periods; and
 - d. the distribution of policies written or costs incurred throughout the experience and forecast periods (e.g., uniform distribution).
- 5.8 Informed Actuarial Judgment—Any trending procedure requires the actuary to exercise informed judgment, using information on historical insurance data and the impact of relevant economic and social factors, as well as statistical validation and testing procedures.

Section 6. Communications and Disclosures

- 6.1 Documentation and Disclosure Standard—The actuary should be mindful that the provisions of ASOP No. 9, *Documentation and Disclosure in Property and Casualty Insurance Ratemaking and Loss Reserving*, adopted by the ASB in April 1989, apply to all aspects of ratemaking.
- 6.2 Trend Selection—If a trend is selected that is substantially different from one that is suggested by the range of available relevant information, the reasons for such a selection should be documented and disclosed.
- 6.3 Deviation from Standard—An actuary who uses a procedure which differs from this standard should include, in the actuarial communication disclosing the result of the procedure, an appropriate and explicit statement with respect to the nature, rationale, and effect of such use.



ACTUARIAL STANDARDS BOARD

**Actuarial Standard
of Practice
No. 23**

Data Quality

Revised Edition

**Developed by the
General Committee of the
Actuarial Standards Board and
Applies to All Practice Areas**

**Adopted by the
Actuarial Standards Board
December 2004**

(Doc. No. 097)

ASOP No. 23—December 2004

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December 2004

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Data Quality

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 23

This booklet contains the final version of a revision of ASOP No. 23, *Data Quality*.

Background

The ASB originally adopted ASOP No. 23, *Data Quality* (Doc. No. 044), in 1993. The previous ASOP was prepared by the Data Quality Task Force of the Specialty Committee of the ASB. The General Committee has prepared this revision of ASOP No. 23 to be consistent with the current ASOP format, to reflect current, generally accepted practice with respect to data quality, and to provide guidance concerning other information relevant to the use of data.

Exposure Draft

The exposure draft of this ASOP was approved for exposure in October 2003 with a comment deadline of March 31, 2004. Twenty-eight comment letters were received and considered in developing the final standard. A summary of the substantive issues contained in the exposure draft comment letters and the General Committee's responses are provided in appendix 2.

The most significant changes from the exposure draft were as follows:

1. Section 1.2, Scope, has been clarified to indicate that if this standard establishes requirements in addition to those imposed by law, the actuary should satisfy the requirements of both the standard and the law.
2. When data are supplied by others, section 3.3 clarifies that the actuary should follow the guidance of section 3.5, Review of Data, before relying on such data. This means that the actuary should review the data for reasonableness and consistency unless, in the actuary's professional judgment, such a review is not necessary or not practical.

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3. Similarly, section 3.4, Reliance on Other Information Relevant to the Use of Data, allows reliance on such information, but now does so “unless it is or becomes apparent to the actuary during the time of the assignment that the information contains material errors or is otherwise unreliable.”
4. The standard clarifies that section 3.5, Review of Data, applies whether the actuary prepared the data or received the data from a third party. The section also suggests that, in doing the review of the data, the actuary attempt to determine the definition of each data element used in the analysis. A definition of “review” has been added to section 2, pointing out that this is an informal examination of the obvious characteristics of the data.
5. The sentence that appeared in the previous ASOP No. 23 but was removed from the exposure draft of this revision, which stated that the actuary is not expected to “develop additional data compilations solely for the purpose of searching for questionable or inconsistent data,” was reinserted in section 3.6, Limitation of the Actuary’s Responsibility.
6. Section (c) of 3.7, Use of Data, was expanded to apply to results that are highly uncertain, in addition to those that have a material bias. Appropriate disclosure is required in section 4.1 if the actuary decides to complete the assignment in such circumstances.
7. The committee clarified section 3.8 by explicitly requiring the actuary to document any material defects in the data, in keeping with the requirements of ASOP No. 41, *Actuarial Communications*.

The General Committee thanks everyone who took the time to contribute comments on the exposure draft.

The ASB voted in December 2004 to adopt this standard.

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General Committee of the ASB

W.H. Odell, Chairperson

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Thomas K. Custis	Mark E. Litow
Larry M. Gorski	Donna C. Novak
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Actuarial Standards Board

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ACTUARIAL STANDARD OF PRACTICE NO. 23

DATA QUALITY

STANDARD OF PRACTICE

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

- 1.1 **Purpose**—The purpose of this actuarial standard of practice (ASOP) is to give guidance to the actuary in the following:
- a. selecting the data that underlie the actuarial work product;
 - b. relying on data supplied by others;
 - c. reviewing data;
 - d. using data; and
 - e. making appropriate disclosures with regard to data quality.
- 1.2 **Scope**—This standard applies to actuaries when providing professional actuarial services in all practice areas. Other actuarial standards of practice may contain additional considerations related to data quality that are applicable to particular areas of practice or types of actuarial assignment.

This standard does not require the actuary to audit data.

If this standard establishes requirements in addition to those imposed by applicable law, regulation, or other binding authority, the actuary should satisfy the requirements of both the applicable law and the standard. To the extent applicable law conflicts with this standard, compliance with such applicable law shall not be deemed a deviation from this standard, provided the actuary discloses that the actuarial assignment was performed in accordance with the requirements of such 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.

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- 1.4 Effective Date—This standard will be effective for any actuarial work product for which data were provided to or developed by the actuary on or after May 1, 2005. In all cases, this standard will be effective for any actuarial work product commenced on or after July 1, 2006.

Section 2. Definitions

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

- 2.1 Appropriate Data—For purposes of data quality, data are appropriate if they are suitable for the intended purpose of an analysis and relevant to the system or process being analyzed.
- 2.2 Audit—To conduct a formal and systematic examination of a set of data for the purpose of testing its accuracy, using techniques commonly employed by audit professionals.
- 2.3 Comprehensive Data—For purposes of data quality, data obtained from inventory or sampling methods are comprehensive if they contain sufficient data elements or records needed for the analysis.
- 2.4 Data—For purposes of this standard, the term refers to numerical, census, or classification information and not to general or qualitative information. Assumptions are not data, but data are commonly used in the development of actuarial assumptions.
- 2.5 Data Element—An item of information, such as date of birth or risk classification.
- 2.6 Practical—Realistic in approach during the time of the assignment, given the purpose and nature of the assignment and any constraints, including cost and time considerations.
- 2.7 Review—An informal examination of the obvious characteristics of the selected data to determine if such data appear reasonable and consistent for purposes of the assignment. A review is not an audit of data.

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Section 3. Analysis of Issues and Recommended Practices

- 3.1 Overview—Data that are completely accurate, appropriate, and comprehensive are frequently not available. The actuary should use available data that, in the actuary’s professional judgment, allow the actuary to perform the desired analysis. However, if material data limitations are known to the actuary, the actuary should disclose those limitations and their implications. The following sections discuss such considerations in more detail.
- 3.2 Selection of Data—In undertaking an analysis, the actuary should consider what data to use. The actuary should consider the scope of the assignment and the intended use of the analysis being performed in order to determine the nature of the data needed and the number of alternative data sets or data sources, if any, to be considered. The actuary should do the following:
- a. consider the data elements that are desired and possible alternative data elements; and
 - b. select the data with due consideration of the following:
 1. appropriateness for the intended purpose of the analysis, including whether the data are sufficiently current;
 2. reasonableness and comprehensiveness of the necessary data elements, with particular attention to internal and external consistency;
 3. any known, material limitations of the data;
 4. the cost and feasibility of obtaining alternative data, including the ability to obtain the information in a reasonable time frame;
 5. the benefit to be gained from an alternative data set or data source as balanced against its availability and the time and cost to collect and compile it; and
 6. sampling methods, if used to collect the data.
- 3.3 Reliance on Data Supplied by Others—In most situations, the data are provided to the actuary by others. The accuracy and comprehensiveness of data supplied by others are the responsibility of those who supply the data. The actuary may rely on data supplied by others, subject to the guidance in section 3.5. In doing so, the actuary should disclose such reliance in an appropriate actuarial communication.

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- 3.4 Reliance on Other Information Relevant to the Use of Data—In many situations, the actuary is provided with other information relevant to the appropriate use of data, such as contract provisions, plan documents, and reinsurance treaties. The validity and comprehensiveness of such information are the responsibility of those who supply such information. The actuary may rely on such information supplied by another, unless it is or becomes apparent to the actuary during the time of the assignment that the information contains material errors or is otherwise unreliable. The actuary should disclose reliance on information provided by another in an appropriate actuarial communication.
- 3.5 Review of Data—A review of data may not always reveal existing defects. Nevertheless, whether the actuary prepared the data or received the data from others, the actuary should review the data for reasonableness and consistency, unless, in the actuary’s professional judgment, such review is not necessary or not practical. In exercising such professional judgment, the actuary should take into account the extent of any checking, verification, or auditing that has already been performed on the data, the purpose and nature of the assignment, and relevant constraints.

When determining the nature and extent of such a review, the actuary should consider the following:

- a. Data Definitions—The actuary should make a reasonable effort to determine the definition of each data element used in the analysis, as described in section 3.2.
- b. Identify Questionable Data Values—The actuary should review the data used directly in the actuary’s analysis for the purpose of identifying data values that are materially questionable or relationships that are materially inconsistent. If the actuary believes questionable or inconsistent data values could have a material effect on the analysis, the actuary should consider further steps, when practical, to improve the quality of the data.
- c. Review of Prior Data—If similar work has been previously performed for the same or recent periods, the actuary should consider reviewing the current data for consistency with the data used in the prior analysis. If the actuary does not have the prior data, the actuary should consider requesting the prior data.

If, in the actuary’s professional judgment, it is not appropriate to perform a review of the data, the actuary should disclose that the actuary has not done such a review and should disclose any resulting limitation on the use of the actuarial work product.

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- 3.6 Limitation of the Actuary's Responsibility—The actuary is not required to do any of the following:
- a. determine whether data or other information supplied by others are falsified or intentionally misleading;
 - b. develop additional data compilations solely for the purpose of searching for questionable or inconsistent data; or
 - c. audit the data.
- 3.7 Use of Data—Because data that are completely accurate, appropriate, and comprehensive are frequently not available, the actuary should make a professional judgment about which of the following is applicable:
- a. the data are of sufficient quality to perform the analysis;
 - b. the data require enhancement before the analysis can be performed, and it is practical to obtain additional or corrected data that will allow the analysis to be performed;
 - c. judgmental adjustments or assumptions can be applied to the data that allow the actuary to perform the analysis. If the actuary judges that the use of the data, even with adjustments and assumptions applied, may cause the results to be highly uncertain or contain a material bias, the actuary may choose to complete the assignment, but should disclose the potential existence of the uncertainty or bias, and, if reasonably determinable, their nature and potential magnitude;
 - d. if the actuary believes that the data are likely to contain material defects, the actuary should determine, if practical, the nature and extent of any checking, verification, or auditing that may have been performed on the data. Then, if, in the actuary's professional judgment, a more extensive review is needed, the actuary should arrange for such a review prior to completing the assignment; or
 - e. if, in the actuary's professional judgment, the data are so inadequate that the data cannot be used to satisfy the purpose of the analysis, then the actuary should obtain different data or decline to complete the assignment.
- 3.8 Documentation—The actuary should comply with the requirements of ASOP No. 41, *Actuarial Communications*, regarding the preparation and retention of the documentation. In addition, the actuary's documentation should include the following:

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- a. the process the actuary followed to evaluate the data, including the review or consideration of prior data;
- b. a description of any material defects the actuary believes are in the data;
- c. a description of any adjustments or modifications made to the data, other than routine corrections made by reference to source documents, including the rationale for any such adjustments or modifications; and
- d. any other documentation necessary to comply with the disclosure requirements of section 4.1.

Section 4. Communications and Disclosures

4.1 **Disclosure**—When issuing communications under this standard, the actuary should refer to ASOP No. 41. In addition, the actuary should disclose the following items:

- a. the source(s) of the data;
- b. whether the actuary reviewed the data and, if not, any resulting limitations on the use of the actuarial work product;
- c. the extent of the actuary's reliance on data and other information relevant to the use of data supplied by others;
- d. any material judgmental adjustments or assumptions that the actuary applied to the data, or are known by the actuary to have been applied to the data, to allow the actuary to perform the analysis;
- e. any limitations on the use of the actuarial work product due to uncertainty about the quality of the data;
- f. any unresolved concerns the actuary may have about the data that could have a material effect on the actuarial work product;
- g. (1) the existence of results that are highly uncertain or have a potentially material bias of which the actuary is aware due to the quality of the data; and (2) the nature and potential magnitude of such uncertainty or bias, if they can be reasonably determined; and
- h. any conflicts that arose from complying with applicable law, regulation, or other binding authority.

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- 4.2 Prescribed Statement of Actuarial Opinion—This ASOP does not require a prescribed statement of actuarial opinion (PSAO) as described in the *Qualification Standards for Prescribed Statements of Actuarial Opinion* promulgated by the American Academy of Actuaries. However, law, regulation, or accounting requirements may also apply to an actuarial communication prepared under this standard, and as a result, such actuarial communication may be a PSAO.
- 4.3 Deviation from Standard—The actuary must be prepared to justify to the actuarial profession’s disciplinary bodies, or to explain to a principal, another actuary, or other intended users of the actuary’s work, the use of any procedures that depart materially from those set forth in this standard. If a conflict exists between this standard and applicable law or regulation, compliance with applicable law or regulation is not considered to be a deviation from this standard.

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Appendix 1

Background and Current Practices

Note: The following appendix is provided for informational purposes, but is not part of the standard of practice.

Background

An actuarial analysis is based upon an analysis of data, along with practical knowledge of the field of practice and training in actuarial theory, which together enable the actuary to interpret the results of calculations. Throughout the analytic process, data play an important role. The accuracy and validity of the actuarial analysis are dependent on, among other things, the quality of the data used. Hence, an actuarial standard of practice concerning data quality is appropriate.

Data frequently contain errors, are not fully complete, and are not precisely appropriate for the intended analysis. Actuaries deal with these limitations, the majority of which are non-critical. However, actuaries are often called upon to perform actuarial services in situations where data limitations may be critical. Actuaries use professional judgment when determining whether and how to refine data or make modifications within the analysis.

Current Practices

Actuaries use informed judgment to determine what kinds of data are appropriate for a particular analysis. It is important that the data used are relevant to the system or process being analyzed.

Persons or organizations responsible for generating, collecting, or publishing data may apply different standards of quality assurance, ranging from straightforward compilation of figures to extensive verification. Actuaries, in turn, deal with the question of the quality of data underlying their work products in a variety of ways and with varying levels of review or checking.

Actuaries are called upon to provide analyses for a broad range of uses, from limited distribution within an organization to public exposure.

Important aspects of data utilization include documentation and disclosure of (1) the sources of data; (2) review of data; (3) material biases resulting from data used by the actuary; (4) adjustments or corrections made to the data; and (5) the extent of reliance on data supplied by others. Typically, actuaries do not audit data.

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APPENDIX 2

Comments on the Exposure Draft and Committee Responses

The exposure draft of this revision of ASOP No. 23, *Data Quality*, was issued in October 2003 with a comment deadline of March 31, 2004. Twenty-eight 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 General Committee carefully considered all comments received. Summarized below are the significant issues and questions contained in the comment letters and the committee’s responses. Unless otherwise noted, the section numbers and titles used below refer to those in the exposure draft.

GENERAL COMMENTS	
Several commentators suggested various editorial changes in addition to those addressed specifically below. The committee implemented such suggestions if they enhanced clarity and did not alter the intent of the section.	
In the transmittal memorandum of the exposure draft, the committee asked readers to comment on whether the exposure draft clarified the previous standard. Most commentators believed that the revisions did clarify the standard, and others had suggestions that are addressed in the following responses.	
Comment	One commentator suggested that the standard should address issues concerning how results vary when using data with different time horizons.
Response	The committee believed that issue was more about credibility than data quality and made no change in the standard.
Comment	A commentator believed that the standard should also provide guidance on privacy, confidentiality, and distribution of the actuarial report.
Response	The committee believed such issues were beyond the scope of this standard. ASOP No. 41, <i>Actuarial Communications</i> , provides guidance with respect to actuarial reports.
Comment	One commentator recommended expanding the title of the standard to add “Actuaries’ Responsibilities in Selecting, Reviewing, and Using Data.”
Response	The committee believed that this was unnecessary, because section 1.1, Purpose, identifies the specific professional services discussed in the standard.
Comment	A commentator suggested that, since it is common for actuaries to extract their own data for use in their analyses, the standard should more clearly indicate the actuary’s responsibility to review data that the actuary has independently created.
Response	The committee agreed and revised section 3.5, Review of Data, in response.
Comment	One commentator thought that the actuary should be required to disclose and resolve material differences between prior and current period data.
Response	The committee believed that the actuary should be satisfied that the current data are appropriate and should disclose other concerns related to data quality in accordance with section 4.1(g) (now 4.1(f)). The reconciliation of data from one period to the next is beyond the scope of this standard.

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SECTION 1. PURPOSE, SCOPE, CROSS REFERENCES, AND EFFECTIVE DATE	
Section 1.2, Scope	
Comment	One commentator objected to not requiring the actuary to audit the data, while several others supported the statement in the standard that audits are not required.
Response	The committee believed that the actuary should generally be required to review, but not audit the data, and left this scope limitation unchanged.
Comment	Several commentators recognized that the actuary must comply with law, regulation, or other binding authority, but disagreed that the actuary should disclose such a conflict.
Response	The committee disagreed and retained the disclosure requirement, consistent with other standards. In response to another comment, the committee also added a sentence clarifying that the actuary must comply with both the standard and the law when the standard has more extensive requirements than the law. Finally, the wording of this section was modified to clarify that the standard applied only to professional “actuarial” services.
Section 1.4, Effective Date	
Comment	A commentator pointed out that it is common in some practice areas to use a significant amount of data collected in prior years and then perform the current analysis after the latest data have been added to the database or using relevant current data. The commentator believed that the prior data should be subject only to requirements in effect when the data were originally collected and not be subject to any new requirements in the standard.
Response	The committee discussed this point and made no change to this section, because it believed that other sections of the standard gave sufficient guidance to the actuary regarding the extent to which the actuary should review the data, including consideration of practicality and materiality.
SECTION 2. DEFINITIONS	
Some commentators suggested adding definitions of other terms. In most cases, the committee did not believe that was necessary. However, it did add a definition of “review,” as suggested by one commentator, to clarify that a review is less formal than an audit and does not verify the accuracy of data, but merely consists of observing its obvious characteristics and abnormalities.	
Section 2.1, Appropriate (now Appropriate Data)	
Comment	Several commentators suggested adding the word “data” to the title of this section.
Response	The committee agreed and added “data” here and in the title of section 2.3.
Comment	One commentator suggested deleting the phrase “relevant to the system or process being analyzed.”
Response	The committee thought the existing language was necessary and sufficiently clear and made no change.
Section 2.2, Audit	
Comment	Some editorial suggestions were made to improve the definition.
Response	The committee adopted some of the suggestions, adding “for the purpose of testing its accuracy” and removing “or review,” because that latter term is now defined and differentiated from an audit.
Section 2.3, Comprehensive (now Comprehensive Data)	
Comment	A commentator recommended that “sufficient data elements” be used in this definition in place of “each data element.”
Response	The committee agreed that this was more appropriate wording and made the change.
Comment	One commentator suggested adding a discussion of inventory or sampling methods.
Response	The committee did not see the need for such a discussion.

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Section 2.4, Data	
Comment	A commentator pointed out that actuaries often use data contained in reports prepared by other professionals and suggested that such data be covered by this definition.
Response	The committee made no change to this definition, because sections 3.3 and 3.4 address reliance on data and other information supplied by others.
Comment	One commentator suggested expanding the definition to indicate that sometimes assumptions are used to develop certain data elements.
Response	The committee did not believe such an expansion was necessary. The use of assumptions to perform such analyses is referenced in section 3.7(c).
Section 2.6, Practical	
Comment	A number of comments were received on the inclusion of the defined term “practical” in response to the committee’s request in the transmittal letter of the exposure draft. Some commentators thought the definition was unnecessary, and some offered suggestions for further improvement.
Response	Because the concept of practicality is an important consideration in this standard in aiding an actuary to make professional judgments regarding selection of data, and whether and to what extent to review the data, among other things, the committee strongly believed that a definition of this term should be included.
Comment	One commentator pointed out that use of hindsight would be inappropriate in determining what was practical.
Response	The committee agreed and added “during the time of the assignment” to the definition.
Comment	One commentator wanted to add guidance on considerations for evaluating materiality.
Response	The committee believed that materiality is a subjective concept that depends on the actuary’s professional judgment, and that it was beyond the scope of this standard to define or provide guidance on materiality.
SECTION 3. ANALYSIS OF ISSUES AND RECOMMENDED PRACTICES	
Section 3.1, Overview	
Comment	One commentator pointed out that some assignments do, in fact, require perfect data, and that the standard should recognize this.
Response	The committee disagreed that the standard should be written to address specific situations that would require more diligent treatment. Sections 3.2 and 3.5 state that consideration should be given to the purpose and nature of the assignment.
Section 3.2, Selection of Data	
Comment	One commentator wanted to clarify the language relating to “review.”
Response	The committee decided to delete reference to “review” in this section as it is thoroughly covered in section 3.5.

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Comment	One commentator believed that section 3.2(b)(5) should be eliminated or at least restricted to alternate data sources reasonably known to the actuary.
Response	The committee believed this guidance is important and, in view of the comment, carefully considered the wording again and revised the wording to clarify that the actuary is provided adequate leeway to consider the benefits of seeking alternative data sources versus the effort necessary to get them.
Comment	One commentator suggested that the terms “data sets” and “data sources” should be consistent here and in section 3.2(b)(5).
Response	The committee agreed and made changes to accomplish this.
Comment	One commentator believed “subject to the limitations presented by the actuary’s reliance on others...” should be added to clarify how this section relates to sections 3.3 and 3.4.
Response	The committee believed that the guidance for selection of data should not depend on whether or not the actuary needs to rely on others to supply the data and did not believe such an addition was necessary or appropriate.
Comment	One commentator suggested deleting “relative availability” and adding “time and” in front of the word “cost” in section 3.2(b)(5).
Response	The committee did drop “relative” and did add “time and.”
Section 3.3, Reliance on Data Supplied by Others	
Comment	One commentator supported the concept of what was labeled “blind reliance.” A couple of commentators were uncertain as to whether the implication of such reliance was appropriate and consistent with sections 3.1 or 3.5. Several others commented that such reliance was inappropriate.
Response	After much discussion and careful consideration, the committee ultimately agreed that additional clarity was needed. Accordingly, the committee added the phrase “subject to the guidance in section 3.5,” and that section provides that the actuary should review the data for reasonableness and consistency unless, in the actuary’s professional judgment, it is not practical or not necessary to do so.
Section 3.4, Reliance on Other Information Relevant to the Use of Data	
Comment	Two commentators were uncomfortable with the implication of absolute reliance in this section, believing that it could conflict with the guidance in other sections of the ASOP by setting a different standard.
Response	The committee believed a lower standard was appropriate but agreed that the actuary should not proceed with the analysis based on information that is known by the actuary to be suspect. Accordingly, the committee added the phrase “unless it is or becomes apparent to the actuary during the time of the assignment that the information contains material errors or is otherwise unreliable.”
Comment	Two commentators thought that “or summaries of such documents” should be specifically added to the list.
Response	Because the list provides examples only, the committee believed that this added language was not needed.
Section 3.5, Review of Data	
Comment	Several commentators questioned the meaning of the word “appropriate.”
Response	The committee deleted the word “appropriate” where it might be confusing.
Comment	Several commentators questioned whether it was always necessary to review prior data and suggested adding the word “consider” in section 3.5(a) regarding review of prior data.
Response	The committee agreed and incorporated this wording change in what is now section 3.5(c).

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Comment	One commentator believed that a new section on the time period of the data should be added.
Response	The committee believed this was sufficiently covered in section 3.2(b)(1).
Comment	Two commentators were unclear if this section applied to data received from others.
Response	The committee clarified that it does apply and that the actuary should review for reasonableness and consistency “unless, in the actuary’s professional judgment, such review is not necessary or not practical.”
Comment	One commentator suggested adding a new consideration: “Data Definitions—The actuary should make a reasonable effort to determine the definition of each data element provided.”
Response	The committee agreed and added what is now section 3.5(a).
Comment	One commentator interpreted section 3.5(b) as requiring a datum-by-datum review and a datum-by-datum correction process, thereby precluding any type of sampling procedure.
Response	The committee disagreed with this interpretation. Section 3.2 specifically allows for sampling procedures. Based on the definition of “review,” the committee believed guidance for the actuary to look for obvious errors or inconsistencies that may materially affect the analysis was appropriate.
Section 3.6, Limitation of the Actuary’s Responsibility	
Comment	Several commentators responded to a question requesting comments about whether it was appropriate to delete the following language from section 5.3(a) of the previous ASOP No. 23: “The actuary is not required to develop additional data compilations solely for the purpose of searching for questionable or inconsistent data.” While a couple of commentators believed the deletion was appropriate, most believed that the language should be put back into the revision.
Response	The committee agreed with the majority and reinserted what is now section 3.6(b).
Comment	Several comments suggested eliminating the word “intentionally” inaccurate.
Response	The committee disagreed and left this wording, because just removing the word “intentionally” would weaken the standard by implying that the actuary is relieved of any responsibility for inaccurate data, whether intentional or not. However, after lengthy discussions the committee revised the section by amending the wording of what is now section 3.6(a), in addition to reinserting section 3.6(b).
Section 3.7, Use of Data	
Comment	One commentator suggested clarifying section (d) to apply when material defects are likely, not just possibilities.
Response	The committee agreed and added the words “are likely to” to this subsection.
Comment	One commentator suggested changing the word “should” to “must,” eliminating the words “when practical,” and specifying that this disclosure should be in the summary level presentation of the results.
Response	The committee disagreed and left the wording as is.
Comment	Two commentators suggested changing the wording in the opening paragraph to clarify that data are rarely completely accurate, appropriate, and comprehensive.
Response	The committee agreed and changed the wording in the opening paragraph.

ASOP No. 23—December 2004

Comment	One commentator suggested that section 3.7 could be viewed to be in conflict with section 4.1, Disclosure.
Response	The committee disagreed that there would be a conflict. If the actuary believes there is a material defect in the data, the actuary can still perform the assignment and make the disclosures in section 4.1.
Comment	One commentator suggested removing the words “if practical” from section (d).
Response	The committee disagreed and left this wording.
Comment	One commentator suggested defining a process for what to do if material defects have been found or are known to exist in the data.
Response	The committee prepared this section to provide guidance to the actuary in discriminating between different types of situations. The committee believed that sections (d) and (e) provided adequate guidance in this respect.
Comment	One commentator suggested removing the first sentence of this section since all items in this section are based on the premise that the actuary is aware of data deficiencies.
Response	The committee revised the first paragraph of section 3.7 to clarify that the actuary should decide which of the circumstances in sections (a)–(e) apply, even if the actuary is not necessarily aware of material defects in the data.
Comment	One commentator suggested removing the first sentence from section (d).
Response	The committee disagreed and left the first sentence.
Comment	One commentator suggested that this section provides only two alternatives for inadequate data.
Response	The committee disagrees and refers the commentator to the four alternatives contained in sections (b)–(e). The committee also added a consideration in section (c) to address results that may be highly uncertain.
Section 3.8, Documentation	
Comment	One commentator suggested adding a section requiring a description of any material defects the actuary believes are in the data and the review conducted by the actuary on this data.
Response	The committee agreed in respect of material defects and added appropriate wording to section 3.8(b).
Comment	Two commentators suggested eliminating the first sentence since it was confusing.
Response	The committee agreed with this commentator and eliminated the first sentence of this section.
Comment	One commentator suggested changing the wording of section (b) by replacing it with “whether the actuary reviewed the data as contemplated by section 3.5 and, if so, the scope of the review.”
Response	The committee agreed that additional clarity was needed and revised the entire section 3.8.
Comment	One commentator suggested changing the wording of section (c) by inserting the words “if reasonably estimable, the” before “effect.”
Response	The committee agreed that this language could be too burdensome and revised the language in section (c).

ASOP No. 23—December 2004

Comment	One commentator suggested adding words to this section similar to those in the disclosure section pertaining to a description of the insufficiencies or issues with the data that may have an impact on the results.
Response	The committee revised section 3.8, adding sections (b) and (d) to deal with this issue.
Comment	One commentator suggested that this section is not needed as long as the disclosure section exists.
Response	The committee believed there is a need for this section, because this section applies to the work papers of the actuary and not the disclosure that goes along with a work product. In addition, some items that should be documented need not be disclosed.
Comment	Numerous commentators suggested changes to section (b).
Response	The committee agreed with these commentators and reworded section (b) with consequential changes to section (a).
SECTION 4. COMMUNICATIONS AND DISCLOSURES	
Section 4.1, Disclosure	
Comment	One commentator suggested that the standard does not appear to require disclosure of the actuary's unresolved concerns, particularly in the case of an actuarial opinion, regarding data that could have a material effect on the actuarial work product.
Response	Section (g) (now (f)) requires the actuary to disclose any unresolved concerns the actuary may have about the data. That disclosure is required in an appropriate actuarial communication, regardless of whether it is an actuarial opinion.
Comment	One commentator suggested adding the words "to the principal" after "following items" to clarify to whom the disclosure is to be made and also wanted to add the words "if other than the principal" to item (a).
Response	The committee did not concur with this commentator.
Comment	Several commentators believed that section (b) was unclear or unnecessary.
Response	The committee deleted section (b).
Comment	One commentator suggested changing the wording in section (c) (now (b)) to reflect the fact that the standard seems to mandate that actuaries almost always review data. Another commentator believed that section (c) (now (b)) should read, "the extent of the actuary's review of the data" rather than "whether the actuary reviewed the data."
Response	The committee very carefully considered this issue and revised what is now section (b) to require, where no review was performed, disclosure of any resulting limitations on the use of the actuarial work product.
Comment	Two commentators suggested adding "material" before "judgmental adjustments" in section (e) (now section (d)).
Response	The committee agreed and made this change.

ASOP No. 23—December 2004

Comment	One commentator believed that section (f) (now (e)) would be clearer if it ended after the phrase “work product.”
Response	The committee revised the language to omit reference to “not sufficiently reviewed,” thereby including situations where the actuary did not review the data as well as situations where the actuary did review the data but is uncertain about the data.
Comment	One commentator believed that section (g) (now (f)) was unnecessary because it was covered by section (h) (now (g)). The commentator believed it was burdensome for the actuary to disclose concerns that would not have a material effect.
Response	The committee disagreed and believed that both sections are needed to fully describe required disclosure because they cover different situations. However, the committee did agree that only “unresolved concerns the actuary may have about the data that could have a material effect...” are required to be disclosed, and the wording of these two sections incorporates the word “material” to support this.
Comment	One commentator believed that section (g) (now (f)) could conflict with section 3.7, which does not contain an option for producing a work product with adequate disclosure if there is a material effect in the data.
Response	The committee did not believe there was a conflict, but revised section 3.7(c) to clarify that the actuary may produce a work product even if the data (after judgmental adjustments or assumptions have been applied) may produce results that “are highly uncertain or contain a material bias” as long as this is disclosed.
APPENDIX (now Appendix 1)	
Current Practices	
Comment	One commentator suggested inserting the words “important aspects of data utilization include such” in the last paragraph of this section as well as deleting the words “of such items” after the word “disclosure” in this same section. The commentator also suggested deleting the word “the” after “reliance on” and deleting the words “are important aspects of utilization of data” in the last paragraph of this section.
Response	The committee agreed with the general thrust of these comments and made appropriate changes.
Comment	One commentator suggested removing the words “complete and independent verification of the data” in the second paragraph of this section. The commentator went on to suggest that actuaries deal with the quality of data in a variety of ways and “with varying levels of review or checking.”
Response	The committee agreed with this commentator and changed the wording as suggested.



ACTUARIAL STANDARDS BOARD

**Actuarial Standard
of Practice
No. 25**

**Credibility Procedures Applicable to Accident and Health,
Group Term Life, and Property/Casualty Coverages**

**Developed by the
Casualty and Health Committees of the
Actuarial Standards Board**

**Adopted by the
Actuarial Standards Board
October 1996**

(Doc. No. 051)

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November 1996

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Credibility Procedures

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice No. 25

This booklet contains the final version of Actuarial Standard of Practice (ASOP) No. 25, *Credibility Procedures Applicable to Accident and Health, Group Term Life, and Property/Casualty Coverages*.

Background

Credibility procedures are an integral part of ratemaking and prospective experience rating, and may be used for other purposes. The purpose of this ASOP is to provide guidance to actuaries in the assignment of credibility values to data.

The Subcommittee on Ratemaking of the Casualty Committee of the ASB named three members as a task force to prepare an initial draft of a proposed standard on credibility procedures. A task force of the Health Committee of the ASB was also starting to draft a proposed actuarial standard of practice on credibility procedures, this one for accident and health (A&H) coverages. The ASB decided that a single standard of practice on credibility, which would apply to both casualty and A&H coverages, would be preferable, if it were possible to develop such a text.

The initial casualty draft of this proposed standard was shared with the health task force, which then collaborated with the casualty task force to extend the draft to encompass A&H coverages. In the process, the draft was also expanded to apply to group term life and to address applications of credibility to subjects other than ratemaking. This revised draft was reviewed by the full Casualty Committee and the full Health Committee, and some changes were indicated. The two task forces addressed the committee members' comments and made revisions to the document, which was then sent again to the full operating committees for approval to submit it to the ASB for exposure. The board approved the exposure draft at its April 1994 meeting.

Adoption

The proposed standard was exposed to the profession in April 1994, with a comment deadline of August 31, 1994. A total of thirty-three comment letters were received. The comment letters were reviewed by representatives of the Casualty and Health Committees (a newly formed task force) and the text was revised in response to these comment letters. Summaries of substantive issues from the comment letters, and the drafting task force's responses to such issues, are summarized in appendix 2.

Format Changes

A number of format changes have also been made since publication of the exposure draft. The ASB voted in May 1996 to change the format of all future actuarial standards of practice. Thus, sections 3 and 4 of the exposure draft now form an appendix titled, Background and Current Practices. (Appendix 1 of this standard contains sections 3 and 4 of the exposure draft.) Further, sections 5 and 6 of the exposure draft have now been renumbered as sections 3 and 4. The new sections 3 and 4, along with sections 1 and 2, now form the actual standard of practice. The heading *Preamble*, which used to apply to the first four sections of the standard, has been deleted. The board made these format changes to help the reader distinguish between a standard's substantive requirements and language intended for general information.

The ASB voted in October 1996 to adopt the final standard.

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ACTUARIAL STANDARD OF PRACTICE NO. 25

CREDIBILITY PROCEDURES APPLICABLE TO ACCIDENT AND HEALTH, GROUP TERM LIFE, AND PROPERTY/CASUALTY COVERAGES

STANDARD OF PRACTICE

Section 1. Purpose, Scope, and Effective Date

- 1.1 Purpose—The purpose of this standard of practice is to provide guidance to actuaries in the selection of a credibility procedure and the assignment of credibility values to sets of data including subject experience and related experience.
- 1.2 Scope—This standard of practice is applicable to accident and health; group term life; property/casualty coverage; and other forms of non-life coverage. This standard also applies to other financial security systems, such as self-insurance, that provide similar coverages. This standard is applicable to ratemaking, prospective experience rating, and whenever else credibility procedures are used, including but not limited to reserve analysis, solvency testing, and asset/liability management. This standard does not apply to annuities and pension plans.
- 1.3 Effective Date—This standard will be effective with respect to work performed after March 1, 1997.

Section 2. Definitions

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

- 2.1 Credibility—A measure of the predictive value in a given application that the actuary attaches to a particular body of data (*predictive* is used here in the statistical sense and not in the sense of predicting the future).
- 2.2 Full Credibility—The level at which the subject experience is assigned full predictive value based on a selected confidence interval.
- 2.3 Ratemaking—The process of determining estimates of the expected value of future costs per unit of exposure for a group of risks.
- 2.4 Related Experience—Premiums, losses, exposures, expenses, and other relevant data for coverage analogous to the coverage under consideration. Other data may include

established rate levels or differentials. Such data might also be external to the client or the insurance industry, such as information on trends in claim costs or patterns of claim frequencies.

- 2.5 Subject Experience—Premiums, losses, exposures, expenses, and other data relevant to the coverage under consideration.

Section 3. Analysis of Issues and Recommended Practices

- 3.1 Purpose and Use of Credibility Procedures—The purpose of credibility procedures is to blend information from subject experience with information from one or more sets of related experience when the subject experience does not have full credibility in order to improve the estimate of expected values, or to determine when the subject experience should have full credibility and blending is unnecessary. Credibility procedures should be used in ratemaking and prospective experience rating and may be used for other purposes. When such procedures are used, this standard applies.

- 3.2 Selection of Credibility Procedures—The actuary should be familiar with and consider various methods of determining credibility. The models selected may be different for different applications. The selection process involves testing the tentatively selected model and possibly revising the model. The actuary should recognize those instances where it may not be cost-effective to perform this selection process. Additional calculations may be made to satisfy applicable regulations and statutes.

The actuary should select credibility procedures that do the following:

- a. produce results that are reasonable in the professional judgment of the actuary,
 - b. do not tend to bias the results in any material way,
 - c. are practical to implement, and
 - d. give consideration to the need to balance responsiveness and stability.
- 3.3 Choice of Related Experience—The actuary should use care in selecting the related experience that is to be blended with the subject experience. Such related experience should have frequency, severity, or other determinable characteristics that may reasonably be expected to be similar to the subject experience. If the proposed related experience does not or cannot be adjusted to meet such criteria, it should not be used. The actuary should apply credibility procedures that appropriately reflect the characteristics of both the subject experience and the related experience.
- 3.4 Informed Actuarial Judgment—Any credibility procedure requires the actuary to exercise informed judgment, using relevant information. The use of credibility procedures is not always a precise mathematical process.

- 3.5 Homogeneity of Data—In carrying out credibility procedures, the actuary should consider the homogeneity of both the subject experience and the related experience. Within each set of experience, there may be segments that are not representative of the experience set as a whole. Credibility can sometimes be enhanced by separate treatment of these segments.

Section 4. Communications and Disclosures

- 4.1 Disclosure—Whenever appropriate in the actuary's professional judgment, the actuary should disclose the credibility procedures used. Any material changes from prior credibility procedures should be disclosed and supported.
- 4.2 Deviation from Standard—An actuary must be prepared to justify the use of any procedures that depart materially from those set forth in this standard and must include, in any actuarial communication disclosing the results of the procedures, an appropriate statement with respect to the nature, rationale, and effect of such departures.

Appendix 1

Background and Current Practices

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

Background

Classical Credibility Procedures—Classical credibility procedures make assumptions as to the form of the underlying probability distribution. From this probability distribution function, the appropriate number of claims, amount of premium, or other measure of volume is calculated such that the probability that the subject loss experience is within a specified percentage (k) of the expected value is equal to a specified parameter (P). This measure of volume is the full credibility standard.

Empirical Credibility Procedures—Empirical credibility procedures measure the statistical relationships of the subject experience to its mean and to comparable experience of prior experience periods, without reference to the underlying distribution.

Bayesian Credibility Procedures—Bayesian analysis procedures merge prior distributions representing the statistical information of the related experience with the statistical information of the subject experience to produce posterior distributions that reflect both. Bayesian credibility procedures provide a least squares approximation to the mean of the a posteriori distribution that would result from a Bayesian analysis.

Historical Development—The concept of credibility has been a fundamental part of actuarial practice since the beginning of the profession. Applications of credibility procedures have recognized the traditional concerns regarding the proper balance between responsiveness and stability. Early discussions of credibility tended to focus on estimating mean claim frequency using classical and empirical credibility procedures. The earliest recorded paper on this subject, “How Extensive a Payroll Exposure Is Necessary to Give a Dependable Pure Premium,” was published by Albert H. Mowbray in Volume I of the *Proceedings of the Casualty Actuarial and Statistical Society* (published by the Casualty Actuarial Society in 1914). Later writers have developed formulas for the credibility of claim severity and for the credibility of total losses including Bayesian credibility procedures. Credibility concepts have also been used in other actuarial work.

Current Practices

Historical Bases—The most commonly used bases for determining credibility are numbers or amounts of claims, losses, premiums, and exposures.

Credibility Procedures for Ratemaking—The sample size required for full credibility may be based on the variance of an assumed underlying probability distribution. If using an assumed frequency distribution, the actuary usually adjusts the required sample size to recognize variation in claim size or other factors.

Credibility Procedures for Prospective Experience Rating—Prospective experience rating formulas assign credibility to actual experience of a single risk or a group of risks (the subject experience). In some instances, the subject experience may be subdivided into different components, for example, primary and excess losses, with different credibility levels appropriate for each piece.

Partial Credibility—Partial credibility is used in a weighting process to combine the subject experience with relevant related experience when the subject experience is determined to be not fully credible. Several common practices are used to determine partial credibility. A common practice is to use a selected fractional exponent of the ratio of the volume of subject experience—such as claims, expected losses, premiums, or exposures—to the full credibility standard. Another common practice is to use a ratio $N/(N + K)$, where N is the volume of subject experience and K is a constant that may be derived from variances in the subject and related experience. The $N/(N + K)$ formula is sometimes modified for those applications where the possibility of attaining full credibility is desired.

Appendix 2

Comments on the Exposure Draft and Committee Responses

The proposed standard of practice was exposed for review in April 1994. Thirty-three comment letters were received. A task force of representatives from the Casualty and Health Committees reviewed these comments and reached the following conclusions. Summaries of substantive issues raised in the comment letters are in lightface, and task force responses are in **boldface**.

Section 1. Purpose, Scope, and Effective Date

Section 1.2, Scope—Concerns were expressed that the scope was too restrictive and should be expanded to all actuarial practice that relies on experience data. **Although the scope was modified slightly, the substance of the text was not changed since it was found to be adequately inclusive. In response to other concerns, the text was streamlined.**

Section 2. Definitions

Section 2.1, Credibility—It was suggested that *credibility* should be defined such that it is relative to another body of data. **In order to avoid eliminating the use of classical credibility, the text was changed to include these ideas, but to still permit the use of classical credibility.**

Section 2.2, Experience Period—**Since this definition is not used within the standard, the task force decided to remove it from the definitions section.**

Section 2.3, Full Credibility (now section 2.2)—Concerns were expressed that no data will have sufficient volume to have full credibility. **The text was changed to clarify that full credibility is based on a selected confidence interval.**

Section 2.4, Manual Ratemaking (now section 2.3 and titled Ratemaking)—Concerns were expressed that sections 2.4 and 2.6 were inconsistent. Also, the reference to “subject experience” was considered unnecessary. **The term defined was changed from *manual ratemaking* to *ratemaking*. The reference to “subject experience” was removed, and the definition in section 2.6 (*rate*) was incorporated into the definition of *ratemaking* (see section 2.3 of this text).**

Section 2.5, Process Variance—As noted by several individuals, this term is not used in the standard. **The term was deleted. The remaining sections were renumbered.**

Section 2.6, Rate—**Since this term is not used in the standard, it was deleted. The remaining sections were renumbered.**

Section 2.7, Related Experience (now section 2.4)—Concerns were expressed about the type of data that could be used as related experience and whether the phrase *with predictive value* was necessary. **To help clarify the data question, the term *relevant* was added before *data* in the first sentence of the definition. The phrase *with predictive value* was deleted.**

Section 3. Background and Historical Issues (now in Appendix 1 under Background)

Section 3.1, Background—It was suggested that a section describing the goal of the use of credibility procedures be included. **This section was merged with the old section 3.5 into a new section, Historical Development, which can be found in appendix 1. The purpose of credibility procedures is discussed in the new section 3.1.**

Section 3.2, Classical Credibility Procedures (this section can now be found in appendix 1)—Suggestions were received recommending that the probability distribution should be identified as underlying the subject experience. Suggestions were also received that the method of determining the full credibility standard should be more precisely described. **The task force changed the text in response to these comments.**

Section 3.3, Bayesian Credibility Procedures (this section can now be found in appendix 1)—It was suggested that the terms *Bayesian* and *classical* are out-of-date and should be replaced with *least squares* and *limited fluctuation*. **The terms *Bayesian* and *classical* are more widely understood, particularly in a historical context.**

It was also suggested that the description of Bayesian credibility was actually a description of Bayesian analysis, and that Bayesian credibility procedures produce a least squares approximation to the results of a Bayesian analysis. **The task force changed the text in response to this comment.**

Section 3.4, Empirical Credibility Procedures (this section can now be found in appendix 1)—Suggestions were received questioning the need for a discussion of empirical credibility. **The discussion of empirical credibility distinguishes *distribution free* methods from nontraditional Bayesian credibility procedures that require assumptions about the underlying distribution.**

Section 3.5, Historical Development (this section can now be found in appendix 1)—Some felt that this section was biased in favor of Bayesian credibility procedures. **The section has been revised to eliminate any real or apparent bias.**

Section 4. Current Practices and Alternatives (now in Appendix 1 under Current Practices)

Section 4.1, Historical Bases (this section can now be found in appendix 1)—Concerns were expressed that the text implied that other bases are not acceptable. **The text was revised to enumerate the most common bases and to omit any comment about other bases.**

Section 4.2, Credibility Procedures for Manual Ratemaking (this section can now be found in appendix 1 under the heading, Credibility Procedures for Ratemaking)—Concerns were expressed about the paragraph referring to the variance of a cumulative loss distribution. **This paragraph was deleted. The first paragraph was revised to eliminate the differentiation between frequency and cumulative losses. The term *manual* was removed from the section title.**

Section 4.3, Credibility Procedures for Experience Rating (this section can now be found in appendix 1 under the heading, Credibility Procedures for Prospective Experience Rating)—As noted by several individuals, greater homogeneity of the related experience used in experience rating does not imply smaller required sample sizes. **The sentence referring to this matter was deleted. The term *prospective* was added to the section title.**

Section 4.4, Partial Credibility (this section can now be found in appendix 1)—Concerns were expressed regarding the term *credibility measure*. **The text was revised to use the phrase *volume of subject experience*.**

It was also suggested that generalizations of $N/(N + K)$ be mentioned and that it be specified that other practices may also be acceptable. **The text was revised to clarify that several practices are common.**

Section 4.5, Data Homogeneity—Numerous concerns were expressed that this section was potentially misleading and unnecessary. **The section was deleted.**

Section 5. Analysis of Issues and Recommended Practices (now Section 3)

Section 5.1, Estimating Future Costs (now section 3.1)—The consensus of comments received was that section 5.1 should be deleted and replaced with section 5.3, and that the language relating to *costs* and the references to the lines of business should be clarified. **Section 5.1 is now section 3.1, Purpose and Use of Credibility Procedures, and the old section 5.3 was merged with the former section 5.1. References to costs and lines of business were dropped.**

Section 5.2, Selection of Credibility Procedures (now section 3.2)—Several comments referred to Bayesian credibility and the absence of other methods. Other comments expressed concern that certain words might make compliance very difficult. The words *distort* and *any known* in section 5.2(b) were of particular concern. Other language changes were also suggested. **In addition to making several wording changes, the task force deleted the reference to Bayesian credibility. In addition, section 5.2(b) (now section 3.2(b)) has been revised to be consistent with the suggestions.**

Section 5.3, Credibility Procedures Should Reflect Experience Characteristics—**This section has been deleted and the remaining sections renumbered.**

Section 5.4, Choice of Related Experience (now section 3.3)—**The last sentence of the old section 5.3 was added to the new section 3.3.**

Section 5.5, Informed Actuarial Judgement (now section 3.4)—The suggestions indicated that the first sentence was not clear, especially the phrase beginning with *on past insurance*. **That portion of the first sentence was deleted, and the type of information required was clarified to be *relevant information*.**

Section 5.6, Homogeneity of Data (now section 3.5)—There were several suggestions on how to improve the readability of the first sentence as well as other minor language suggestions for the remainder of the section. In addition, one individual suggested that the last sentence of this section confused credibility with classification ratemaking. **The section has been rewritten, incorporating several suggestions. The last sentence was deleted.**

Section 6. Communications and Disclosures (now Section 4)

Section 6.1, Other Relevant Standards of Practice—**This section was deleted.**

Section 6.2, Credibility Selection—Several comments expressed concern that there is no single “degree of credibility” suggested by subject data. **This section was deleted.**

Section 6.3, Disclosure (now section 4.1)—Concerns were expressed that this section requires disclosure beyond the requirements of Actuarial Standard of Practice (ASOP) No. 9. **The task force does not believe that this section creates a disclosure requirement that exceeds that of ASOP No. 9.**

Both the Casualty and Health Committees thank everyone who took the time and made the effort to write comment letters. All of the letters were helpful in developing the final standard.



ACTUARIAL STANDARDS BOARD

**Actuarial Standard
of Practice
No. 29**

**Expense Provisions in
Property/Casualty Insurance Ratemaking**

**Developed by the
Subcommittee on Ratemaking of the
Casualty Committee of the
Actuarial Standards Board**

**Adopted by the
Actuarial Standards Board
July 1997**

(Doc. No. 056)

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August 1997

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Expense Provisions in Property/Casualty Insurance Ratemaking

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice No. 29

This booklet contains the final version of actuarial standard of practice (ASOP) No. 29, *Expense Provisions in Property/Casualty Insurance Ratemaking*.

Background

This standard was developed by the Subcommittee on Ratemaking of the ASB's Casualty Committee. The Casualty Actuarial Society's *Statement of Principles Regarding Property and Casualty Insurance Ratemaking* identifies and describes principles applicable to the determination and review of property/casualty insurance rates. These principles are limited to that portion of the ratemaking process involving the estimation of costs associated with the transfer of risk. For most lines of business, the expense component is a significant portion of the rate. For some lines of business, the expense component can actually exceed the loss component. For this reason, it is necessary to have a standard of practice to provide guidance to actuaries in the determination of a proper expense component.

Exposure Draft

This standard was exposed for review in October 1994, with a comment deadline of March 15, 1995. Thirty-one comment letters were received. The Subcommittee on Ratemaking reviewed all the comments carefully, and many of the suggestions were incorporated into the final standard. In particular, the subcommittee expanded the discussions concerning (1) residual market and statutory assessment provisions, (2) the provision for reinsurance, and (3) policyholder dividends. (For a detailed discussion of the issues raised in the comment letters, and the subcommittee's responses to such, please see appendix 2.)

Format Changes

A number of format changes have also been made since publication of the exposure draft. The ASB voted in May 1996 to change the format of all future actuarial standards of practice. Thus, sections 3 and 4 now form an appendix titled, Background and Current Practices. (Appendix 1 of this standard contains sections 3 and 4 of the exposure draft.) Further, sections 5 and 6 of the exposure draft have now been renumbered as sections 3 and 4. The "new" sections 3 and 4,

along with sections 1 and 2, now form the actual standard of practice. The heading *Preamble*, which used to apply to the first four sections of the standard, has been deleted. The board made these format changes to help the reader distinguish between a standard's substantive requirements and language intended for general information.

The Subcommittee on Ratemaking and the Casualty Committee thank everyone who provided input during the exposure process. The comments were helpful in making revisions. The Casualty Committee also thanks the following former subcommittee members, who made significant contributions to this work: Daniel J. Flaherty, Gary Grant, and Robert Lindquist. The ASB voted in July 1997 to adopt the final standard.

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ACTUARIAL STANDARD OF PRACTICE NO. 29

EXPENSE PROVISIONS IN PROPERTY/CASUALTY INSURANCE RATEMAKING

STANDARD OF PRACTICE

Section 1. Purpose, Scope, and Effective Date

- 1.1 Purpose—The purpose of this standard of practice is to provide guidance to actuaries in estimating costs for property/casualty insurance ratemaking other than (1) incurred losses, (2) the provision for profit and contingencies, (3) investment expenses, and (4) federal and foreign income taxes.
- 1.2 Scope—This standard of practice applies to all property/casualty insurance coverages. This standard also applies to property/casualty risk financing systems, such as self-insurance, that provide similar coverages. References in the standard to *risk transfer* should be interpreted to include risk financing systems that provide for risk retention in lieu of risk transfer.
- 1.3 Effective Date—This standard will be effective with respect to work performed after December 1, 1997.

Section 2. Definitions

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

- 2.1 Commission and Brokerage Fees—Compensation to agents and brokers.
- 2.2 Expense Limitations—Legislative or regulatory rules that disallow or limit certain categories of expenses in determining rates.
- 2.3 General Administrative Expenses—All operational and administrative expenses (other than investment expenses) not specifically defined elsewhere in this section.
- 2.4 Loss Adjustment Expenses (LAE)—All expenses incurred in investigating and settling claims.
- 2.5 Other Acquisition Expenses—All costs, other than commission and brokerage fees, associated with the acquisition of business.
- 2.6 Policyholder Dividends—Nonguaranteed returns of premium or distributions of surplus.

- 2.7 Premium-Related Expenses—Those expenses that vary in direct proportion to premium, e.g., premium taxes. These expenses are sometimes referred to as *variable expenses*.
- 2.8 Rate—An estimate of the expected value of future costs.
- 2.9 Residual Market Provision—A provision for the entity's costs that represents its share of residual market profits or losses.
- 2.10 Statutory Assessment Provision—A provision for the entity's costs stemming from any mandated assessment.
- 2.11 Taxes, Licenses, and Fees—All taxes and miscellaneous fees except federal and foreign income taxes.

Section 3. Analysis of Issues and Recommended Practices

- 3.1 Categorizing Expenses—The actuary should be familiar with the pertinent requirements for defining expenses, such as those prescribed in the *Instructions for Uniform Classification of Expenses*, published by the National Association of Insurance Commissioners (NAIC), or Regulation 30 of the New York State Insurance Department. The actuary should also be familiar with the entity's own methods of classifying and assigning expenses.
- 3.2 Determining Expense Provisions—The actuary should determine the provisions for loss adjustment expenses; commission and brokerage fees; other acquisition expenses; general administrative expenses; and taxes, licenses, and fees that are appropriate for the policies to be written or coverages provided during the time the rates are expected to be in effect. In addition, where appropriate, the actuary should consider subdividing the expense categories. Expense provisions should reflect the conditions expected during the time these policies or coverages are expected to be in effect and should include all expenses expected to be incurred in connection with the transfer of risk.

For expenses other than premium-related expenses, the actuary should consider estimating these expenses on a basis that is not directly proportional to premium, such as per policy, per coverage, a percentage of claim losses, or per unit of exposure. Studies or actuarial judgment may support such estimates.

- 3.3 Start-Up Costs—The actuary may amortize start-up or development costs using an appropriate amortization period.
- 3.4 Expense Trending—In determining the future expense components of the rate, the actuary should be guided by Actuarial Standard of Practice (ASOP) No. 13, *Trending Procedures in Property/Casualty Insurance Ratemaking*.

- 3.5 Policyholder Dividends—The *Statement of Principles Regarding Property and Casualty Insurance Ratemaking* of the Casualty Actuarial Society (CAS) classifies policyholder dividends as an expense to operations. When the actuary determines that policyholder dividends are a reasonably expected expense and are associated with the risk transfer, the actuary may include a provision in the rate for the expected amount of policyholder dividends. In making this determination, the actuary should consider the following: the company's dividend payment history, its current dividend policy or practice, whether dividends are related to loss experience, the capitalization of the company, and other considerations affecting the payment of dividends.
- 3.6 Residual Market and Statutory Assessment Provisions—The actuary should include a provision in the rate for any residual market costs or statutory assessments expected to occur during the period of time the rates are expected to be in effect. If these costs are assessed retrospectively, it may be appropriate to include a provision to recover these costs to the extent they were not included in previous rates.
- 3.7 Provision for Reinsurance—The actuary may elect whether to include the cost of reinsurance as an expense provision. If a provision for reinsurance is included, the actuary should consider the amount to be paid to the reinsurer; ceding commissions or allowances; expected reinsurance recoveries; and other relevant information specifically relating to cost, such as a retrospective profit-sharing agreement and reinstatement premiums between the reinsured and the reinsurer.

Section 4. Communications and Disclosures

- 4.1 Conflict with Law or Regulation—The rate filed with a regulator may differ from an actuarially determined rate because of expense limitations. If a law or regulation conflicts with the provisions of this standard, the actuary should develop a rate in accordance with the law or regulation, and disclose any material difference between the rate so developed and the actuarially determined rate to the client or employer.
- 4.2 Documentation—The actuary should be guided by the provisions of ASOP No. 9, *Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations*.
- 4.3 Deviation from Standard—An actuary must be prepared to justify the use of any procedures that depart materially from those set forth in this standard and must include, in any actuarial communication disclosing the results of the procedures, an appropriate statement with respect to the nature, rationale, and effect of such departures.

Appendix 1

Background and Current Practices

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

Background

Inflation—Prior to the relatively high inflation of the 1970s, a predominant ratemaking technique involved including expenses, other than loss adjustment expenses, as a percentage of premium. In doing so, it was assumed that the expense portion of the rate was subject to the same trend (usually very low) to which the loss and loss adjustment expense portions were subjected. However, higher levels of inflation had a rather significant impact on the expected change in the various components of the rate. By the 1970s, the assumption that the trend in expenses would approximate the trend in losses was being questioned. Although the actuarially determined loss trend may have been applied to the loss and loss adjustment expenses as usual, a separate analysis and trend may have been necessary to properly reflect the anticipated change in certain other expenses.

Expense Flattening—Expense flattening techniques assign expenses to policies or other units of exposure rather than in proportion to premium or losses. Thus, expense flattening is a procedure sometimes used to determine that portion of the rate that does not vary in direct proportion to premium or losses.

Expense Trending—Expense trending reflects how changes over time affect expenses. Over the years, separate trending of expenses has become a more common ratemaking technique. However, including expenses as a proportion of premium is still used.

Actuarial Literature—Although the property/casualty actuarial literature is relatively sparse on the topic of expense provisions in ratemaking, techniques for separately trending losses and expenses and alternatives to premium-related expense provisions have been included in such literature. Also included are discussions about the inappropriateness, in some cases, of assuming proportional expenses for administrative ease when, in fact, some expense categories do not vary in direct proportion to premium.

Regulation—Beginning in the late 1970s, some regulators have applied expense limitations in either limiting or disallowing certain expenses and in requiring expense flattening.

Current Practices

Categories—Expenses other than investment expenses are generally divided into five broad categories to determine the expense component of the rate. These expenses are (1) loss adjustment expenses, (2) commission and brokerage fees, (3) other acquisition expenses, (4) general administrative expenses, and (5) taxes, licenses, and fees. Studies may be conducted to determine which expenses vary in direct proportion to premium, losses, number of policies, or other units of exposure, and which expenses may be independent.

Loss Adjustment Expenses—Loss adjustment expenses are generally of two types: allocated and unallocated. Allocated loss adjustment expenses (ALAE) are sometimes combined with and, thus, treated the same as, incurred losses (IL). ALAE are combined with unallocated loss adjustment expenses (ULAE) for some lines of business. ULAE may be expressed as a function of IL plus ALAE, but may also be expressed as a function of premium. For lines of business in which all loss adjustment expenses are combined, the loss adjustment expenses are generally expressed as a function of either IL or premium.

Commissions and Premium Taxes—Commissions and premium taxes are typically paid as a percentage of direct written premium. Such expenses are generally treated as premium-related expenses.

General Administrative Expenses and Other Acquisition Expenses—General administrative expenses and other acquisition expenses may be expressed as a function of premium; or may be partially related to premium, partially related to the number of policies, and partially related to the number of exposures.

Current Information—Historical expenses are generally analyzed in light of current relevant information to determine whether they will be representative of future costs.

Budgeted versus Historical Expenses—Because of the prospective nature of ratemaking, certain expenses, such as commissions, are generally based on budgets rather than determined from historical data.

Expense Trending—Historical expenses may be adjusted to reflect changes over time.

Residual Market and Statutory Assessment Provisions—Residual market costs and statutory assessments are often included as expenses. For those classes of business written in the voluntary market that caused the insurer to receive a share of the residual market, the residual market provision may be separately identified or embedded in the rate.

Appendix 2

Comments on the Exposure Draft and Subcommittee Responses

The proposed standard of practice was approved for release as an exposure draft in October 1994, with a comment deadline of March 15, 1995. Thirty-one comment letters were received and reviewed by the Subcommittee on Ratemaking of the ASB's Casualty Committee. Summarized below are the substantive issues raised and questions contained in the comment letters, printed in lightface. The subcommittee's responses to those issues appear in **boldface**.

Note also that, as mentioned in the transmittal memorandum to this standard of practice (see page vi), the ASB adopted on May 1, 1996, a new format for all actuarial standards of practice. Thus, the section numbers below refer to section numbers in the exposure draft, unless otherwise noted (some section numbers have remained the same).

Section 1. Purpose, Scope, and Effective Date

Section 1.1, Purpose—Several comments were received asking for clarification of the issues covered by the standard. **The subcommittee added the phrase *for property/casualty insurance ratemaking* to clarify that the standard is limited to ratemaking. Further, the section was revised to note that the subject of federal and foreign income taxes is clearly *excluded* by the standard. The subject of investment expenses was also specifically excluded since the subcommittee agreed that the subject should not be considered in this standard.** One commentator questioned whether allocated loss adjustment expenses were included in the standard. **The subcommittee revised the section to make it clear that all loss adjustment expenses are included in this standard.**

Section 1.2, Scope—A few commentators noted that this section is ambiguous in its use of examples. **The subcommittee modified the text to clearly note that the standard applies to all property/casualty coverages.**

Section 2. Definitions

Section 2.1, Allocated Loss Adjustment Expenses—**This definition was deleted since it is not used in the standard.**

Section 2.4, General Administrative Expenses (now section 2.3)—Several comments were received regarding reinsurance expenses. **The subcommittee added a new section, Provision for Reinsurance (see section 3.7), to discuss the treatment of reinsurance expenses. No changes were made to the definition of *general administrative expenses*.**

Section 2.5, Guaranty Fund Assessments (now section 2.10 and titled, Statutory Assessment Provision)—**The subcommittee developed a broader definition that refers to all statutory assessments in order to reflect guaranty fund assessments, and emerging statutory insurance and reinsurance mechanisms, such as the Florida Hurricane Catastrophe Fund, the Florida Windstorm Underwriting Association, and the California Earthquake**

Authority, as well as various administrative and special fund expenses for which entities are assessed. The subcommittee also replaced the word *insurer* with *entity* to further broaden the application.

Section 2.8, Policyholder Dividends (now section 2.6)—One comment letter noted that this was a weak definition. **Although the definition was slightly modified, the subcommittee believes that the revised definition is the most descriptive and definitive one available. The subcommittee deleted the phrase *charged to operations* at the end of the definition and added the phrase *or distributions of surplus*.**

Section 2.9, Rate (now section 2.8)—**No change was made. This definition is the same as the one found in the CAS *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*.**

Section 2.10, Residual Market Provision (now section 2.9)—**Per comments received, the entire second sentence of the section was moved to section 4.9 of the exposure draft, which can now be found in appendix 1 under the title, Residual Market and Statutory Assessment Provisions.**

Section 2.11, Taxes, Licenses, and Fees—**Based on comments received and on an analysis of the insurance expense exhibit breakout, the subcommittee inserted the words *federal and foreign* before *income taxes* to make clear that state income, municipal, police department, fire department, etc., premium taxes should be considered.**

Section 2.12, Unallocated Loss Adjustment Expenses—Some commentators noted that since some companies contract claim handling as a percentage of each claim cost, some types of claim costs could be classified as “allocated” for one company and “unallocated” for another. **This definition was deleted since it is not used in the standard.**

Section 2.13, Variable Expenses (now section 2.7 and titled Premium-Related Expenses)—One commentator suggested that this section be titled, Premium Variable Expenses. **The subcommittee agreed in concept and changed the title to, Premium-Related Expenses.**

Other commentators suggested that the standard define *nonvariable expenses*, since the term is used in section 4.8 (this section can now be found in appendix 1, Current Practices, with the title, Expense Trending) and section 5.4, Measurement Base. **The subcommittee deleted use of this term. Thus, no definition is necessary. Expenses that are not related to premiums are treated in the second paragraph of section 3.2, Determining Expense Provisions, in this standard.**

Section 3. Background and Historical Issues (Now in Appendix 1 under Background)

Section 3.1, Inflation and Price Controls (this section can now be found in appendix 1 under the title, Inflation)—It was noted that *price controls* are not mentioned elsewhere in the section. **This phrase was deleted. The subcommittee also modified the wording in the last sentence of the paragraph to make the application of the loss trend less restrictive.**

Section 3.2, Expense Flattening (this section can now be found in appendix 1)—It was suggested that the word *policies* be expanded to *policies or other units of exposure*. **The subcommittee agreed and made the modification. In addition, the wording in the last sentence was changed to make the definition of *expense flattening* more explicit.**

Section 3.3, Expense Trending (this section can now be found in appendix 1 under Background)—It was noted that the phrase *expense trending* does not need to be italicized. **The subcommittee deleted the italics and replaced *measures* with *reflects*, since expense trending is not a true measure of changes.**

Section 3.4, Actuarial Literature (this section can now be found in appendix 1)— **In the first sentence, the subcommittee replaced the word *expenses* with the phrase *expense provisions in ratemaking* to make it consistent with the subject of the standard of practice. In the last sentence, the wording was modified to be consistent with the section, Expense Flattening.**

Section 3.5, Regulation (this section can now be found in appendix 1)—It was suggested that the second sentence (*These expense limitations should be taken into account when establishing the premium rate filed with the regulator.*) reflects procedure rather than background. **The subcommittee deleted this sentence from the section, and modified the wording in section 4.1 of the standard to reflect this change.**

Section 4. Current Practices and Alternatives (Now in Appendix 1 under Current Practices)

Section 4.1, Categories (this section can now be found in appendix 1)—Suggestions included rearranging this section to remove the reference to specific loss adjustment expenses and inserting this reference into section 4.2. It was also suggested that the draft may be too limiting regarding current practice. **The subcommittee moved a portion of this section to the section directly below it (i.e., the old section 4.2, Loss Adjustment Expenses), and rewrote the remaining text to broaden the scope of current practice. Also, the word *special*, describing the studies that could be conducted, was deleted.**

Section 4.2, Loss Adjustment Expenses (this section can now be found in appendix 1)—It was suggested that the third and fourth sentences were inconsistent. **The subcommittee revised the third and fourth sentences of this section to clarify that unallocated expenses may be expressed as a function of premium.**

Section 4.3, Commissions and Premium Taxes (this section can now be found in appendix 1)—A concern was expressed that this section did not mention “truly variable commissions, e.g., ones that include profit-sharing based on loss ratios.” In addition, minor editorial changes were recommended. **The subcommittee is satisfied that this section is broad enough to allow the actuary to work with variable commissions. The editorial suggestions were adopted.**

Section 4.4, General Administrative Expenses and Other Acquisition Expenses (this section can now be found in appendix 1)—One commentator suggested that this section is inconsistent with sections 4.1 and 5.1 of the exposure draft. In addition, minor editorial suggestions were offered.

The subcommittee does not agree that an inconsistency exists among the sections, but it did incorporate the suggested editorial changes.

Section 4.5, Specific Jurisdiction versus Nationwide—Minor editorial changes were suggested. **After further consideration, the subcommittee concluded that this section was not necessary and deleted it.**

Section 4.8, Nonvariable Expenses (this section can now be found in appendix 1, Current Practices, with the title, Expense Trending)—Concern was expressed that this section restricts expense trending to only nonvariable expenses. It was also suggested that this section be broadened to include a discussion of the prospective treatment of expenses. **The subcommittee renamed this section Expense Trending, modifying the text to acknowledge that expenses may need to be adjusted to reflect changes over time.**

Section 4.9, Residual Market Provisions and Guaranty Fund Assessments (this section can now be found in appendix 1 with the title, Residual Market and Statutory Assessment Provisions)—A few comment letters requested making this section more general by removing references to *guaranty funds* and removing the reference to *state-specific residual market costs*. **The phrase *guaranty fund* was replaced with the term *statutory* in the title, and the phrase *state-specific* was eliminated from the section. The subcommittee also added language to identify an appropriate treatment of a residual market provision.**

Section 5. Analysis of Issues and Recommended Practices (Now Section 3)

Section 5.1, Categorizing Expenses (now section 3.1)—Concerns were expressed that requiring the actuary to be familiar with the *Instructions for Uniform Classification of Expenses* and with the entity's own methods of classifying expenses is too onerous. **This information (i.e., that contained in the NAIC publication and the entity's own methods) is important to the selection of an appropriate expense methodology. The section was left unchanged.** It was also suggested that the National Council on Compensation Insurance statistical plan be added to the list of expense definitions. **The subcommittee believes that the requirement to be “familiar with the entity's own methods” covers this issue.**

Section 5.2, Determining Expense Components (now section 3.2 and titled Determining Expense Provisions)—Several concerns were expressed about the discussion of ULAE and ALAE. Also, several comments requested that residual market costs be discussed in a separate section. **The discussion of ULAE and ALAE was deleted. Also, the subcommittee added a new section, Residual Market and Statutory Assessment Provisions (see section 3.6), and a new paragraph providing direction for handling expenses that do not vary directly with premium. This new paragraph replaces section 5.4 of the exposure draft.**

Section 5.3, Start-Up Costs (now section 3.3)—Comments were received that start-up costs should be more precisely defined. **The subcommittee believes that the determination of which costs are start-up costs and which are not should be made by the actuary in each unique situation. The subcommittee changed the language to include development costs, and made**

other editorial changes, but did not think it appropriate to more explicitly define these costs.

Section 5.4, Measurement Base—Several comment letters stated that the term *nonvariable expenses* needs to be defined. It was also suggested that the reference to *premium discounts or expense constants* be deleted. **As noted earlier regarding comments on section 5.2, the subcommittee deleted this section and moved the discussion of expenses that do not vary directly with premium to the second paragraph of section 3.2 of this standard.**

Section 5.5, Expense Trending (now section 3.4)—It was suggested that this section specifically identify the pertinent sections of ASOP No. 13, so that actuaries would not need to review the other standard of practice. **ASOP No. 13, *Trending Procedures in Property/Casualty Insurance Ratemaking*, should be reviewed whenever an actuary is engaged in ratemaking. No changes were made to this section.**

Section 5.6, Policyholder Dividends (now section 3.5)—Concerns were expressed that this section is unclear as to when policyholder dividends are (or are not) associated with the transfer of risk. **The subcommittee rewrote this section for clarification and to provide additional guidance.**

Note, as well, that two new sections have been added: section 3.6, Residual Market and Statutory Assessment Provisions (see the comments above regarding section 5.2 of the exposure draft), and section 3.7, Provision for Reinsurance (see the comments above regarding section 2.4 of the exposure draft).

Section 6. Communications and Disclosure (Now Section 4)

Section 6.1, Conflict with Law or Regulation (now section 4.1)—It was suggested that the actuary should quantify the economic impact of any limitations or exclusions. It was also suggested that conflicts should be disclosed to the regulator, in addition to the client or employer. **The subcommittee revised this section to note that, if a law or regulation conflicts with the provisions of this standard, the actuary should develop a rate in accordance with the law or regulation, and disclose any material difference between the rate so developed and the actuarially determined rate to the client or employer. In those situations where the regulator is neither a client nor an employer, it could be inappropriate for an actuary to disclose information directly to the regulator. Thus, the section was modified accordingly.**

Section 6.2, Documentation—One comment letter suggested that this section should simply reference ASOP No. 9, *Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations*. **The subcommittee made the suggested change.** The Subcommittee on Ratemaking of the Casualty Committee thanks everyone who took the time and made the effort to write comment letters. The input was helpful in developing the final standard.



ACTUARIAL STANDARDS BOARD

**Actuarial Standard
of Practice
No. 30**

Treatment of Profit and Contingency Provisions and the Cost of Capital in Property/Casualty Insurance Ratemaking

**Developed by the
Task Force on Rate of Return of the
Casualty Committee of the
Actuarial Standards Board**

**Adopted by the
Actuarial Standards Board
July 1997**

(Doc. No. 057)

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August 1997

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in Profit and Contingency Provisions and the Cost of Capital in Property/Casualty Insurance Ratemaking

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice No. 30

This booklet contains the final version of Actuarial Standard of Practice (ASOP) No. 30, *Treatment of Profit and Contingency Provisions and the Cost of Capital in Property/Casualty Insurance Ratemaking*.

First and Second Exposure Drafts

The first draft of this standard was exposed for review in October 1994, with a comment deadline of March 15, 1995. Thirty-one comment letters were received. The second draft of this standard was exposed for review in August 1996, with a comment deadline of December 2, 1996. Ten comment letters were received on the second exposure draft. (For a copy of either exposure draft, please contact the ASB office.) The Task Force on Rate of Return of the ASB's Casualty Committee reviewed and carefully considered all comments received on both exposure drafts. As was the case after the first exposure, the task force revised the second exposure draft after participating in many conference calls and listening to comments made during question-and-answer sessions held at various Casualty Actuarial Society (CAS) meetings.

Substantive Issues

Following the first exposure draft, the task force received a number of comment letters regarding the discussion of rates versus prices. Although several changes were made in the second exposure draft to more clearly indicate that the proposed standard intended only to address the evaluation of costs (i.e., rates), some of the commentators' letters on the second exposure draft still expressed confusion on this point. In response, the task force further revised several sections to make clear that the standard does not address considerations such as marketing goals, competition, and legal restrictions that may affect price.

In addition to the "rates versus prices" issue, several commentators questioned whether the cost of capital is truly equivalent for stock, mutual, and other insurance organizations. After extensive discussion, the task force changed the language of the standard to focus the practitioner on assessing the cost of capital as an opportunity cost and to recognize that all risk transfers have an opportunity cost. The task force also combined section 3.8 with section 3.2 to indicate that the cost of capital may differ for various capital providers due to their differing risk characteristics,

and that such differences play a role in assessing the cost of capital for a specific capital provider. (For a detailed discussion of the comments and the task force's responses to such, please see appendix 2 of this standard.)

The task force is grateful to the many individuals who contributed written comments or participated in the numerous discussions of the proposed standard at CAS meetings. The task force believes that the final standard benefitted significantly from this professional debate.

The ASB voted in July 1997 to adopt the final standard.

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ACTUARIAL STANDARD OF PRACTICE NO. 30

TREATMENT OF PROFIT AND CONTINGENCY
PROVISIONS AND THE COST OF CAPITAL
IN PROPERTY/CASUALTY INSURANCE RATEMAKING

STANDARD OF PRACTICE

Section 1. Purpose, Scope, and Effective Date

- 1.1 Purpose—According to the *Statement of Principles Regarding Property and Casualty Insurance Ratemaking* (hereafter the *Statement of Principles*) of the Casualty Actuarial Society, insurance rates should provide for the cost of capital through underwriting profit and contingency provisions. This standard of practice provides guidance to actuaries in estimating the cost of capital and evaluating underwriting profit and contingency provisions.
- 1.2 Scope—This standard of practice applies to all property/casualty insurance coverages. This standard also applies to property/casualty risk financing systems, such as self-insurance, that provide similar coverages. References in the standard to *risk transfer* should be interpreted to include risk financing systems that provide for risk retention in lieu of risk transfer. Further, as is true of the *Statement of Principles*, this standard is limited to defining a *rate* as the estimation of future *costs* and does not address other considerations that may affect a *price*, such as marketing goals, competition, and legal restrictions.
- 1.3 Effective Date—This standard will be effective with respect to work performed after December 1, 1997.

Section 2. Definitions

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

- 2.1 Capital—The funds intended to assure payment of obligations from insurance contracts, over and above those funds backing the liabilities.
- 2.2 Contingency Provision—A provision for the expected differences, if any, between the estimated costs and the average actual costs, that cannot be eliminated by changes in other components of the ratemaking process.
- 2.3 Cost of Capital—The rate of return that capital could be expected to earn in alternative investments of equivalent risk; also known as *opportunity cost*.

- 2.4 Insurance Cash Flows—Funds from premiums and miscellaneous (non-investment) income from insurance operations, and payments for losses, expenses, and policyholder dividends. Associated income taxes are recognized when the analysis is on a post-tax basis.
- 2.5 Insurance Risk—The extent to which the level or timing of actual insurance cash flows is likely to differ from expected insurance cash flows.
- 2.6 Investment Income—Proceeds (other than the return of principal) derived from the investment of assets, minus investment expenses. Associated income taxes are recognized when the analysis is on a post-tax basis.
- 2.7 Investment Income from Insurance Operations—The income associated with the investment of insurance cash flows. (This is sometimes referred to as *investment income on policyholder-supplied funds*.)
- 2.8 Investment Risk—The extent to which the level or timing of actual investment proceeds is likely to differ from what is expected.
- 2.9 Leverage—A measure of the relative amount of risk to which capital is exposed, typically expressed as the ratio of an exposure measure (such as premium or liabilities) to the capital amount.
- 2.10 Operating Profit—The sum of underwriting profit, miscellaneous (non-investment) income from insurance operations, and investment income from insurance operations. Associated income taxes are recognized when the analysis is on a post-tax basis.
- 2.11 Rate—An estimate of the expected value of future costs.
- 2.12 Total Return—The sum of operating profit and investment income on capital, usually after income taxes, often expressed in percentage terms.
- 2.13 Underwriting Expenses—All expenses except losses, loss adjustment expenses, investment expenses, policyholder dividends, and income taxes.
- 2.14 Underwriting Profit—Premiums less losses, loss adjustment expenses, underwriting expenses, and policyholder dividends.
- 2.15 Underwriting Profit Provision—The provision for underwriting profit in the actuarially developed rate, typically expressed as a percentage of the rate.

Section 3. Analysis of Issues and Recommended Practices

- 3.1 Estimating the Cost of Capital and the Underwriting Profit Provision—Property/casualty insurance rates should provide for all expected costs, including an appropriate cost of capital associated with the specific risk transfer. This cost of capital can be provided for by estimating that cost and translating it into an underwriting profit provision, after taking leverage and investment income into account. Alternatively, the actuary may develop an underwriting profit provision and test that profit provision for consistency with the cost of capital. The actuary may use any appropriate method, as long as such method is consistent with the considerations in this standard.

For historical and practical reasons, this standard separately discusses the underwriting profit provision, investment income from insurance operations, and investment income on capital. The actuary should keep in mind that evaluation of whether the cost of capital is appropriately recognized does not necessarily require these distinctions.

- 3.2 Basis for Cost of Capital Estimates—In estimating the cost of capital, the actuary should consider the relationship between risk and return. The methods used for estimating the cost of capital should reflect the risks involved in the risk transfer under consideration. These risks may include insurance, investment, inflation, and regulatory risks, as well as diversification, debt structure, leverage, reinsurance, market structure, and other appropriate aspects of the social, economic, and legal environments.

Thus, the cost of capital is likely to vary from one insurer to another. The actuary should recognize that the capital which is needed to support any risk transfer has an opportunity cost regardless of the source of capital or the structure of the insurer.

- 3.3 Estimates of Future Costs—Since all components of a rate should be estimates of future costs relating to the risk transfer during the prospective period of time to which the rate applies, capital costs, investment income, income taxes, cash flows, and leverage factors used in calculating the profit provision should all be based on expected future values.

- 3.4 Parameters of the Risk Transfer —The actuary should recognize that the cost of capital associated with an individual risk transfer may vary, based on the specific parameters of the transfer. To the extent that deductibles, dividend or return of premium plans, reinsurance, etc., affect the risk of the insurer, the cost of capital and the amount of capital needed to support the transaction may be affected.

- 3.5 Investment Income—There are two elements of investment income that the actuary should consider: investment income from insurance operations and investment income on capital.

The actuary should assess the investment risk, since the amount and cost of capital should reflect investment risk as well as the risk associated with the insurance cash flows. Investment risk addresses the cost of default, reinvestment risk, and other investment uncertainties. Such risks can result in a significantly different yield than the stated yield rate.

Any of several general approaches may be used by the actuary to estimate investment income, as long as the assumptions are reasonable and appropriate. The investment yield rates used should be appropriate for the cash flow patterns associated with the coverages under consideration. If historical balance sheet and cash flow data are used to project investment income, the data should be adjusted to represent future investment income from the associated coverages.

The actuary may use any of a number of methods for recognizing investment income from insurance operations. Two such approaches are as follows:

- a. Methods that estimate investment income based on projected insurance cash flows. The insurance cash flows are projected for each future period, and the expected investment yield rate appropriate for each future period is applied to the insurance cash flow for that period. The investment yield rates should be appropriate for the cash flow patterns associated with the coverages under consideration.
- b. Methods that apply an expected investment yield rate to assets representing the liabilities for losses, loss adjustment expenses, and unearned premium net of agents' balances and prepaid expenses. If historic liability-to-premium relationships are used, they should be adjusted to reflect expected future relationships between liabilities and premiums. The actuary should also consider, for example, the effects of growth, changes in expected loss or expense patterns, and the effect of the delayed receipt of investment income. The investment yield rate selected should represent the expected investment yield for the insurer during the period the rates are expected to be in effect.

3.6 Income Taxes—To the extent income taxes are not included in the expense provision, the actuary should use provisions for expected income taxes that are consistent with the earnings expected from the insurance transaction being evaluated.

3.7 Contingency Provision—The actuary should include a contingency provision if the assumptions used in the ratemaking process produce cost estimates that are not expected to equal average actual costs, and if this difference cannot be eliminated by changes in other components of the ratemaking process.

While the estimated costs are intended to equal the average actual costs over time, differences between the estimated and actual costs of the risk transfer are to be expected in any given year. If a difference persists, the difference should be reflected in the ratemaking calculations as a contingency provision. The contingency provision is not

intended to measure the variability of results and, as such, is not expected to be earned as profit.

- 3.8 Use of Different Bases—The cost of capital can be expressed as a percentage of capital, a percentage of assets, a percentage of premium, or other appropriate base. The actuary may choose any such appropriate base. Actuaries may use different bases, which can be converted from one to another. Regardless of which base is used to reflect the cost of capital, the actuary should clearly identify the base used and should document the relevant assumptions.
- 3.9 Accounting Rules for Comparing the Cost of Capital—The accounting rules employed within any model should be internally consistent. When comparing one industry with another, the actuary should make any necessary adjustments so that costs of capital of industries with different accounting methods can be properly compared.

Section 4. Communications and Disclosures

- 4.1 Conflict with Law or Regulation—If a law or regulation conflicts with the provisions of this standard, the actuary should develop a rate in accordance with the law or regulation, and disclose any material difference between the rate so developed and the actuarially determined rate to the client or employer.
- 4.2 Documentation—The actuary should be guided by the provisions of ASOP No. 9, *Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations*.
- 4.3 Deviation from Standard—An actuary must be prepared to justify the use of any procedures that depart materially from those set forth in this standard and must include, in any actuarial communication disclosing the results of the procedures, an appropriate statement with respect to the nature, rationale, and effect of such departures.

Appendix 1

Background and Current Practices

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

Background

Historical Procedures—Until the 1970s, it was common practice to include in rate calculations a standard underwriting profit and contingency provision of 2.5% for workers compensation insurance and 5% for other property/casualty lines of insurance (6% for some property lines). These provisions did not explicitly reflect investment income, since there was general agreement at the time that these standard provisions implicitly reflected investment income and insurance risk in a reasonable fashion. However, economic and structural changes in the insurance industry over time began to lead to the explicit recognition of investment income in calculating insurance rates.

Historical Issues—A number of issues have historically accompanied the development and evaluation of the underwriting profit and contingency provisions: (1) how to measure risk and reflect it in the underwriting profit provision, (2) how or whether to measure any systematic variation from expected costs and reflect it in the contingency provision, (3) which accounting rules should be used to measure insurance returns and to compare them with returns in other industries, (4) how or whether to allocate investment income and capital, and (5) how to relate underwriting profit provisions in rates to the cost of capital.

Role of Capital—Capital plays several roles in an insurance transaction, including providing the initial investment in physical plant and equipment and providing working capital. However, the primary role is to assure payment of obligations from insurance contracts, over and above those funds backing the liabilities.

Capital has a value and its use entails a cost. The cost is the expected return the capital could earn in alternative investments of equivalent risk. Judicial decisions dealing with the cost of capital and profit provisions (see, e.g., *Federal Power Commission v. Hope Natural Gas*, 320 U.S. 591 (1944)) provide background and definitions for the determination of the cost of capital in a regulatory setting.

Role of the Underwriting Profit Provision—The underwriting profit provision, together with all other cost and revenue components as defined in section 2.12, provides the risk taker with an expected total return to cover the cost of capital.

Role of the Contingency Provision—A common assumption underlying property/casualty insurance ratemaking is that the expected costs included in the rate calculations will equal the actual costs over the long run. If not, and the expected difference cannot be explicitly attributed

to a specific component of the rate (and thereby eliminated), then this difference is incorporated in the ratemaking process by including a contingency provision.

Current Practices

A method commonly used to develop or test the underwriting profit provision in insurance rates is to estimate the cost of capital and translate that cost into an underwriting profit provision. Some methods currently used to estimate the cost of capital, and financial models to relate that cost to the underwriting profit provision, are described below.

Underwriting profit provisions can also be developed using models that do not directly relate the cost of capital to the underwriting profit provision. Some of these models are also described below.

Inclusion of a particular model in this appendix should not be interpreted as an endorsement, but rather a recognition that such a model is used. Some applications of these models may not be consistent with section 3 of this standard.

Estimating the Cost of Capital—Several techniques are used to estimate the cost of capital. These include, but are not limited to, the following:

1. **Comparable Earnings Model**—The comparable earnings model is used to analyze historical returns on equity for entities or industries of comparable risk. The cost of capital is related to the average rate of return over a historical period.
2. **Discounted Cash Flow Model**—One form of the discounted cash flow (DCF) model, the dividend discount model, is used to analyze the current prices and dividend levels of publicly traded securities that pay dividends. The cost of capital is calculated as the sum of the expected first-year dividend yield plus the expected annual growth rate in dividends.
3. **Risk Premium Model**—The risk premium model is used to analyze the spread in returns for investments of different risk. The cost of capital is estimated as the sum of the expected return on a reference investment plus a margin to reflect relative risk. One widely used form of risk premium analysis is known as the capital asset pricing model (CAPM), in which the reference security is a risk free Treasury security, and the risk margin is determined using a measure of risk known as *beta*, defined as the covariance of an investment's return with returns in capital markets as a whole.

Relating the Cost of Capital to the Underwriting Profit Provision—This section describes various models currently used regarding the relation of the cost of capital to the underwriting profit provision.

1. Models that directly develop an underwriting profit provision are as follows:

- a. Net Present Value Model—The net present value (NPV) model is used to discount the estimated net cash flow to the capital provider at a rate equal to the cost of capital. For the purpose of these calculations, *net cash flow* is defined as the residual amounts of cash that flow to and from the equity account, after all policy obligations are met. The net cash flow reflects the timing of each of the individual cash flows, including the commitment and release of capital in support of the insurance transaction. The internal rate of return (IRR) model, a specific application of the general NPV model, uses an iteration technique to calculate the rate(s) of return that will set the net present value of a risk transfer's cash inflows and outflows equal to zero.
 - b. Other Discounting Models—Other discounting models can be used to estimate the present value of the individual cash flows from the insurance transaction. The present value of the premium and miscellaneous (non-investment) income, before profit, is set equal to the present value of the associated losses, expenses, policyholder dividends, and income taxes. The present values are estimated using appropriate prospective investment yield rates. A margin can be added to the present value of the premium so that the margin plus the expected investment income on capital generate a post-tax return that, when divided by the required capital, equals the cost of capital.
 - c. Total Financial Needs Model—Total financial needs models are used to develop the underwriting profit provision such that the sum of underwriting profit, miscellaneous (non-investment) income, investment income from insurance operations, and investment income on capital, after income taxes, will equal the cost of capital. Each of these components is explicitly quantified.
2. Models that do not directly relate the cost of capital to the underwriting profit provision are as follows:
- a. State X Model—The State X model (originally appearing in some Insurance Services Office, Inc. rate filings as the *State X method*) is used to estimate the investment income from insurance operations. The method does not, in itself, allow for development of the total return or of a profit provision; it is used merely to develop one component of the total rate of return—the estimated investment income from insurance operations.
 - b. Risk Adjusted Net Present Value Model—The risk adjusted net present value (RANPV) model is used to estimate the risk adjusted present value of the insurance cash flows. Each of the flows is analyzed for its specific risk, and the otherwise attainable prospective investment yield rate is adjusted by the risk component prior to calculating the present value. Using the RANPV model, one calculates the premium directly, so that the risk adjusted present value of the premium and miscellaneous (non-investment) income equals the risk adjusted present value of the losses, expenses, policyholder dividends, and associated in-

come taxes. The expected underwriting profit in the premium can be derived from the RANPV model by summing all components using their undiscounted values.

- c. Growth Requirement Model—The growth requirement model is used to set the level of retained earnings based on the expected future growth rate of the entity or industry.
- d. Additional Models—Other models that do not directly relate the cost of capital to the underwriting profit provision include options pricing models, arbitrage pricing models, models based on ruin theory, models based on utility theory, and shareholder value models.

Developing and Evaluating a Contingency Provision—Contingency provisions have been developed in practice using methods that measure differences between expected and actual costs.

Appendix 2

Comments on the 1996 Second Exposure Draft and Task Force Responses

The second draft of this standard was exposed for review in August 1996, with a comment deadline of December 2, 1996. Ten comment letters were received and reviewed carefully by the Task Force on Rate of Return of the ASB's Casualty Committee. Summarized below are the significant issues and questions contained in the comment letters, printed in lightface. The task force's responses appear in **boldface**.

General Observations

Of the ten comment letters received on the second exposure draft, most of the comments were favorable. Even those commentators who provided suggestions for changes seemed pleased with the overall direction the task force took in developing the second exposure draft. Samples of such satisfaction were found in comments such as follows: "I think this is an example of the type of standards that the profession should be developing," "[t]his draft represents an overall improvement over the initial exposure draft," and "the [task force] has taken great pains in carefully defining many critical concepts that our standards omit today." Most of the suggestions for revising text were to further clarify concepts already present within the second exposure draft.

However, it was also evident from the comments that some confusion still exists surrounding the "rate versus price" issue. For example, one commentator believes that the standard should not limit actuarial practice in setting profit margins that are either explicit or implicit in actual prices in the marketplace. The commentator further raises potential legal issues were the actuarial profession to engage in limiting actuarial practice in this area. **The task force agrees with the commentator that the standard does not apply to final (market) prices— the standard is entirely focused on the evaluation of costs. In fact, the task force has consistently and consciously focused on costs (not on prices) in its deliberations in consideration of the legal environment and has obtained competent legal advice as appropriate.**

The commentator also questions whether a consensus on acceptable actuarial practice currently exists in this area. **The task force believes such consensus exists and is embodied in the standard. The current syllabus upon which actuarial examinations are based is one indicator that a consensus exists. The extensive presentations and discussions of the proposed standard at Casualty Actuarial Society (CAS) meetings and seminars is another indication that such a consensus exists.**

Section 1. Purpose, Scope, and Effective Date

Section 1.1, Purpose—One commentator thought that the use of the phrase *include the cost of capital* in the first sentence of this section implied that the *Statement of Principles Regarding*

Property and Casualty Insurance Ratemaking of the CAS requires that an explicit provision for the cost of capital be included in rates. **The task force revised the text by replacing *include* with *provide for* to more closely match its understanding of the *Statement of Principles*.**

Section 1.2, Scope—**The task force revised this section to more clearly distinguish between *rate* and *price*. In addition, the task force added language to clarify that the standard applies to property/casualty risk financing systems, such as self-insurance.**

Section 2. Definitions

Section 2.2, Contingency Provision—One commentator suggested clarifying the language in this section to note that, in addition to quantification, a contingency provision might be provided for in other ways. **The task force reworded the section, making it more consistent with section 3.7.** Another commentator questioned the definition's lack of consideration of the potential variance in results. **The task force did not expand the definition, since it believes that the profit provision more appropriately should reflect variance in results.**

Section 2.3, Cost of Capital—Two commentators suggested changes. One suggested inclusion of specific components in the definition; the second suggested that *cost of capital* be defined as the *cost of capital desired by the capital provider*. **The task force did not modify the definition, as section 3.2 references a number of influences on the cost of capital. The task force did, however, revise section 3.2 by including additional explanatory language and believes these revisions to section 3.2 address the concerns raised by the second commentator.**

Section 2.4, Insurance Cash Flows—One commentator suggested changing the title of this section to Net Insurance Cash Flows, while another suggested referencing the treatment of taxes directly rather than indirectly. **The task force modified the language to clarify that miscellaneous (non-investment) income is from insurance operations. The revised section 2.4 also presents the components of insurance cash flow as items in a list to avoid the appearance of a calculation and directly references the treatment of income taxes.**

Section 2.6, Investment Income—Two commentators suggested clarifying the language with respect to the treatment of income taxes. **The task force adopted the suggestions and also adopted consistent language in sections 2.4 and 2.10.**

Section 2.8, Investment Risk—Two commentators pointed out an inconsistency in the usage of the terms *proceeds* and *income* in other definitions. **The task force clarified the text by using the term *proceeds* consistently.**

Section 2.10, Operating Profit, and Section 2.13, Underwriting Profit (now sections 2.10, Operating Profit; 2.13, Underwriting Expenses; and 2.14, Underwriting Profit)—Three commentators questioned the usage of the terms included (or excluded) in these definitions. There also appeared to be some confusion as to which expense items were included in the term *expenses*. **After careful review and discussion of the comments, the task force made changes in these definitions and added a new section (2.13, Underwriting Expenses). The intent of**

the commentators was incorporated in the three definitions, and the task force believes the revisions achieve the clarity and consistency suggested. These definitions are consistent with the categories used in the underwriting and investment exhibit statement of income in the National Association of Insurers Commissioners (NAIC) annual statement blank for property and casualty insurers. Specifically, the definition of *underwriting profit* is consistent with the definition of *net underwriting gain (or loss)* from the NAIC statement blank.

Section 2.12, Total Return—One commentator suggested that the definition include some examples of commonly used bases of total return. **The task force did not make any changes, since it believes the definition is clear as stated.**

Section 3. Analysis of Issues and Recommended Practices

Section 3.1, Estimating the Cost of Capital and the Underwriting Profit Provision—One commentator wanted to change the beginning of the third sentence of this section from *Similarly* to *Alternatively*. **The task force made the change.**

Section 3.2, Basis for Cost of Capital Estimates—One commentator suggested that in the second sentence, the phrase *business activity* be changed to *risk transfer*. **The task force made this change.** Another commentator suggested adding *currency* to the list of risks included and noted that the list could be construed as “limiting or as a checklist of specific requirements.” **The task force disagrees. Since the types of risk to consider are many and diverse, the task force believes that it is necessary to provide a reasonable set of examples. The language of the standard (i.e., *These risks may include*) clearly indicates that the list is not exhaustive.**

Another commentator suggested that the reference to the *Hope Natural Gas* case be placed in the background section, i.e., in appendix 1. **The task force agrees and moved the reference accordingly (see the section titled, Role of Capital).**

Note as well that a new paragraph was added to section 3.2 (see the discussion below regarding comments received on section 3.8).

Section 3.3, Estimates of Future Costs—Several commentators disagreed that capital costs should be based upon expected future values, since the cost is dependent on the risk or variability to which it is exposed. **The task force agrees that risk or variability is an element of capital costs. Risk or variability is appropriately considered in deriving the expected value; therefore, no change in the language used is necessary.**

Section 3.4, Risk Sharing (now titled Parameters of the Risk Transfer)—One commentator suggested that the title of this section should be changed, noting that insurance is a risk transfer device, and not a risk sharing device. This commentator also suggested alternative wording to clarify the roles of the two main parties to the insurance transaction: the insured and the insurer. **The task force agrees with the commentator and rewrote the section to indicate that the cost of capital may vary with the specific parameters of the risk transfer.**

Another commentator noted that deductibles, limits, etc., affect the *structure* of the risk transfer rather than the parties involved. **The task force agrees that these factors affect the structure of the risk transfer and believes that the revised language addresses this concern.**

Section 3.5, Investment Income—One commentator suggested a revised second sentence in paragraph two as follows: *Investment risk includes the estimated cost of default and reinvestment risk on the assets associated with the proposed transaction, since such costs can result in a significantly different yield than the stated yield rate.* **The task force agrees with the commentator and changed the text to be substantially similar to the suggested revision.**

This commentator also suggested revising paragraph (b) to add *retention of business* as a subject for the actuary's consideration. **The task force agrees that retention of business may be a consideration, but the standard is not intended to provide an exhaustive list of considerations. The phrase *for example* was added to clarify that the section does not provide a complete list.**

Section 3.6, Income Taxes—One commentator suggested adding the following sentence: *The income tax position of the risk assuming entity, such as tax loss carry forwards, and alternative minimum taxes, may also be relevant to accepting or rejecting the proposed risk transfer.* **The task force disagrees with this suggestion, because it believes this suggestion addresses considerations that are not relevant to the cash flows for the risks being transferred. Therefore, no change was made.**

Section 3.7, Contingency Provision—One commentator suggested adding a sentence which would state that the actuary need not explicitly identify the contingency provision separate from the profit provision, and that the contingency provision is not intended as a risk margin for catastrophic events. **The task force believes the definition of *contingency provision* makes it clear that it is *not* a risk margin for catastrophic events. The task force disagrees that a contingency provision can implicitly be combined with a profit provision, because the two provisions are distinctly different, both subject to explicit determination.**

Another commentator suggested that the use and meaning of a contingency provision was unclear and needed to be clarified in the standard. **The task force believes that, with the clarifying changes made to the second paragraph of this section, the standard adequately explains the use of the contingency provision as a correction factor when the ratemaking process has produced in the past, and is expected to produce in the future, cost estimates not equal to average actual costs.**

Section 3.8, Structure of Insurer—This section of the second exposure draft addressed the structure of the insurer, such as stock, mutual, etc. Several commentators expressed concern that the requirements of the capital providers should be taken into account when considering the cost of the insurance product, and that non-stock organizations might have different requirements than stock companies. One commentator specifically suggested making a greater distinction between the cost of capital and the desired return on capital. **The task force rewrote the text of this section to place greater emphasis on the economic concept of *opportunity cost*, which**

refers specifically to the value of capital in its next best alternative use. Under this definition, the proper cost of capital is the return that the capital could earn in an alternative investment of equivalent risk. The task force does not believe that this differs depending on the ownership structure (i.e., stock, mutual, or other) of the insurer per se. However, as discussed in section 3.4, the actuary's estimate of the cost of capital should reflect characteristics of the risk transfer that may arise due to ownership structure (such as, for example, the availability of policyholder dividends). Note, in addition, that the text of this section was moved to section 3.2 in order to enhance clarity.

One commentator who questioned section 3.8 also wished to add to the standard a new section, which would read as follows:

Several of the models used for estimating the underwriting profit provision also permit the actuary to rank potential risk transfer undertakings. An actuary should be prepared to rank the risk versus the reward (the total return, from underwriting and from investment income) for various scenarios involving the allocation of capital towards a certain line of insurance or a specific product.

The commentator's rationale for this suggestion is that “the actuary of the future may often be called upon to estimate not only the reward (the total return from allocating capital towards a certain line of insurance or a specific product), and not only the associated risk, but also to rank several risk/reward scenarios for a client or employer.” **The task force agrees that an actuary can be asked to estimate and rank various risk/reward scenarios for a client or an employer. However, the task force thinks that while this is implicit in the role an actuary plays, the matter is beyond the scope of the standard.**

Appendix 1—Background and Current Practices

Role of the Underwriting Profit Provision—One commentator found the references to *all other cost and revenue components* too vague. **The task force agrees that the reference is not precise, but the next clause of the sentence refers to *total [rate of] return*, which is precisely defined in section 2.12. Hence, no change was made.**

Estimating the Cost of Capital—One commentator suggested adding a parenthetical phrase, (*generally a risk free investment*), to the description of the risk premium model (in the second sentence of item (3), after the phrase, *reference investment*). **The task force disagrees with this change. In the typical (perhaps the most common) implementation of the risk premium method, the reference security is a long-term utility bond, which is not risk free. Thus, the second sentence was left unchanged. However, the task force did modify the next sentence as follows: *One widely used form of risk premium analysis is known as the capital asset pricing model (CAPM), in which the reference security is a risk free Treasury security, and the risk margin is determined....* This correctly identifies that in the CAPM variant of risk premium analysis, the reference security is risk free.**

Relating the Cost of Capital to the Underwriting Profit Provision—One commentator expressed concern about the use of the singular *rate* in the last sentence of the section that discusses the net present value model, and another suggested alternative wording for clarity, in the definition of the IRR model. **The task force changed *rate* to *rate(s)*, and adopted the proposed wording to note that the IRR calculates the rate(s) of return by setting the net present value of a risk transfer's cash inflows and outflows equal to zero.**

The task force thanks everyone who took the time and made the effort to write comment letters. The input was helpful in developing the final standard.



ACTUARIAL STANDARDS BOARD

**Actuarial Standard
of Practice
No. 39**

**Treatment of Catastrophe Losses in
Property/Casualty Insurance Ratemaking**

**Developed by the
Subcommittee on Ratemaking of the
Casualty Committee of the
Actuarial Standards Board**

**Adopted by the
Actuarial Standards Board
June 2000**

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June 2000

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in the Treatment of Catastrophe Losses in Property/Casualty Insurance Ratemaking

FROM: Actuarial Standards Board (ASB)

SUBJ: Actuarial Standard of Practice (ASOP) No. 39

This booklet contains the final version of Actuarial Standard of Practice No. 39, *Treatment of Catastrophe Losses in Property/Casualty Insurance Ratemaking*.

Background

Many property/casualty insurance products are, by their nature, subject to large aggregate losses resulting from relatively infrequent events or natural phenomena, i.e., from catastrophes. These losses can cause extreme volatility in historical insurance data and generally require separate and different treatment from other losses in ratemaking methodologies. Historically, the most common method was to calculate the ratio of actual catastrophe losses to noncatastrophe losses over a longer experience period, and apply that ratio to expected noncatastrophe losses in the ratemaking formula.

In 1992 and 1994, two events occurred that changed the actuarial profession's view of catastrophe losses. The Hurricane Andrew and Northridge Earthquake catastrophes clearly demonstrated the limitations of relying exclusively on historical insurance data in estimating the financial impact of potential future events. In addition, property/casualty insurers (including self-insurers) and their actuaries began to focus on the impact that large individual events or sequences of events could have on the insurers' solvency, cash flow, and earnings.

This actuarial standard of practice is intended to provide guidance to actuaries in evaluating catastrophe exposure and in determining a provision for catastrophe losses and loss adjustment expenses in property/casualty insurance ratemaking.

Exposure Draft

This standard was exposed for review in February 1999, with a comment deadline of June 15, 1999. Fourteen comment letters were received. The Subcommittee on Ratemaking reviewed all the comments carefully, and many of the suggestions were incorporated in the final standard. In particular, the subcommittee did the following: (1) revised the title and the scope of the standard to more explicitly recognize that the standard applied to ratemaking; (2) revised the text to indicate that the actuary was estimating a catastrophe provision not estimating actual catastrophe

losses; and (3) more explicitly recognized that, in the end, the procedure that the actuary uses must reflect the expected frequency and severity distribution of catastrophes, as well as the anticipated class, coverage, geographic and other relevant exposure distributions. For a summary of the substantive issues contained in these fourteen comment letters and the task force's responses, please see appendix 2.

The subcommittee and Casualty Committee thank all those who commented on the exposure draft.

The subcommittee also thanks former member Robert W. Gossrow for his contributions during the development of this proposed ASOP.

The ASB voted in June 2000 to adopt this standard.

Subcommittee on Ratemaking of the Casualty Committee

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ACTUARIAL STANDARD OF PRACTICE NO. 39

**TREATMENT OF CATASTROPHE LOSSES IN
PROPERTY/CASUALTY INSURANCE RATEMAKING**

STANDARD OF PRACTICE

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

1.1 Purpose—The *Statement of Principles Regarding Property and Casualty Insurance Ratemaking* of the Casualty Actuarial Society states that consideration should be given to the impact of catastrophes and that procedures should be developed to include an allowance for catastrophe exposure in the rate. The purpose of this actuarial standard of practice (ASOP) is to provide guidance to actuaries in evaluating catastrophe exposure and in determining a provision for catastrophe losses and loss adjustment expenses in property/casualty insurance ratemaking.

1.2 Scope—This standard provides guidance to actuaries when performing professional services in connection with ratemaking for property/casualty insurance coverages including property/casualty risk financing systems, such as self-insurance or securitization products, which provide similar coverage.

If a conflict exists between this standard and applicable law or regulation, the actuary should comply with the requirements of the law or regulation and make the disclosures specified in section 4.1 of this ASOP. Compliance with applicable law or regulation is not considered to be a deviation from this standard.

1.3 Cross References—When this standard refers to the provisions of other documents, the reference includes the referenced document as it may be amended or restated in the future, and any successor to it, by whatever name called. If the 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 work performed on or after December 15, 2000.

Section 2. Definitions

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

- 2.1 Catastrophe—A relatively infrequent event or phenomenon that produces unusually large aggregate losses.
- 2.2 Catastrophe Ratemaking Procedures—Ratemaking procedures that adjust for the impact of catastrophe losses in the experience data and determine a provision for catastrophe losses and loss adjustment expenses.
- 2.3 Contagion—A lack of independence between the occurrence of losses among different entities.
- 2.4 Demand Surge—A sudden and usually temporary increase in the cost of materials, services, and labor due to the increased demand for them following a catastrophe.

Section 3. Analysis of Issues and Recommended Practices

In evaluating catastrophe exposure and in determining a provision for catastrophe losses and loss adjustment expenses in property/casualty insurance ratemaking, the actuary should be guided by the following sections.

- 3.1 Identification of Catastrophe Perils or Events—The actuary should take reasonable steps to identify the perils or events that have the potential to generate catastrophe losses that differ materially from the expected aggregate losses or the expected distribution of losses. These perils or events have at least one of the following characteristics:
 - a. The Potential to Display Contagion—Examples of perils that display contagion include windstorms, earth movement, and freezing.
 - b. Infrequent Occurrence—Some events that occur infrequently have the potential to produce losses that can significantly distort the historical experience. An example of such an event is an explosion that results in the release of toxic material. If the experience data contain such events, using this experience data without adjustment may overstate the catastrophe provision in the rates. If the experience data do not contain such events, using this experience data without adjustment may understate the catastrophe provision in the rates.
- 3.2 Identification of Catastrophe Losses—The actuary should identify, where practicable, the catastrophe losses in the historical insurance data. In doing so, the actuary should consider how accurately the catastrophe losses can be identified, and the extent to which they may have a material impact on the results of the analysis.

3.3 The Use of Data in Determining a Provision for Catastrophe Losses—The actuary may use historical insurance data and noninsurance data, as described in sections 3.3.1 and 3.3.2 below.

3.3.1 Use of Historical Insurance Data—The actuary should consider the following when using data available from insurance sources:

- a. Evaluating Historical Insurance Data—The actuary should consider comparing historical insurance data to noninsurance data to determine the extent to which the available historical insurance data are fully representative of the long-term frequency and severity of the perils or events identified in section 3.1 that produced the catastrophe losses. Thus, in determining a provision for catastrophe losses, the actuary should consider the sensitivity of the provision to changes in the historical insurance data relating to the following: (1) the frequency of catastrophes; (2) the severity of catastrophes; and (3) the geographic location of catastrophes.
- b. The Applicability of Historical Insurance Data—The actuary should consider the applicability of historical insurance data for the insured coverage. This includes determining (1) whether catastrophe losses are likely to differ significantly among elements of the rate structure, such as construction type and location; (2) whether such differences should be reflected in the ratemaking procedures; and (3) how to reflect such differences, taking into account both homogeneity and the volume of data. In addition, the actuary should consider whether there is a sufficient number of years of comparable, compatible historical insurance data.
- c. Adjustments to Historical Insurance Data to Reflect Future Conditions—The actuary should consider making adjustments to the historical insurance data to reflect conditions likely to prevail during the period in which the rate will be in effect. Such adjustments should take into account the impact of changes in the exposure to loss, including coverage differences, the underlying portfolio of insured risks, building codes and the enforcement of these codes, and building practices; population shifts; costs; and demand surge during both the historical period and the period for which the rate will be in effect. These considerations become more important when a longer experience period is used because they can have a greater effect over longer time periods.
- d. Stability of Outcomes Based on Historical Insurance Data—The actuary should consider the extent to which the provision for catastrophe losses would change if the catastrophe ratemaking procedure were to be carried out using different historical experience periods. If, in the actuary's judgment, the procedure is too sensitive to the inclusion or exclusion of an

individual catastrophe or sets of years, the actuary should consider modifying the procedure to reduce the sensitivity.

- e. Differing Trends in Loss Data—Historical insurance data used to determine a provision for catastrophe losses will often extend over much longer time periods than data used in most other ratemaking procedures; thus, the effect of small differences in annual trend rates will be magnified. The actuary should consider the potential for catastrophe losses to trend at a rate materially different than the noncatastrophe losses and reflect such differences in the ratemaking process as appropriate.
- f. Consistent Definition of a Catastrophe—In utilizing a catastrophe ratemaking procedure, the actuary often uses two sets of historical insurance data. The first set may be comprised of data from the ratemaking experience period from which the catastrophe losses have been removed. The second set may contain longer term experience for catastrophe losses. Collecting a greater volume of data for this second data set may be accomplished in various ways, such as by using a greater number of relevant years or by using relevant data for a broader segment of business.

The actuary should consider the catastrophe definition pertaining to, and the catastrophe potential in, both of these data sets to ensure that the definitions are not materially inconsistent. Specific areas to consider are consistency of the thresholds used to determine catastrophe losses and consistency in identifying specific catastrophes.

3.3.2 Use of Noninsurance Data and Models—If, after considering the items contained in section 3.3.1(a–f), the actuary believes that the available historical insurance data do not sufficiently represent the exposure to catastrophe losses, the actuary should consider doing one of the following:

- 1. use noninsurance data to adjust the historical insurance data;
- 2. use noninsurance data (including models based thereon) as input to ratemaking procedures; or
- 3. use models based on a combination of historical insurance data and noninsurance data.

The actuary should be satisfied that the resulting ratemaking procedures appropriately reflect the expected frequency and severity distribution of catastrophes, as well as anticipated class, coverage, geographic, and other relevant exposure distributions.

- 3.4 Using a Provision for Catastrophe Losses—In ratemaking, actuaries generally use historical data or modeled losses to form the basis for determining future cost estimates. The presence or absence of catastrophes in any historical data used to form future cost estimates can create biases that diminish the appropriateness of using that data as the basis for future cost estimates. The actuary should address such biases by adjusting the historical data used to form future cost estimates and determining a provision for catastrophe losses (after consideration of the issues and practices found in sections 3.1–3.3).

The actuary may employ other considerations and methods to adjust for catastrophes associated with casualty coverages. For example, such adjustments may include limiting losses in the underlying data and using increased limits factors or excess loss factors based on industry data or other sources, or adjusting for legislative changes, legal decisions, changes in the distribution of policy limits, and coverage provisions. In addition, other adjustments, such as supplementing state-specific data with countrywide data or company-specific data with industry information, may be appropriate.

- 3.5 Loss Adjustment Expenses—The actuary should be aware that the relationship of loss adjustment expense to incurred loss can be significantly different for catastrophe losses and for noncatastrophe losses. In some cases, the historical relationships of overall loss adjustment expense to overall incurred losses may produce inappropriate loss adjustment expense estimates for catastrophe losses. Similarly, the historical relationship of overall loss adjustment expense to overall incurred losses may produce inappropriate loss adjustment expense estimates for noncatastrophe losses if the historical period was impacted by catastrophe losses. The actuary should modify the loss adjustment expense procedure where necessary to develop a reasonable estimate of prospective loss adjustment expense for both catastrophe and non-catastrophe losses.

Section 4. Communications and Disclosures

- 4.1 Conflict with Law or Regulation—If a law or regulation conflicts with the provisions of this standard, the actuary should develop a rate in accordance with the law or regulation, and disclose any material difference between the rate so developed and the actuarially-determined rate to the client or employer.
- 4.2 Documentation and Disclosure—The actuary should be guided by the provisions of ASOP No. 9, *Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations*. If the actuarial work product includes mathematical modeling developed by someone other than the actuary, the documentation should include the source of the model and how the model was used in the analysis. In addition, if the model is outside the actuary’s area of expertise, the actuary should be guided by the documentation and disclosure requirements of ASOP No. 38, *Using Models Outside the Actuary’s Area of Expertise*.

- 4.3 Prescribed Statement of Actuarial Opinion—This ASOP does not require a prescribed statement of actuarial opinion (PSAO) as described in the *Qualification Standards for Prescribed Statements of Actuarial Opinion* promulgated by the American Academy of Actuaries. However, law, regulation, or accounting requirements may also apply to an actuarial communication prepared under this standard, and as a result, such actuarial communication may be a PSAO.
- 4.4 Deviation from Standard—An actuary must be prepared to justify the use of any procedures that depart materially from those set forth in this standard and must include, in any actuarial communication disclosing the results of the procedures, an appropriate statement with respect to the nature, rationale, and effect of such departures.

Appendix 1

Background and Current Practices

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

Background

Historical Procedures—Prior to Hurricanes Hugo and Andrew, the predominant ratemaking procedures used to determine a catastrophe provision involved calculating the long-term ratio of such losses to noncatastrophe losses over a twenty- to thirty-year span. Catastrophes were identified either by some industry-dollar or loss-ratio threshold, and typically represented weather-related perils such as hurricanes, tornadoes, or snow storms. Other physical catastrophes such as floods and earthquakes were usually covered by separate policies designed to specifically include such perils. A provision for casualty-related catastrophes was typically not included separately in the rates, but was implicitly included with the contingency provision.

Issues—In the late 1980s and early 1990s, catastrophes produced record levels of damage, and it became evident that adjustments to historical ratemaking procedures were necessary. Hurricanes Hugo, Andrew, and Iniki produced aggregate losses exceeding previously expected possibilities. These huge losses brought to light other issues such as population shifts, non-adherence to building codes, and exposure concentration, none of which had been addressed previously. In addition, the occurrence of earthquakes in both San Francisco and Northridge, and a major flood in the Midwest during this period heightened the need for development of improved ratemaking procedures for these perils. Finally, catastrophes that had not been contemplated previously, such as the World Trade Center bombing and the Oakland Hills fires, raised other questions concerning how to provide for such losses in the rate.

In addressing these issues, catastrophe models, which previously were used by companies to determine their probable maximum loss under various scenarios, were adjusted for use in ratemaking. However, since these models were often multidisciplinary in nature or proprietary, it was often difficult to (1) ascertain the underlying assumptions of the model, and (2) obtain regulatory approval of rates based on these models.

Other issues have also emerged, making assessment of catastrophe exposure even more difficult. Examples of such issues include coverage changes, such as the greater use of guaranteed replacement cost on homeowner policies or the use of separate wind deductibles; the emergence of state-run catastrophe funds; and the availability of catastrophe options.

Current Practices

Subsequent to Hurricanes Hugo and Andrew, numerous enhancements and alternatives have been developed that improve on the traditional, long-term catastrophe ratemaking procedure.

One procedure uses the traditional excess wind approach but supplements or replaces the historical insurance data with hypothetical losses from an infrequent event (for example, a fifty-year event) as calculated by a catastrophe simulation model. Historical events of greater severity than the modeled fifty-year event are eliminated. Separate excess factors are calculated from the historical insurance data and for a hypothetical year constructed to include the modeled fifty-year event. The excess factor is calculated as a weighted average of those two separate factors.

A second procedure involves loading catastrophe reinsurance costs into the rate calculation. With this procedure, the rates are initially calculated using losses net of the catastrophe reinsurance. The company's overall catastrophe reinsurance costs are allocated to state and line, and those allocated costs are added to the calculated rate net of reinsurance.

A third procedure separates catastrophes into hurricane and nonhurricane components and treats each separately. This enables the actuary to focus on the particular difficulties, low frequency and high severity, in estimating hurricane losses. One specific procedure that is used for nonhurricane catastrophes is to relate catastrophe losses to amount of insurance years. A long-term ratio of catastrophe losses to amount of insurance years is calculated and used to load the ratemaking experience period for expected catastrophe losses. This procedure has also been used for hurricanes, using noninsurance data such as long-term hurricane frequencies to adjust the historical insurance data.

A fourth procedure that has been used for nonhurricane catastrophes is based on frequency. With this procedure, daily frequencies are calculated over a long period and each day is ranked using that frequency. A set percentage of days with the highest frequencies is considered excess. The losses incurred on those excess days are compared to the losses incurred on all other days in order to calculate an excess factor.

In considering earthquakes and hurricanes, the predominant approach currently used to calculate expected catastrophe losses is computer simulation models. These models make extensive use of noninsurance data to estimate the overall frequency of these events, as well as the frequency of the key defining characteristics of these events. Based on these estimated frequencies, a large number of catastrophes are simulated across a broad geographic area. For each simulated catastrophe, the model translates the event or phenomenon into a specific "hazard" parameter, such as wind speed or ground shaking, at all locations impacted by the event. Based on engineering analysis and prior catastrophe losses, the hazard parameter is translated into a damage ratio, i.e., ratio of losses to amount of insurance. These damage ratios are applied to the current or projected amounts of insurance and, when adjusted by the estimated frequencies of the specific catastrophes, produce the expected catastrophe losses.

Since our knowledge of catastrophes is not complete and is still evolving, computer simulation models are also evolving. The expected catastrophe losses calculated from these models can be

subject to significant variation, since different models (i.e., both models from different developers and different versions of models from the same developer) will obviously provide different answers.

All of these procedures may or may not be supplemented with a risk load calculated in accordance with ASOP No. 30, *Treatment of Profit and Contingency Provisions and the Cost of Capital in Property/Casualty Insurance Ratemaking*.

Appendix 2

Comments on the 1999 Exposure Draft and Subcommittee Responses

The exposure draft of this actuarial standard of practice (ASOP)—formerly titled *Treatment of Catastrophe Losses in Property/Casualty Insurance*—was issued in February 1999, with a comment deadline of June 15, 1999. Fourteen comment letters were received. The Subcommittee on Ratemaking carefully considered all comments received. Summarized below are the significant issues and questions contained in the comment letters, printed in roman type. The subcommittee's responses are printed in **boldface**.

General Comments

One commentator notes that, in the end, the definition of a catastrophe is driven by frequency. High frequency loss processes should produce credible estimates of future losses without adjustment. Low frequency events do not provide these estimates and adjustments are needed. **The subcommittee disagrees and believes that the most important facts are that the event or phenomenon not only should be relatively infrequent but should also produce unusually large aggregate losses.**

Two commentators suggested that the title of the standard should be *Treatment of Catastrophe Losses in Property/Casualty Insurance Ratemaking*. **The subcommittee agreed and changed the title.**

Two commentators believed that the standard too often specified what the actuary *should* do, suggesting the use of *may* as more appropriate. **The subcommittee disagrees, since the standard generally is specifying what the actuary needs to consider. The standard does not say the actuary needs to do something after the consideration if the item has no material impact on the results. In performing this work, the actuary needs to consider all items that may materially impact or bias the results.**

One commentator noted that the standard permits the actuary to rely on the work of nonactuaries without proper review and disclosure, particularly as it pertains to models developed by others. **The subcommittee disagrees that an actuary can rely on the work of a nonactuary without review and disclosure. The subcommittee prepared this standard fully aware of ASOP No. 38, *Using Models Outside the Actuary's Area of Expertise (Property and Casualty)*, which was being exposed concurrently.**

One commentator suggested that the definitions and explanations should be phrased more in statistical terms whenever possible. **The subcommittee believes that, given the wide variation in available methodologies, a statistically-based definition would too narrowly restrict current acceptable practices.**

Another commentator suggested that the term *procedures* should be replaced by *models*. **The subcommittee believes that *procedures* is appropriate, particularly since *models*, in this case, could be too narrowly read to mean computer models.**

One commentator stated that the standard does nothing to help an actuary who uses a computer model to develop estimated catastrophe losses and is challenged by individuals who refuse to accept the validity of these models. **The subcommittee disagrees. The standard provides the analytical steps that the actuary should follow in examining the available data. Based on the analysis, the actuary can determine and demonstrate to others whether the data need to be supplemented by additional data or, alternatively, whether models that consider various sources of data should be used.**

Transmittal Memorandum

The transmittal memorandum of the exposure draft asked readers to address several key questions. One question asked, “Is the application of the standard to casualty (i.e., nonproperty) insurance appropriate, and has the subject been addressed adequately?” One commentator stated that catastrophes should be limited to first party coverages, particularly since the considerations listed in 3.3.1 and 3.3.2 were property related in nature. The commentator also noted that the methodologies referenced were predominantly for property coverages. The commentator did suggest, that if the standard were to apply to casualty coverages, it would need to include considerations such as limiting losses to basic limits; using excess loss factors; adjusting for changes in limits, coverages, or reinsurance; and supplementing state data with countrywide data. **The subcommittee intends that the requirements of this ASOP should also apply to casualty catastrophe losses when such a catastrophe is identified. The subcommittee has included the suggested language for casualty catastrophes in section 3.4.**

The subcommittee also drew its readers’ attention to several provisions in particular: section 2.1, Catastrophe; section 3.1, Identification of Catastrophe Perils or Events; section 3.3.2, Use of Noninsurance Data; and section 4.1, Conflict with Law or Regulation. Please see those sections below for discussion of any pertinent readers’ comments and subcommittee responses.

Section 1. Purpose, Scope, and Effective Date

Section 1.1, Purpose—One commentator stated that no guidance has been given regarding a unique or separate loss adjustment expense for catastrophe. The commentator suggested that the standard delete reference to loss adjustment expenses or provide explicit guidance on this aspect. **The subcommittee agreed and added section 3.5, Loss Adjustment Expenses, to address the issues surrounding loss adjustment expenses.**

Section 1.2, Scope—One commentator noted that the purpose section specifically makes reference to insurance ratemaking, but the scope section says that the standard applies to many more professional services. The commentator asked, “Does this standard apply to those entities cited in the scope section, only when they are related to property/casualty ratemaking?” **The**

standard has been retitled to specify that it applies to property/casualty insurance ratemaking. The services referred to for risk financing systems, such as self-insurance and securitization products, are considered to be ratemaking when estimates for future costs are being determined.

Section 2. Definitions

Section 2.1, Catastrophe—One commentator believed that the definition of catastrophe should relate to how the event or phenomenon violated the general insurance ratemaking model assumption of independent events. **The subcommittee believes that the use of a qualitative definition is more broadly applicable and useful in terms of current accepted practices.**

Another commentator believed that the phrase “or natural phenomenon” should be removed, as the phrase “relatively infrequent events” included natural and manmade phenomena. **The subcommittee agreed and deleted the word “natural” from the definition.**

Another commentator believed that “relatively” should modify high amounts, instead of infrequent events. **The subcommittee believes that it is more important to emphasize the frequency aspects of the definition as opposed to the amount of loss dollars.**

Another commentator stated that serious damage to a very large risk would be considered a catastrophe according to the definition. In the commentator’s view, this did not seem appropriate since a large number of claims might not have resulted. **The subcommittee does not believe that the event needs to produce a large number of claims in order for it to be defined as a catastrophe.**

One commentator believed that the definition need not include the adjective “insured” to modify losses. **The subcommittee agrees and removed it.**

Another commentator suggested the definition eliminate the phrase, “the potential to” produce, as an event either is or is not a catastrophe. **The subcommittee agreed and eliminated the phrase “the potential to” in the definition.**

Section 2.2, Catastrophe Ratemaking Procedures—One commentator believed that the use of the term “adjust” was defensive in nature and that the definition should be something like “to provide a better expected value estimate than could be developed with the limited actual history.” **The subcommittee believes that the original definition is more descriptive of the actual practices in use, while still being consistent with the more theoretical expression of the commentator.**

Another commentator expressed the concern that the current use of the word “adjust” would limit the ability of the actuary to consider any method that includes supplementing or credibility-weighting the losses. **The subcommittee believes that the current wording does not limit the ability of the actuary to use any techniques that, in the opinion of the actuary, produce appropriate estimates of catastrophes losses.**

Two commentators suggested editorial changes in the definition to clarify the timing of the catastrophe losses. **The subcommittee agreed with the suggestions and revised the definition.**

Section 2.3, Contagion—One commentator expressed the concern that some casualty catastrophes may result in claims against a single entity. **The subcommittee is aware of this issue and believes that the standard addresses the issue by providing guidance in section 3.4.**

Section 2.4, Demand Surge—Several commentators suggested editorial changes to sharpen the definition. **The subcommittee changed the definition to reflect the fact that demand surge is a sudden and temporary increase, not only in material and labor but also in services.**

Section 3. Analysis of Issues and Recommended Practices

Section 3.1, Identification of Catastrophe Perils or Events—Several commentators expressed concern about the original language, which seemed to require the actuary to identify all perils or events that might have the potential to generate insured catastrophe losses. **The subcommittee agreed and revised the language to include the idea that the actuary should take reasonable steps to identify the perils or events that would generate material losses.** Another commentator believed that it was appropriate to add a condition of suddenness, either in the discovery or occurrence of loss to the list of characteristics. **The subcommittee did not think that any additional characteristics were needed.**

Some commentators suggested clarifications to section 3.1(b). One commentator suggested replacing the last two sentences with the phrase “the presence or absence of such events in the experience period may result in materially different perceptions of future loss estimates.” **While the subcommittee agrees that the original two sentences were awkward, the revision retains the parallel treatment because the subcommittee believes that a more explicit explanation of the impacts is appropriate.** Another commentator suggested that *infrequent occurrence* should be defined in terms like the frequency of the event over a longer time period than the experience period. **The subcommittee concluded that it was important for the actuary to be able to evaluate the materiality of the loss and frequency of events relative to the long term in the context of the methodology being used.**

Section 3.2, Identification of Catastrophe Losses—Two commentators suggested that the language should be clarified to indicate that the actuary may not be able to identify the catastrophe losses in all the historical data used. **The subcommittee agreed and modified this section to reflect such a possible limitation.** Another commentator believed that the standard provided no guidance to the actuary as to how to identify catastrophe losses in the historical insurance data. **The subcommittee believes that the perils insured and the events covered provide sufficient guidance for the identification of catastrophe losses.**

Section 3.3, The Use of Data in Determining a Provision for Catastrophe Losses—The subcommittee made an editorial revision to the order of the items (a), (b), (c) and (d). Item (d)

was placed first and relabeled as (a) to emphasize the importance of the frequency component of historical data in making use of the historical data in determining a provision for catastrophe losses. One commentator noted that computer simulations are not data. **The subcommittee agreed and revised this section.** Another commentator believed that sections 3.3.1(b) and 3.3.1(a), and 3.3.1(c) and 3.3.1(e), could be combined. **The subcommittee notes that 3.3.1(b) refers to a comparison over time within the set of insurance data, whereas 3.3.1(a) addresses a comparison of the insurance data to external sources. With regard to 3.3.1(c) and 3.3.1(e), the subcommittee believes that 3.3.1(c) refers to the distribution of the exposure to loss in the experience period, compared to the prospective period, whereas 3.3.1(e) refers to possible differing trends in the costs by peril over the available period.**

Two commentators noted that the language in section 3.3.1(a) created an obligation that may not be possible to satisfy in all cases. **The subcommittee agreed and revised this section to say that the actuary should consider comparing historical insurance data to noninsurance data.** Another commentator noted that this section implies that one uses historical data only if the data give comparable results to modeling, since use of modeling will give the full spectrum of loss distribution. **The subcommittee notes that this section is alerting the actuary to be sure that he or she believes that the data underlying his or her procedure sufficiently reflect the long-term frequency and severity of events producing insured catastrophe losses. If the actuary does not believe that the data are sufficient, section 3.3.2 states that the actuary should consider using a modeling procedure.**

In section 3.3.1(b), one commentator suggested changing the language to say “whether catastrophe losses are likely to differ significantly among elements.” **The subcommittee agreed and made the change.**

In section 3.3.1(c), one commentator suggested the use of a bullet-point list to highlight the importance of each element, particularly items related to coverage, such as limits, co-insurance, deductibles, etc. **The subcommittee agrees that it is important to highlight aspects of coverage and has explicitly mentioned changes in coverage as a consideration.**

In section 3.3.1(d), one commentator believed that if the indicated rate change is sensitive to the number of years in the historical experience period, then one should not use the historical period at all. The commentator believed that this section implies one would modify the current procedure, not switch to using computer simulation. **The subcommittee disagrees. In fact, the subcommittee views modifying procedures to include adopting computer simulation models.**

In section 3.3.1(e), one commentator noted that the section should be revised to say “when noncatastrophe losses are expected to change at a rate materially different from that for catastrophe losses.” **The subcommittee agreed with this and revised the text to cover the potential aspects as referring to past and future time periods.**

Another commentator stated that the phrase “most catastrophe ratemaking procedures” should be revised to “traditional catastrophe ratemaking procedures,” since generally the standard is

referring to procedures that have existed in the past. **The subcommittee revised this section to remove the reference to any specific type of procedure.**

One commentator suggested several editorial changes for section 3.3.1(f) that generalized the section as well as broadened the suggested conditions for increasing the amount of data in the second set. **The subcommittee agreed with this comment and revised the text.**

Two commentators suggested that the term “consistent” be replaced by “not materially inconsistent.” **The subcommittee agreed with this suggestion and made the revision.** Another commentator suggested that the last sentence should be revised to remove the word “dollar” and changing the “or” to “and.” **The subcommittee agreed and revised the text.**

Section 3.3.2, Use of Noninsurance Data—One commentator suggested that the standard is giving the false impression that one should adjust past insurance data for all catastrophe perils. This commentator suggests that the adjustments are impossible to do adequately, giving false hope that meaningful results can be obtained. The commentator suggested that the standard be restructured to separate the treatment of catastrophes, such as hurricanes and earthquakes, from all others. **The subcommittee disagrees with these comments. The standard provides the actuary with a framework for evaluating the usability of the available data and developing appropriate catastrophe treatments. The standard identifies the issues for the actuary and gives sufficient freedom for the actuary to demonstrate the appropriateness of the resolution of the issues.**

The exposure draft contained sections 3.3.2(a) and (b). The revisions made as a result of comments received combined parts (a) and (b). All responses to comments received in this section refer to the original section references.

In section 3.3.2(a), one commentator suggested the addition of the phrase “and other relevant.” **The subcommittee agreed with this suggestion.** The same commentator suggested that the section be modified to say “expected” frequency and catastrophes “for the current or prospective periods.” **The subcommittee disagreed as the expected frequency and severity of catastrophes was felt to be sufficiently descriptive.**

In section 3.3.2(b), two commentators believed the section implied that the actuary was capable of making decisions on when the historical insurance data best capture the range of frequency and severity of catastrophes. **The subcommittee recognizes that an actuary may not know these facts without consultation with outside experts. The subcommittee believes that the actuary could become aware of the issues by referring to such experts, and make intelligent decisions about the representativeness of the data.**

One commentator suggested that in section 3.3.2(b) the phrase “if the results of the simulation” was inappropriate. The commentator’s point was that the process—not the results—was most important here. **The subcommittee agreed and has deleted any reference to results of the simulation and has focused the actuary on addressing the appropriateness of the procedures used.**

Section 3.4, Using a Provision for Estimated Catastrophe Losses—One commentator believed that the section demanded that the actuary *always* replace the actual data with estimated data, and suggested that the phrase “should adjust” be changed to “may consider adjusting.” **The subcommittee disagrees and believes that if the actuary has biased data, the actuary needs to estimate what the values should be excluding the bias.**

Section 4. Communications and Disclosures

Section 4.1, Conflict with Law or Regulation—Several commentators felt that the requirement that the actuary disclose material differences between the rate developed in accordance with law or regulation and the actuarially-determined rate was unnecessarily burdensome. One commentator suggested that this disclosure burden was unique among all ASOPs. **The subcommittee believes that the potential range of differences could be so large that disclosing the difference to the client or employer would be necessary. The subcommittee also notes that this same requirement exists in ASOP No. 30, *Treatment of Profit and Contingency Provisions and the Cost of Capital in Property/Casualty Insurance Ratemaking.***