

The following pages were inadvertently left out of the printed manual.

They are the final pages of

**CAS Exam 5, 2013 Edition, Volume II**

3. Given the following as of December 31, 2011:

Accident Year	Earned Premium	On-Level Earned Premium
2008	\$2,491	\$2,616
2009	2,853	2,853
2010	2,898	2,753
2011	2,800	2,800

Cumulative Paid Claims (\$000s)

Accident Year	12 Months	24 Months	36 Months	48 Months
2008	\$1,100	\$1,430	\$1,573	\$1,652
2009	1,200	1,560	1,716	
2010	1,100	1,430		
2011	1,000			

Cumulative Paid Claims Development Factors

12-Ult.	24-Ult.	36-Ult.	48-Ult.
1.502	1.155	1.050	1.000

- i) The tort reform effective January 1, 2010 reduced expected losses by 5% for accident year 2010 and subsequent years.
- ii) The loss trend is 0%.
- iii) Case outstanding for accident year 2011 as of December 31, 2011 is \$780.
  - a. Use the expected claim technique to estimate IBNR for accident year 2011.
  - b. Evaluate the reasonableness of negative IBNR. (12–5–21–2.5/.5)

**American Academy of Actuaries, Actuarial Standards Board,  
Actuarial Standard of Practice No. 9: “Documentation and Disclosure  
in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations,” January 1991**

OUTLINE

I. COVER LETTER

A. Background

1. Preparation by subcommittees of the Casualty Committee of the AAA
2. Though may be significant differences of opinion, standard describes recommended practices as a guide
3. At first applied only to ratemaking and loss reserving, but expanded to valuations

B. Responses to Comments on the 1988 Exposure Draft

1. Intended to support statements of principles of the CAS
2. Not needed for a statement of principles to refer to this standard
3. Extent of responsibility regarding the misuse of own work
  - a. Reasonable steps to minimize the risk of misuse
  - b. But standard does not require positive action if aware of misuse as this is an issue of professional conduct or work ethics

II. PREAMBLE

A. Purpose, Scope, Date

1. To define the disclosure requirements for P&C ratemaking and reserving
2. Limited to practices related to CAS statements of principles
3. Effective July 14, 1989 and May 1, 1991 (for valuations)

B. Definitions

1. **Actuarial report** – formal document/presentation conveying an actuary’s conclusions, recommendations, and methods
2. **Actuarial work product** – result of the work applicable to various actuarial communications
3. **Required actuarial document** – communication whose formal content is prescribed by law or regulation
4. **Statement of actuarial opinion** – formal opinion without details
5. **Statement of actuarial review** – formal appraisal of another’s actuarial work

C. Background and Historical Issues

1. Statements of principles for ratemaking, reserving, and valuations serve as guides for this standard
2. Methodology and material assumptions should be documented and in some cases available for disclosure

3. Issues addressed
  - a. Extent of documentation
  - b. Persons to whom documentation should be available
  - c. Extent to which deviations should be documented
  - d. Requirement of responsibility for work products
  - e. Requirement of disclosure of the names of others upon whom reliance placed
4. Current practices governed by guides and interpretations of actuarial organizations

### III. STANDARD OF PRACTICE

#### A. Analysis of Issues and Recommended Practices

1. Form and content of an actuarial communication should meet the needs of the particular circumstances including the knowledge of and relationship with both direct (client/employer) and indirect users
2. Should keep documentation sufficient for an evaluation of the work by another actuary
  - a. Sources of data
  - b. Material assumptions
  - c. Methods
  - d. Material changes from the last analysis, their causes, and their impact
3. Actuary should take steps to prevent the misuse of information
  - a. Fair presentation of the work product
  - b. Clarity in actuarial aspects
  - c. Identification of the actuary as the source of actuarial aspects
4. If the results conflict with professional judgment or when the actuary acts or seems to act as an advocate, appropriate disclosures should be made
5. Availability of documentation
  - a. To client, employer, and others if the client/employer requests and not improper and appropriate compensation
  - b. Ownership established by actuary and client/employer
6. Conflicting interests
  - a. Normally no obligation to communicate with other than the client/employer
  - b. If conflict, advise the client/employer and include qualifications/disclosures
7. Signature on work product
  - a. If law requires or client/employer desires
  - b. Signing of name and possibly affiliated organization
8. Reliance on another
  - a. Actuary who makes communication assumes responsibility for it unless he indicates reliance on another's work
  - b. Reliance means use without the assumption of responsibility
  - c. Need for a definition of the extent of any reliance
9. Waiver of fee does not eliminate the need to observe professional standards

#### B. Communications and Disclosures

If deviation from the standard, include a statement on its nature, rationale, and effect

#### C. Appendices

1. "Statement of Principles Regarding Property and Casualty Insurance Ratemaking"
2. "Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves"
3. "Statement of Principles Regarding Property and Casualty Valuations"

**PAST CAS EXAMINATION QUESTIONS**

1. According to the Actuarial Standard of Practice No. 9 on documentation and disclosure, reliance on another person means using that person's work and assuming responsibility therefore. (91-7-4-.5)
2. The Actuarial Standard of Practice No. 9 on documentation and disclosure requires positive actions on the actuary's part if he/she is aware of any misuse of his/her actuarial work product. (91-7-5-.5)
3. The Actuarial Standards Board's Actuarial Standard of Practice No. 9 on documentation and disclosure and the CAS "Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves" are related. Which of the following describes this relationship?
  1. With its adoption, the standard of practice replaces the statement of principles.
  2. The statement of principles serves as a guide to the standard of practice.
  3. The standard of practice addresses the application of the principles contained in the statement of principles.A. 1 B. 2 C. 3 D. 2,3 E. None of these answers are correct. (92-7-38-1)
4. Actuarial Standard of Practice No. 9: "Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations" indicates that the documentation underlying an actuary's work should be sufficient for any state regulator to understand and evaluate the work. (93-7-2-.5)
5. Actuarial Standard of Practice No. 9: "Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations" addresses which of the following items?
  1. Disclosure of professional fees for the actuarial services
  2. Conflicting interests
  3. Disclosure regarding reliance upon the work of othersA. 1,2 B. 1,3 C. 2,3 D. 1,2,3 E. None of these answers are correct. (93-7-30-1)
6. Actuarial Standard of Practice No. 9 on documentation and disclosure requires the documentation of an actuarial work product whether or not there is a legal or regulatory requirement for documentation. (94-7-5-.5)
7. According to Actuarial Standard of Practice No. 9 on documentation and disclosure, which of the following statements is false?
  - A. When an actuary acts as an advocate for an employer, the nature of that relationship should be disclosed.
  - B. An actuary is required to alert indirect users of his/her product to any conflicting interests between the actuary's employer and the indirect users.
  - C. An actuary should disclose the names of others upon whose work he/she has relied.
  - D. An actuary is not prohibited from deviating from the standard of practice.
  - E. All of these statements are true. (94-7-26-1)
8. Actuarial Standard of Practice No. 9 on documentation and disclosure does not require an actuary to take action if he is aware that his actuarial work products are being misinterpreted. (95-7-2-.5)
9. According to Actuarial Standard of Practice No. 9 on documentation and disclosure, an actuary is required to take positive action if he believes his work has been misused or misinterpreted. (96-7B-4-.5)

1. F, p. 4 – Substitute “without” for “and.”
2. F, p. v – Substitute “does not require” for “requires.”
3.
  1. F, p. 2 – The statement serves as a guide to the standard.
  2. T, p. 2
  3. T, p. 2 – It is concerned with the documentation of the application of the principles

Answer: D

4. F, p. 3 – Substitute “another actuary working in the same field” for “any state regulator.”
5.
  1. F, pp. 3–4 – This is not mentioned.
  2. T, p. 4
  3. T, p. 4

Answer: C

6. T, p. 3.
7.
  - A. T, p. 3
  - B. F, p. 4 – Substitute “alert the employer” for “alert indirect users of his/her product.”
  - C. T, p. 4
  - D. T, p. 4

Answer: B

8. T, p. v.
9. F, p. v – Substitute “is not” for “is.”

10. Which of the following are true according to Actuarial Standard of Practice No. 9 on documentation and disclosure?
1. The actuary should document material changes in the source of data.
  2. The actuary should provide both the impact of and rationale for changes in methods or assumptions from the previous analysis.
  3. The actuary should refuse to complete a project if a conflict of interest arises between the client and an indirect user of the actuary's product.
- A. 1 B. 2 C. 3 D. 1,2 E. 1,3 (96-7B-21-1)
11. According to Actuarial Standard of Practice No. 9: "Documentation and Disclosure," which of the following statements are true?
1. When an actuary may seem to be acting as an advocate for a client or employer, the nature of that relationship should be disclosed to directly interested parties.
  2. The term actuarial work product excludes oral communications.
  3. Any material changes in sources of data from the last analysis do not need to be documented in an actuarial report.
- A. 1 B. 1,2 C. 2,3 D. 1,2,3 E. None of these answers are correct. (97-7US-22-1)
12. The following is an excerpt from the Statement of Actuarial Opinion of the Solvent Insurance Company:
- ... I have examined the actuarial assumptions and methods used in determining reserves listed below, as shown in the Annual Statement of the company as prepared for filing with state regulatory officials, as of December 31, 1996.
- |  |              |
|--|--------------|
| Reserve for net unpaid losses                                    | \$10,000,000 |
| Reserve for net unpaid loss adjustment expenses                  | 5,000,000    |
| Reserve for unpaid losses – direct and assumed                   | 32,000,000   |
| Reserve for unpaid loss adjustment expenses – direct and assumed | 9,000,000    |
- ... The company participates in involuntary workers compensation pooling arrangements. The company books reserves as reported to it by the pool, without any accrual for reporting lag. Aggregate reserves held by the company for such pools are \$2,500,000.
- During 1996, the company performed a ground-up analysis of its pollution exposure. This is a material change in methodology from prior years. Although there are still significant uncertainties surrounding reserves for pollution exposure, I believe the reserves held by the company for this exposure are a reasonable estimate of future liabilities...
- Assume that the previous two paragraphs are the only two references to the pool reserves and pollution exposure.
- a. Describe one example of documentation that would support this opinion excerpt as outlined in ASB Number 9: "Documentation and Disclosure."
  - b. Is the actuary responsible for the adequacy of the pool reserves? Why or why not?
  - c. Explain two potential problems with this opinion excerpt. (97-7B-46-.5/.5/1)
13. Actuarial Standard of Practice No. 9: "Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations" includes the requirement that actuaries report on any suspected misuse of an actuarial work product. (98-7US-16-.5)

10. 1. T, p. 3  
2. T, p. 3  
3. F, p. 4 – He should include appropriate qualifications or disclosures.

Answer: D

11. 1. T, p. 3  
2. F, p. 1 – Substitute “includes” for “excludes.”  
3. F, p. 3 – Substitute “need” for “do not need.”

Answer: A

12. a. 1) Reserves reported to the company by the pool  
2) Worksheets of the actual ground-up analysis of the pollution exposure and its range of reserves, p. 3.  
b. He is responsible because he has not stated his reliance on another person’s work, p. 4.  
c. 1) The reasons for and the impact of the change in the methodology for pollution exposures are not given, p. 3.  
2) Whether the pollution exposure is material is not indicated, AAA “Statement of Actuarial Opinion,” p. 18.
13. F, p. v. – Substitute “does not include” for “includes.”

14. According to Actuarial Standard of Practice No. 9: “Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations,” what two actions should be taken when the service requested of the actuary conflicts materially with the actuary’s professional judgment? (00–6–45–1)
15. According to the ASB Actuarial Standard of Practice No. 9: “Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations,” which of the following regarding loss reserve analyses is false?
- A. Documentation must be sufficient for another actuary practicing in a different field to evaluate the work.
  - B. If an actuary appears to be acting as advocate for a client, the nature of the relationship should be disclosed to directly interested parties.
  - C. The actuary must disclose in actuarial communications any known conflicts of interest between indirect users of the actuary’s work, and the actuary’s client or employer.
  - D. When required by law or regulation to provide documentation of work, the disclosure should be provided in writing and should be signed by the actuary responsible for the work.
  - E. The total waiver of a fee for professional services does not relieve the actuary of the need to observe professional standards. (02–6–11–1)
16. Which of the following issues does Actuarial Standard of Practice No. 9: “Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving and Valuations” address?
- 1. The extent to which an actuarial work product should be documented
  - 2. The persons to whom documentation should be available
  - 3. The methods to be used in an actuarial work product
- A. 1   B. 3   C. 1,2   D. 2,3   E. 1,2,3   (04–6–1–1)

14. 1) “[T]he actuary should advise the client or employer of the conflict.”  
2) The actuary “should include appropriate qualifications or disclosures in any related actuarial communication,” p. 3.

15. A. F, p. 3 – Substitute “the same” for “a different.”  
B. T, p. 3  
C. T, p. 4  
D. T, p. 4  
E. T, p. 4

Answer: A

16. 1. T, p. 2  
2. T, p. 2  
3. F, p. 2 – This is not mentioned.

Answer: C

**American Academy of Actuaries, Actuarial Standards Board,  
Actuarial Standard of Practice No. 43: “Property/Casualty Unpaid Claims Estimates,”  
June 2007**

OUTLINE

I. STANDARD OF PRACTICE

A. Section I: Purpose, Scope, Cross References, and Effective Date

1. Purpose
  - a. Provide guidance in estimating loss and LAE for P&C unpaid claims
  - b. Unless indicated otherwise, unpaid claims include LAE
2. Scope
  - a. Only applies to reserving for events that occur prior to an accounting date
  - b. Excludes reserves developed for ratemaking
  - c. Applies to all classes of entities
    - 1) Self-insureds
    - 2) Insurers
    - 3) Reinsurers
    - 4) Government entities
  - d. Applies to gross amounts before recoverables, amounts after recoverables, and the following recoverables:
    - 1) Deductibles
    - 2) Ceded reinsurance
    - 3) Salvage
    - 4) Subrogation
  - e. Only applies to unpaid claims estimates communicated as an actuarial finding
  - f. Term “reserve” limited to amount booked in a financial statement
  - g. Statement covers services whether called reserving, estimating unpaid claims, etc.
  - h. Does not apply to items that are a function of unpaid claims or claim outcomes such as the following:
    - 1) Loss-based taxes
    - 2) Contingent commissions
    - 3) Retrospectively rated premiums
  - i. Applies to health benefits only if related to WC and liability policies
  - j. Applies only to undiscounted claim estimates; additional considerations for discounted estimates under ASOP No. 20
  - k. Additional consideration under ASOP No. 36 if estimates undertaken in the context of a statement of actuarial opinion
  - l. Compliance required unless conflict with statutes, regulations, etc.
3. Cross references – includes successor documents to the extent applicable and appropriate
4. Effective date – covers work products produced on 9/1/07 or later

**B. Definitions**

1. **Actuarial current estimate** – “estimate that represents an expected value over the range of reasonably possible outcomes”
2. **Claim adjustment expense** – “costs of administering, determining coverage for, settling, or defending claims even if it is ultimately determined that the claim is invalid”
3. **Coverage** – “terms and conditions of a plan or contract, or the requirements of applicable law, that create an obligation for claim payment associated with contingent events”
4. **Event** – “incident or activity that triggers potential for claim or claim adjustment expense payment”
5. **Method** – “systematic procedure for estimating the unpaid claims”
6. **Model** – “mathematical or empirical representation of a specified phenomenon”
7. **Model risk** – “risk that the methods are not appropriate to the circumstances or the models are not representative of the specified phenomenon”
8. **Parameter risk** – “risk that the parameters used in the methods or models are not representative of future outcomes”
9. **Principal** – “actuary’s client of employer”
10. **Process risk** – “risk associated with the projection of future contingencies that are inherently variable, even when the parameters are known with certainty”
11. **Unpaid claim estimate** – “actuary’s estimate of the obligation for future payment resulting from claims due to past events”
12. **Unpaid claim estimate analysis** – “process of developing an unpaid claim estimate”
13. If actuary has client and employer, use facts and circumstances to determine which is principal in a specific situation

**C. Analysis of Issues and Recommended Practices**

1. Purpose or use of the unpaid claim estimate
  - a. Actuary to identify the intended purpose or use
  - b. Possible purposes or uses of liability estimates
    - 1) External financial reporting
    - 2) Internal management reporting
    - 3) Appraisal work
    - 4) Scenario analyses
  - c. If multiple purposes with potential conflicts, actuary should consider adjustments to accommodate
2. Constraints on the unpaid claim estimate analysis – if because of constraints, risk that a more detailed analysis would produce a different result, actuary should notify the principal

3. Scope of the unpaid claim estimate – actuary to identify the following:
  - a. Intended measure of the unpaid claim estimate
    - 1) Examples
      - a) High estimate
      - b) Low estimate
      - c) Median
      - d) Mean
      - e) Mode
      - f) **Actuarial central estimate** – “expected value over the range of reasonably possible outcome”
        - i) May not include all conceivable outcomes, e.g., extreme events whose contribution cannot be reliably estimated
        - ii) Need not be based on a probability distribution or a statistical analysis
      - g) Mean plus risk margin
      - h) Actuarial central estimate plus risk margin
      - i) Specified percentile
    - 2) Best estimate and actuarial estimate only describe quality and source of estimate but not its objective
  - b. Whether estimate is gross or net of specified recoverables
  - c. Whether collectability risk is to be considered
  - d. Specific types of unpaid CAE included
  - e. Claims to be covered, e.g., type of loss, line of business, year, and state
  - f. Other items needed to describe the scope
4. Materiality – may disregard items seen as not material considering the following:
  - a. Professional judgment
  - b. Applicable law
  - c. Intended purpose of the estimate
5. Nature of unpaid claims
  - a. Actuary should have an understanding equivalent to what a qualified actuary in the same practice area should be reasonably expected to know or foresee given the situation
  - b. Aspects that may need understanding include the following:
    - 1) Coverage
    - 2) Conditions/circumstances that affect claim frequency and severity
    - 3) Underlying claim adjustment process
    - 4) Potential recoverables
6. Unpaid claim estimate analysis
  - a. Methods and models
    - 1) Actuary should select or develop models considering the following:
      - a) Nature of the claims and underlying exposures
      - b) Development characteristics associated with these claims
      - c) Characteristics of the available data
      - d) Applicability of various methods or models to the data
      - e) Reasonableness of underlying assumptions
    - 2) Need to consider purpose, constraints, and scope of assignment
    - 3) Different methods may be used for estimate’s different components
    - 4) Should consider use of multiple methods/models; if not, should explain
    - 5) If update, may use old methods/models, new ones, or a combination

- b. Assumptions
    - 1) Need to consider appropriateness of the following:
      - a) Methods/models
      - b) Underlying parameters
    - 2) Should use ones that have no known significant bias and are not inconsistent
    - 3) Should consider sensitivity to alternative assumptions; if reasonable alternatives have a material effect, should notify the principal
    - 4) If principal has interest in alternative assumptions, actuary may provide results
  - c. Data – consult ASOP No. 23
  - d. Recoverables – if multiple sources, should consider their interaction and make appropriate adjustment
  - e. Gross vs. net – circumstances will affect which of the following components are estimated:
    - 1) Gross estimate
    - 2) Estimated recoverables
    - 3) Net estimate
  - f. External conditions – should consider relevant external conditions that are likely to have a material effect on the unpaid claim estimate analysis such as the following:
    - 1) Potential economic changes
    - 2) Regulatory actions
    - 3) Judicial decisions
    - 4) Political or social forces
  - g. Changing conditions
    - 1) Need to consider significant changes that are not reflected in data or assumptions, e.g., changes in claims handling practices
    - 2) May arise from entity’s circumstances or external factors
    - 3) Should consider obtaining supporting information on such
  - h. Uncertainty
    - 1) Measurement of such not required or prohibited
    - 2) If measuring, use methods/models/assumptions appropriate for the type and source of uncertainty
    - 3) Types
      - a) Model risk
      - b) Parameter risk
      - c) Process risk
7. Unpaid claim estimate
- a. Reasonableness – use appropriate indicators or tests to judge the estimate
  - b. Multiple components – need to consider whether estimates are consistent
  - c. Presentation – possible ways of presentation
    - 1) Point estimate
    - 2) Range of estimates
    - 3) Point estimate with a margin for adverse deviation
    - 4) Probability distribution of the unpaid claim amount
8. Documentation – consult ASOP No. 41

## D. Communications and Disclosures

1. Actuarial communication – should disclose the following:
  - a. Intended purposes or uses of the estimate
  - b. Significant limitations, e.g., significant risk that a more in-depth analysis would produce a materially different result
  - c. Scope of the unpaid claim estimate
  - d. Dates
    - 1) **Accounting date** – “date used to separate paid versus unpaid claim amounts”
    - 2) **Valuation date** – “date through which transactions are included in the data used in the unpaid claim estimate analysis”
    - 3) **Review date** – “cutoff date for including information known to the actuary in the unpaid claim estimate analysis”
  - e. Specific risks and uncertainties
  - f. Significant events/assumptions/reliances that have a material effect on the estimate; should disclose unreasonable assumption/method/model and its source
2. Additional disclosures
  - a. Basis of range provided
    - 1) Range of estimates, each considered reasonable on a stand-alone basis
    - 2) Range representing a confidence interval of outcomes from a particular model(s)
    - 3) Range representing a confidence interval reflecting certain risks, e.g., parameter risk
  - b. If updated estimate, disclose changes with a material impact and reasons for such
3. Prescribed statement of actuarial opinion – law, regulation, or accounting requirements may apply
4. Deviation from standard – still compliance with standard in the following cases:
  - a. Material deviations to comply with applicable law – should disclose and indicate that work product may not be appropriate for other purposes
  - b. Other material deviations
    - 1) Should consider whether appropriate and practical to explain or quantify
    - 2) Should be prepared to explain and justify

## II. BACKGROUND AND CURRENT PRACTICES

### A. Background

1. Standard defines issues and considerations in estimation of unpaid claims
2. *Statement of Principles* had been primary guide; will be revised to focus on principles only, not considerations
3. Exclusion of estimates made for ratemaking purposes
  - a. Goal to avoid placing inappropriate requirements on such
  - b. Desire to exclude considerations only applicable to ratemaking
  - c. Ratemaking involves more hypothetical analysis of possible future events

B. Current Practices

1. ASOPs
  - a. No. 9 – documentation and disclosure
  - b. No. 20 – discounting of P&C reserves
  - c. No. 23 – data quality
  - d. No. 36 – statement of opinion on reserves
  - e. No. 41 – actuarial communications
2. Practices notes published by the AAA’s Casualty Practice Council are not binding

III. COMMENTS ON “ACTUARIAL CURRENT ESTIMATE”

A. Background

1. Appendix not part of the standard of practice
2. Desire to create default intended measure produces term “actuarial central estimate”
3. As many traditional actuarial methods do not clearly define the intended measure of their estimate, need to develop definition having the following characteristics:
  - a. Measure of central tendency – “conceptual mean” seen as best representation
  - b. Failure to include the entire range of all possible outcomes, e.g., unidentified sources of loss
  - c. Term other than “central estimate,” which is seen as too generic
4. **Actuarial central estimate (initial definition)** – “estimate that represents a mean excluding remote or speculative outcomes, that in the actuary’s professional judgment, is neither optimistic nor pessimistic”
  - a. May or may not be based on a probability distribution or statistical analysis
  - b. Intended to clarify the concept rather than assign a precise statistical measure
  - c. Common actuarial methods usually do not produce a statistical mean

B. Comments and Responses

1. Categories of comments
  - a. Use of the term “mean” in defining “actuarial central estimate”
  - b. Exclusion of “remote or speculative” outcomes may produce a bias downward
  - c. Desire for default to allow or promote conservatism
  - d. Desire to promote statistical techniques
  - e. Preference for term “best estimate” over “actuarial central estimate”
2. Decision not to prescribe a default measure since different opinions on what it should be
3. Continued use of term “actuarial central estimate” to describe estimate that results from traditional methods whose goal is a mean estimate
4. Replacement of term “mean” with “expected value” as former seen to convey an implied statistical approach
5. Replacement of terms “speculative” and “remote” with wording that reflects concern that reliable estimates of such outcomes cannot be produced
6. Margin for adverse deviation not required in all situations; if such included, should be explicitly disclosed
7. Standard does not require use of stochastic models; actuary determines method used

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**Casualty Actuarial Society, Committee on Reserves,  
“Statement of Principles Regarding Property and Casualty  
Loss and Loss Adjustment Expense Reserves,” May 1988.**

OUTLINE

I. DEFINITIONS

A. Elements of the Total Loss Reserve

1. Case reserves
2. Provision for future development on known claims
3. Reopened claims reserve
4. Provision for claims incurred but not reported
5. Provision for claims in transit (incurred and reported but not recorded)

B. Dates

1. **Accounting date** – date before which insured claims have occurred
2. **Valuation date** – date at which the evaluation of a reserve liability is made, regardless of when the analysis is performed

C. Reserves

1. **Adjusters' estimates** – aggregate of the estimates by claims personnel on individual claims
2. **Allocated loss adjustment expenses (ALAE)** – claim adjustment expenses assigned to specific claims
3. **Carried loss reserve** – amount shown in a published statement
4. **Case reserve** – sum of the values of adjusters' estimates and formula reserves
5. **Formula reserves** – those established by formulas applied to individual or aggregate claims based on certain classifying information
6. **IBNR reserve** – amount provided for future payments on insured losses that have occurred but have not been reported
7. **Indicated loss reserve** – estimated amount produced by a particular reserving procedure
8. **Loss adjustment expense (LAE) reserves** – provision for allocated and unallocated LAE
9. **Reopened claims reserve** – provision for future payments on claims closed as of an accounting date that may be reopened; if not actually reopened, may include with the development on known claims
10. **Reserve for known claims, a.k.a. reported reserve, reserve for claims adjusted or in the process of adjustment, or reserve for unpaid losses excluding IBNR** – estimated amount as of the valuation date required for future payments on claims already reported
11. **Unallocated loss adjustment expenses (ULAE)** – expenses apportioned to claims adjustment that are not assigned to specific claims

D. Development

1. **Development** – difference between the observed number of claims or claim payments at two valuation dates
2. **Emergence** – claims already incurred but that will be first reported in future periods
3. **Incurred development** – difference between the estimates of incurred costs at two valuation dates
4. **Provision for future development on known claims** – incurred development on those claims reported to an insurer on or before a specific accounting date still open as of that date

## II. PRINCIPLES AND CONSIDERATIONS

### A. Principles

1. **Actuarially sound loss or LAE reserve (as of a given valuation date)** – estimate based on reasonable assumptions and appropriate actuarial methods of the unpaid amount required to settle all claims with an incurred liability on or prior to a particular accounting date
2. True value of the liability for losses or LAE as of an accounting date only known when all claims have been settled; inherent uncertainty implies a range of actuarially sound estimates
3. Need to consider the relative likelihood of estimates within this range and the financial reporting context in determining the appropriate reserve

### B. Considerations

1. Data organization
  - a. Key dates
    - 1) **Accident date** – date on which a loss occurred or is deemed to have occurred
    - 2) **Report date** – date on which a loss is first reported to company
    - 3) **Recorded date** – date on which a loss is first entered in a company’s statistical records
    - 4) **Accounting date** – calendar date chosen for an accounting or statistical purpose
    - 5) **Valuation date** – calendar date as of which the loss reserve is evaluated
  - b. Generally, companies compile claim dates by accident periods, policy periods, or report periods
  - c. Strategies include report period and accident period approaches
  - d. Report period approach requires additional analysis for IBNR
  - e. Reopened claims may be treated as either development of known claims or IBNR depending on whether new report dates are used
2. Homogeneity – degree to which claims grouped together exhibit similar experience, settlement, and size-of-loss patterns; such grouping often improves accuracy
3. Credibility – measure of predictive value; balance more homogeneous groupings and larger groupings
4. Data availability – secure necessary data, reconcile it with financial records, and assign reserves to required categories
5. Emergence patterns – delay between the occurrence and reporting of claims varies by line (shorter for property) and company
6. Settlement patterns – slower-settling lines make reserving more difficult; BI claims affected by the type and severity of the injury and the intricacies of the judicial process
7. Development patterns – affected by company practices, the length of time to settlement, and the extent of the discount
8. Frequency and severity – greater accuracy if high frequency and low severity; need to adjust for potential claims not in the historical data

9. Reopened claims potential – affected by line, judicial opinions, legislation, and company procedures
10. Claims-made – claims reported (rather than claims occurring) during a certain period; segregate such, but may augment with report period occurrence data
11. Aggregate limits – may need to modify reserve liabilities to take into account such limits
12. Collateral sources – consideration of salvage, subrogation, coinsurance, deductibles, coordination of benefits, second-injury fund recoveries, etc.
13. Generally Accepted Accounting Principles – governs reports to shareholders and securities regulators; may produce different estimates from statutory reserves, though use the same principles of analysis
14. Reinsurance – consideration of the differences between current and prior plans and the recoverability of ceded reinsurance
15. Portfolio transfers and commutations – as may recognize the time value of money, should evaluate the impact on reserves and development patterns
16. Pools and associations – may need to adjust reported reserves to reflect their operating and reserving policies
17. Operational changes – review the effects of such things as computer, accounting, and organizational changes
18. Changes in contracts – contractual changes, such as policy limits, deductibles, and coverage attachment points, may affect the frequency and severity of claims
19. External influences – consider the impact of the judicial environment, regulatory and legislative changes, residual or involuntary market mechanisms, and economic variables
20. Discounting – if reserves are discounted, perform an undiscounted analysis, then apply the effect of discounting
21. Provision for uncertainty – need to consider uncertainty if great variability or discounting
22. Reasonableness – compare estimates to relevant indicators such as premiums, etc. and find explanations for material departures
23. Loss-related balance sheet items – reserve analysis may have implications for other balance sheet items such as contingent commissions, etc.
24. Loss reserving techniques – select appropriate estimation approaches
25. Standards of practice – addresses the application of these principles

## PAST CAS EXAMINATION QUESTIONS

### A. Definitions and Principles

- A1. As defined in the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” all of the following are elements of the total loss reserve, except:
- A. Reopened claim reserve
  - B. Provision for future development on known claims
  - C. Provision for claims incurred and reported but not recorded
  - D. Case reserves
  - E. All of the above are elements of the total loss reserve. (80–7–36–1)
- A2. Identify and briefly define five elements of the total loss reserve as set forth in the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves.” (82–7–54–3)
- A3. Which of the following statements are consistent with the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves”?
1. The reserve valuation date must be on or after the accounting date.
  2. Case reserves are defined to be the sum of the values assigned to specific claims by claims adjusters, whereas formula reserves are defined to be IBNR estimates established by formula.
  3. The IBNR reserve must cover the ultimate value of future emergence and must therefore include a provision for the initial claim estimates and subsequent development on claims that are incurred but not reported at the valuation date.
- A. 1,2   B. 1,3   C. 2,3   D. 1,2,3   E. None of these answers are correct. (85–7–29–1)
- A4. List three elements of the total reserve that can be characterized as either reported reserves or IBNR reserves, depending on the insurance company’s accounting procedures. (86–7–35–2)
- A5. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” the successful organization of a reserving database revolves around five key dates. Briefly define each of these dates. (90–7–44–2)
- A6. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” the reopened claims reserve is a provision for future payments on claims closed, subsequently reopened, and remaining open as of the accounting date. (91–7–31–MC)
- A7. a. The “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves” indicates that: “A total loss reserve is composed of five elements.” List these five elements.
- b. The “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves” also indicates that: The successful organization of a data base for reserving revolves around five key dates.” List these five key dates. (93–7–67–1/1)
- A8. Which of the following categories should not be accounted for as incurred losses in a company’s financial statements?
- A. Pending claims that require further adjustment
  - B. Previously closed claims that will be reopened for additional payments after the financial statement evaluation date
  - C. Claim reported but not recorded before the financial statement evaluation date
  - D. Claims that have not yet occurred as of the evaluation date, but may occur and will be covered by policies in effect prior to the evaluation date
  - E. All should be accounted for as incurred losses. (94S–3B–64–2)

A1. E, p. 57.

- A2. 1) Case reserve – “sum of the values assigned to specific known claims whether determined by claims adjusters or set by formulas.”  
2) Provision for future development on known claims – “difference between estimates of incurred costs at two valuation dates for a defined group of claims.”  
3) Reopened claim reserve – “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.”  
4) Provision for claims incurred but not reported – “provision for claims incurred but not reported . . . This provision results from the normal delay that occurs in reporting losses.”  
5) Provision for claims in transit – reserve for claims, “which are incurred and reported but not recorded. This provision represents the additional time consumed by the insurer’s recording procedures,” p. 58.

- A3. 1. F, p. 57 – It may be prior to the accounting date.  
2. F, p. 58 – Formula reserves may be established for known claims.  
3. T, p. 59

Answer: E

A4. Development on known cases, claims in transit, and reopened claims, pp. 58-60.

- A5. 1) An accident date 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.”  
2) A report date is “the date on which the loss is first reported to the insurer.”  
3) A recorded date is “the date on which the loss is first entered in the statistical records of the insurer.”  
4) An 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.”  
5) A 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,” pp. 57, 60.

A6. F, p. 58 – They are closed as of the accounting date.

- A7. a. See A2.  
b. See A5.

- A8. A. F, p. 58 – They should be accounted for as part of the loss reserve.  
B. F, p. 58 – They should be accounted for as part of the loss reserve.  
C. F, p. 58 – They should be accounted for as part of the loss reserve.  
D. T, p. 57 – Only claims that have occurred as part of the loss reserve.

Answer: D

- A9. The CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves” lists five elements that comprise the total loss reserve. Which of these may be alternatively classified as either reported reserves or IBNR? (95–7–37–1)
- A10. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” XYZ Insurance Company writes a one-year homeowners policy effective July 1, 1996, for a total premium of \$2,000. If XYZ’s expected loss ratio on homeowners business is 50%, then XYZ’s IBNR reserve as of December 31, 1996, should include \$500 for losses expected to occur in 1997 on this policy. (98F–3B–51–1)
- A11. Based on the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” the most appropriate reserve within a range of actuarially sound estimates depends on two considerations. List these two considerations. (98–7B–61–1)
- A12. Based on the following data and the definitions given by the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserve,” which of the following ranges would include the pure IBNR reserve?
- |   |           |                               |         |
|---|-----------|-------------------------------|---------|
| Paid-to-date losses                               | \$750,000 | Case reserves                 | 400,000 |
| Total IBNR reserve                                | 650,000   | Provision for reopened claims | 100,000 |
| Provision for future adjustments of case reserves |           |                               | 200,000 |
| Provision for claims reported but not recorded    |           |                               | 150,000 |
- A. < \$300,000  
 B. ≥ \$300,000 but < \$350,000  
 C. ≥ \$350,000 but < \$400,000  
 D. ≥ \$400,000 but < \$450,000  
 E. ≥ \$450,000 (99S–3B–67–2)
- A13. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserve,” which of the following should be excluded from an insurer’s loss reserves?
- A. Amounts of claims that occurred on the balance sheet date  
 B. Provision for closed claims that will be reopened  
 C. Provision for losses that occurred before the balance sheet cutoff date but are reported to the insurance company after that date  
 D. Amounts of claims approved for payment, but not yet paid  
 E. All of the above should be included. (99S–3B–69–2)
- A14. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserve,” the provision for claims in transit is an element of the IBNR reserve. (00–6–7–.5)
- A15. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserve,” a valuation must be coincident with or subsequent to the accounting date. (00–6–8–.5)
- A16. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserve,” the five elements of a total loss reserve should be individually quantified. (01–6–4–.5)
- A17. What are the four principles of loss and LAE reserving contained in “Statement of Principles Regarding Property and Casualty Loss & Loss Adjustment Expense Reserves”? (04–6–28–2)

- A9. Development on known cases, claims in transit, and reopened claims, pp. 58-60.
- A10. T, p. 57 – Only claims that have occurred are part of the loss reserve.
- A11. 1) “[T]he relative likelihood of estimates within the range”  
2) “[T]he financial reporting context in which the reserve will be presented,” p. 59.
- A12. Pure IBNR = Total IBNR – Provision for Claims Reported but not Recorded  
Pure IBNR = 650,000 – 150,000 = 500,000, p. 58.
- Answer: E
- A13. E, p. 57.
- A14. T, p. 58.
- A15. F, p. 57 – Substitute “prior to, coincident with,” for “coincident with.”
- A16. F, p. 57 – Substitute “may not necessarily” for “should.”
- A17. 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 data 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,” p. 59.

**B. Considerations**

- B1. A consideration cited in the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves” is the impact of reinsurance plans and retentions. (81–7–28–1)
- B2. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” an analysis of case reserve adequacy using a report year method should include an estimate of claims reported to the company but not yet entered in the company’s statistical or accounting system (i.e., claims in transit). (81–7–2–1)
- B3. The CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves” discusses a number of considerations affecting the reliability of reserve estimates. Name two of these considerations and for each:
- Give a specific example of a condition affecting the reliability of a reserve estimate; and
  - Describe an appropriate modification to the data of methodology to correct for the effect of the condition. (81–7–48–4)
- B4. Which of the following is not mentioned as a major consideration in the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves”?
- A. Aggregate limits      B. Collateral sources      C. Emergence patterns      D. Reasonableness  
E. Stability      (86–7–26–1)
- B5. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” subdividing data into homogeneous groupings decreases the credibility of the data. (86–7–15–.5)
- B6. Which of the following is not mentioned as a key date in the date organization in the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves”?
- A. Accident date      B. Report date      C. Retroactive date      D. Accounting date      E. Valuation date  
(87–7–23–1)
- B7. Explain why it is important for a reserve analyst to review each of the following reserve considerations and give a specific example in each case:
- Data availability
  - Data homogeneity
  - Reinsurance
  - Claim emergence characteristics.
- (88–7–48–4)
- B8. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” the evaluation of reserves for low-frequency/high-severity groups of claims will ordinarily require more extensive analysis than the evaluation of reserves for high-frequency/low-severity groups. (91–7–31–MC)
- B9. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” to interpret development patterns correctly when reserves have been established at present values, the development history should be restated to remove the effect of discounting. (91–7–31–MC)
- B10. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” if reserves have been established at present values, then development history should be restated to remove the effect of discounting in order to allow for the proper interpretation of development patterns. (93–7–1–.5)

- B1. T, p. 63.
- B2. F, p. 60 – In practice, the report date is the one on which a claim is recorded on the company’s books and thus claims in transit are part of IBNR.
- B3. 1) Homogeneity – Reserve estimates for heterogeneous product lines, such as miscellaneous liability or commercial multiperil, are affected when there are shifts in the individual development patterns for different subgroups. Splitting the data into more homogeneous groupings mitigates the problem.  
2) Settlement Pattern – Reserve estimates based on a paid loss method are affected when there is a slowdown in settlements and payments. In such a situation, an incurred loss method should produce more accurate estimates, p. 61.
- B4. A. F, p. 62  
B. F, p. 62  
C. F, p. 61  
D. F, p. 64  
E. T, pp. 59–64 – This is not mentioned.

Answer: E

- B5. F, p. 61 – Substitute “increases” for “decreases.”
- B6. C, p. 60.
- B7. a. “Existing information systems may impose constraints while more suitable data are being developed.” “If reserves are established in less detail than necessary for reporting requirements, procedures for properly assigning the reserves to required categories must be developed.”  
b. “Loss reserving accuracy often is improved by subdividing the experience into groups exhibiting similar characteristics, such as comparable claim experience patterns, settlement patterns or size of loss distributions. For a heterogeneous product, such a commercial multi-peril or miscellaneous liability insurance, consideration should be given to segregating the experience into more homogeneous groupings.”  
c. “Reserves are affected by types of reinsurance plans and retentions that were and are in force. . . The recoverability of ceded reinsurance is a further consideration. . .”  
d. “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,” pp. 61, 63.
- B8. T, p. 62.
- B9. T, p. 62.
- B10. T, p. 62.

- B11. Accident year approaches to reserve estimation produce indications consistent with the broad definition of IBNR. (94-7-3-.5)
- B12. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” data used in the analysis of reserves must reconcile to the insurer’s financial records. (94-7-4-.5)
- B13. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” policy effective date is one of the key dates in the organization of a reserving database. (95-7-1-.5)
- B14. According to the CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserve,” if reserves in a data triangle have been established at present values, the development history should be restated to remove the effect of discounting. (99-7B-9-.5)
- B15. Under the precise definition of IBNR, the method of assigning report dates to reopened claims can affect the IBNR reserve. (99-7B-12-.5)
- B16. a. Identify and explain how a change external to a particular insurance company could affect claim frequency for that company.  
b. Identify and explain how a change external to a particular insurance company could affect claim severity for that company.  
c. Explain why frequency and severity changes cannot be considered independently. (07-6-39-.5ea.)
- B17. A company’s reserving actuary observes that one segment for a particular line of business has much higher severity and a longer-tailed settlement pattern than the remaining segments. Exposures in the high-severity, longer-tailed segment are growing faster than in the other segments.
- a. Explain how the guidance provided by the “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves” applies to this situation.  
b. Describe a potential bias that could result if the actuary analyzes these segments on a combined basis. (08-6-1-.5ea.)

- B11. T, p. 60.
- B12. T, p. 61.
- B13. F, p. 60 – This date is not mentioned.
- B14. T, p. 62.
- B15. T, p. 60 – If the report date for a reopened claim is the date of the original report, it is not included in pure IBNR; if it is the date of the reopening, it is included in pure IBNR.
- B16. a. A court decision that expanded coverage to a previously excluded peril could affect claim frequency.
- b. Inflation increases claim severity.
- c. Severity changes may impact frequency and vice versa. If inflation increases the value of losses previously excluded by a deductible, so that they are greater than the deductible, claim frequency will increase. If the relative frequency of smaller claims versus larger claims increases, all other things being equal, average severity will decrease, p. 63.
- B17. a. “The length of time that it normally takes for reported claims to be settled will affect the choice of the loss reserving methods. For claims that require “ a long time to settle, . . . the amount of settlement often varies considerably from the original estimate. “ in addition, “the evaluation of reserves for low frequency/high severity groups of claims will ordinarily require more extensive analysis.” Thus the segment with higher severity and a longer-tailed settlement pattern should be reserved separately if it has sufficient credibility.
- b. If the segments are analyzed on a combined basis, the fact that the proportion of exposures with high severity and a longer-tailed settlement pattern is changing will not be taken into consideration and past development patterns will be assumed to continue into the future. This will understate actual development, pp. 61–62.