

Singapore Actuarial Society

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Guidance Note for

**Actuaries Investigating Policy Liabilities
Relating to General Insurance Business**

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1 BACKGROUND AND SCOPE

- 1.1 This document has been prepared as a guidance note for actuaries advising general insurance companies on the estimation of policy liabilities relating to general insurance business. Adherence to this guidance note is mandatory. If a member has any concerns about the operation of this guidance note then the issue should be referred to a member of the council or alternatively to the President of the member's examining professional body.
- 1.2 The statutory duties of the actuary of a general insurance insurer are to carry out an actuarial investigation under section 37 (1) of the Insurance Act of the Policy Liabilities Relating to the General Insurance Business.
- 1.3 Members of the Singapore Actuarial Society who undertake activities covered in this guidance note should make reference to their compliance with this guidance note whenever they give written advice. In particular, any area where the actuary gives advice which is not consistent with this guidance note should be specifically highlighted. In this case, the actuary should ensure that adequate records are kept to justify any departure from this guidance note.
- 1.4 This guidance note is meant to supplement (but not replace) existing professional standards from other actuarial bodies which apply to members working in Singapore.
- 1.5 The essence of a profession lies in upholding its standards, technical and ethical, in the public interest. Any actuary who becomes doubtful as to the proper course to adopt in relation to a potentially significant problem is strongly advised to seek help and advice from an appropriate professional body or the Council of the Singapore Actuarial Society.

2 DATA & INFORMATION USED BY THE ACTUARY

2.1 Basis of Data

It is the actuary's responsibility to ensure that the data used gives an appropriate basis for estimating insurance liabilities. This includes the insurer's own exposure and claim experience data, but should also extend to industry data where the insurer's own data is not sufficient to reduce uncertainty to an acceptable level. Where even industry data is sparse, it may be necessary to rely, to a greater or lesser extent, on professional judgement. In such cases, the actuary should explain the reasoning for his approach.

2.2 Data Source and Verification

2.2.1 The actuary should take reasonable steps to verify consistency, completeness and accuracy of the data collated.

2.2.2 Possible checks include:

- Reconciling premium and loss history to company's audited financial statements
- Reconciling data and claims/premiums triangles to MAS returns, e.g.:
 - sum of case estimate diagonal and IBNR reserves;
 - sum of claims paid diagonal match amount paid in the financial period;
 - earned premiums for individual classes; and
 - unearned premium reserves for individual classes.
- Reconciling claims triangle to claims database
- Running reasonableness checks on the claims database e.g. that amounts lie within reasonable ranges and seeking explanation for figures which may seem unusual including negative reserves.

2.2.3 An actuary should be familiar with the administration and accounting procedures for policies and claims.

2.2.4 The degree to which the actuary relies upon data provided by the insurer, and the work of external auditors, including the limitations such reliance places on the actuary's confidence in the data, should be clearly explained in the report.

2.2.5 The actuary should draw attention to any material shortcomings in the data. E.g. effect on the appropriateness of data due to changes in underwriting, claims processing, reinsurance arrangements, policy coverage, legal decisions affecting claims settlements. The actuary should make particular reference to circumstances in which the shortcomings have materially added to the uncertainty surrounding the estimates that he/she has made.

2.2.6 Should the data prove to be incomplete, inaccurate, unreliable, or not as appropriate as desired, the actuary should consider whether the use of such imperfect data may produce material biases in the results of the investigation and make appropriate allowance and document the details. If the data is so inadequate that it cannot be used to carry out the work required for compliance with legislation and regulations, even on a very conservative basis, the actuary should decline to provide a certificate.

2.3 Grouping of Risks

2.3.1 The valuation of the insurance policy liabilities of the insurer may require the sub-division of risks into lines or divisions of lines of business with similar characteristics.

2.3.2 The actuary should determine the most appropriate subdivision for the purpose of the valuation. However, the value of the insurance policy liabilities must be reported for each line of business prescribed under Form 6 of First Schedule of Insurance (Accounts and Statements) Regulations 2004.

2.3.3 Notwithstanding this, where subdivision of lines of business is made, the actuary should include a statement as to the manner of grouping of risks into lines and divisions of lines of business.

2.4 Data Adjustment

2.4.1 The actuary may make adjustments to the data collated to account for abnormal items such as large losses. Where such adjustments are made, the nature, amount and rationale for the adjustments should be clearly stated.

2.4.2 In order to meet reporting deadlines, an actuary may be asked to value insurance liabilities as at a valuation date prior to the reporting date. It may be intended either to use this valuation as if it were at the reporting date, or to update it to the reporting date. Another approach is to develop a model based on analysis of data up to an earlier date, in order to estimate the liability at the valuation date. This practice is acceptable, provided that the actuary does not have reason to

believe, on the basis of the data emerging since the full analysis, that a full valuation using more recent data would give significantly (in the technical statistical sense) different results. To establish this, the actuary should quantify the materiality of the difference between the actual emergence versus what is projected in the model and look out for any emerging large claims. The actuary should comment in the report on any features of the subsequent data that might materially affect the result and quantify the difference.

3 ASSUMPTIONS

3.1 Choosing Assumptions

- 3.1.1 The selection of the claim experience assumptions should have regard to the valuation model, the analysis of the experience and the legal and claims environment.
- 3.1.2 The analysis should consider factors both internal and external to the company that may have influenced the observed patterns in historical experience. Such factors, and changes to them, may include, but are not limited to:
- underwriting strategies;
 - mix of business;
 - policy coverage, including deductibles, limits and exclusions;
 - legislation;
 - economic and social trends;
 - claim management procedures; and
 - reinsurance programs.
- 3.1.3 An actuary should also be familiar with economic, technological, medical, legal and social trends within the broader community which may impact upon the value of insurance liabilities.
- 3.1.4 In some cases, there may be an insufficient amount of claim experience data on which to reliably base assumptions for the selected model or models. The actuary may give partial or full weight to assumptions drawn from industry data, if satisfied that such an approach is appropriate.
- 3.1.5 The assumptions used to estimate premium liabilities would generally be expected to be consistent with those used to estimate the outstanding claim liabilities.
- 3.1.6 The report should disclose:
- assumptions on premium rate changes;
 - assumptions underpinning the development factors and ultimate loss ratios selected; and
 - assumptions on direct and indirect claim expenses. The expense rate used in the valuation should be stated.

3.2 Analysis of Experience and Reconciliation with Previous Investigation

- 3.2.1 Policy and claim experience should be analysed on an individual policy or claim basis or on the basis of cohorts of similar claims. Depending on the nature of the class of business being examined and the availability and reliability of data, this analysis should consider the development over time of claim payments in relation to some or all of the following measures of exposure:
- Number of policies;
 - Earned premium;
 - Numbers of claims;
 - reported
 - continuing
 - settled
 - finalized
 - reopened, etc.
 - Prior payments;
 - Case estimates; and
 - Reported incurred costs.
- 3.2.2 The claim experience need not necessarily be analysed in a fashion that distinguishes claims of different status such as reported, IBNR and reopened.
- 3.2.3 Analyses of experience should be carried out to verify the assumptions used in the previous actuarial valuation. Should there be any major departure, the actuary should consider revising the assumptions to reflect trends in experience. However, it should be borne in mind that past experience may not necessarily be a good guide for the future and the actuary should use judgment based on knowledge and experience of the business.
- 3.2.4 Analysis of changes in premium rates should be carried out in real terms and allow for the time lag for the rate increase to take effect, for analysis based on accident year data.
- 3.2.5 The actuary has the responsibility to consider the reasonableness of the estimates produced and to quantify the effects of any changes in the valuation basis since the previous actuarial valuation. The actuary should set out an explanation where possible for any major departure.

3.3 Specific Assumptions

3.3.1 Future Claims Experience Assumptions

Due regard should be given to expected trends in the factors listed in paragraph 3.1.1 when selecting future claim experience assumptions.

3.3.2 Discount Rate

The rate to be used in discounting the expected future payments for a class of business is the gross redemption yield, as at the valuation date, of a portfolio of government bonds or securities with similar features, with currency and duration similar to that of the insurance liabilities for that particular class.

3.3.3 Expenses

3.3.3.1 A separate allowance for policy and claim administration expenses will be necessary where such expenses are not included elsewhere in the data being analysed for outstanding claim and premium liabilities. This allowance may vary between the outstanding claim and premium liabilities.

3.3.3.2 If possible the actuary should analyse historical levels of expenses when determining appropriate future expense allowances. Where the insurers own expense analysis does not properly allocate expenses between policy issue, ongoing policy administration, claim establishment and claim management it is acceptable to have regard to market allowances and comment to such effect in the actuarial report.

3.3.4 Inflation

3.3.4.1 Claim inflation may be incorporated into the estimates of outstanding liabilities either implicitly or explicitly. Where the model adopted requires an explicit assumption it may be useful to separate claim escalation into standard inflation and superimposed inflation.

3.3.4.2 Standard Inflation is not specific to an insurer's portfolio. It is an external factor operating in the economy at large. It is appropriate to refer to publicly available information on historic wage and price inflation and economists' forecasts to estimate historic and future standard inflation respectively.

3.3.4.3 Superimposed inflation should ideally be derived from an analysis of the insurer's own claim statistics. In smaller portfolios it may be difficult to be definitive as to the existence of superimposed inflation or its level. In such cases it is reasonable to give recognition to wider industry analysis or generally accepted views adopted by other actuaries

4 METHODOLOGY

4.1 Overview

- 4.1.1 Selection of the most appropriate valuation model to estimate the liabilities is the responsibility of the actuary. The actuary may investigate more than one model before arriving at an estimate. The model or models should take into account the available data, the nature of the portfolio, and the results of the analysis of experience. The actuary should explain the basis for the choice of the model.
- 4.1.2 MAS 210 provides information on methodologies to be used in assessing a best estimate.
- 4.1.3 The best estimate is intended to be the mean of the underlying probability distribution. It is important to recognise that many general insurance probability distributions are positively skewed. That is, there is often a wider spread of larger (absolute) values than of small values. As a result, the mean is usually greater (in absolute value) than either the mode or the median. There is a natural tendency, in informal estimation, to use the most probable value. This can lead to under-estimation.
- 4.1.4 If the actuary's choice results lead to negative Incurred But Not Reported (IBNR) claim reserves, the actuary should disclose why a release of reserves is justified.
- 4.1.5 For a reasonably stable portfolio, it is often possible to extend the outstanding claims valuation models to estimate the premium liabilities, on the basis of claims frequency, average costs, and ultimate loss ratios. If this is done, the actuary should adjust the assumptions to reflect the changes in risk exposure, underwriting standards, rate levels, and other factors on the expected claim experience.
- 4.1.6 Where a reinsurer is in default, or known to be at serious risk of default, the assumptions regarding recoverability of such reinsurances should be stated explicitly.
- 4.1.7 In some cases, it may be necessary for an actuary to estimate future, or unclosed premiums for policies underwritten up to the reporting date. The actuary should consider the delay between when the business is underwritten and when premiums are received and factors that influence this delay. The division between the amount of unclosed premium that is earned and unearned should also be considered. The principles in this Guidance Note with respect to Outstanding Claim Liabilities also apply, where relevant, to unclosed premiums.

4.1.8 The focus of MAS210 is for estimates of insurance liabilities that are net of reinsurance and other recoveries. Ordinarily, analysis and valuation of outstanding claims will be on a net basis, however, consideration should be given to an analysis on a gross basis, with separate estimates for reinsurance and other recoveries, particularly in situations where reinsurance arrangements or other recoveries have changed materially. The analysis of reinsurance and other recoveries should be appropriate to the circumstances. The estimation of reinsurance recoveries may require separate deterministic or stochastic analysis of large claims, large events or aggregate costs.

4.2 Use of Case Estimates

4.2.1 Where case estimates are used as the basis for liabilities, they need careful interpretation. It is necessary to understand how they are set and how they relate to what is likely to be paid out.

4.2.2 Given sufficient historical data, standard actuarial techniques can be used to quantify this relationship, provided that the basis of estimation has not been changed.

4.2.3 In the absence of such data, it may be possible to form a view as to the relationship on the basis of discussions with those responsible for the estimates. Care, however, is needed in interpreting such information.

4.2.4 Case estimates are often based on what the estimator thinks the claim is most likely to cost. If the potential range is small, this may be close to the mean. Where the potential range is large, however, the probability distribution is likely to be highly skew and the most probable value could be well below the mean. Even greater bias may result, if the estimates are based on a best case or worst scenario.

4.2.5 Case estimates seldom take account of how long it might take to settle a claim, and do not often incorporate a suitable allowance for either inflation or discounting, where these may be material.

4.2.6 For most short-tail lines of business, the estimate will be based on physical examination of the damage or on records of purchase, and can be a reliable estimate of the gross cost. The principal uncertainties may relate to salvage and subrogation, which are not always estimated. Other approaches to case estimation should be considered on their merits.

- 4.2.7 If estimation practices have changed, it may be necessary to make a subjective measure of the impact of the change, until experience emerges. It should be noted that, even if estimation rules are unchanged, a change in personnel could have a material impact on the case estimates.
- 4.2.8 If the financial reporting deadlines allow, hindsight can be a very useful tool in assessing short-tail case estimates. Even two weeks can show a considerable turnover of estimates into paid claims and conversion of reports into considered estimates.
- 4.2.9 For long-tail lines of business, it is substantially more difficult to derive suitable valuation estimates from case estimates. If there is sufficient data for a proper actuarial analysis, this should be undertaken. If actuarial analysis of case estimates is undertaken, it is important for the actuary to have an understanding of the current and historical case estimation process, as changes in this process can have a material impact. It may sometimes be appropriate for the actuary to obtain independent expert advice on the insurer's case estimation procedures, particularly where large reported claims make up a significant proportion of the liabilities.
- 4.2.10 If the numbers of long-tail claims are too small for meaningful analysis of historical data, then it becomes even more important to understand the nature of the case estimates. It may be possible to draw analogies with other lines of business or with other insurers, or to draw on industry data. Such comparisons need to take into account any discernible differences between the portfolio being valued and the base portfolio, with particular reference to the case estimation process.
- 4.2.11 It is also important to note that even a large portfolio can contain too few large claims to allow credible statistical analysis; for example, a major environmental disaster in the context of a liability portfolio where most claims are for minor personal injuries. In such cases, there is a danger of 'outlier' claims that cannot easily be dealt with using conventional statistical methods. In such cases, the actuary needs to exercise professional judgement and should take great care in so doing. Very large claims are a lesser concern for a direct insurer with suitable reinsurance, where the main interest is the net liability, which can be estimated from the retention.
- 4.2.12 Case estimates may be particularly useful for identifying the presence (or absence) of large claims or events and in the estimation of amounts recoverable under non-proportional reinsurances. However, the actuary needs to be aware if there are any classes or types of claim for which the company inserts a purely nominal case estimate when a claim is reported.

4.2.13 If case reserves have been used for the purposes of the valuation, the actuary should provide a description of the case reserving policy of the insurer in the report. The description should include:

- the components of the case reserves;
- allowance for inflation in the case reserves;
- the setting of the initial case reserves;
- the changes made to the initial case reserves in subsequent years;
- for the setting of the initial case reserves and any subsequent changes made to case reserves, reference should be made to:
 - the use of loss adjusters/solicitors
 - establishment of claim files
 - closing of claim files
 - process for handling reopened claims
- changes in the company's case reserving policy over the analysis period. In addition reference should also be drawn to the changes in the management and claims managers and any other influential factors.

4.3 Relationship between Outstanding Claims and Premium Liability

4.3.1 Different approaches may be taken to the assessment of premium liabilities. The choice depends on many factors, including the nature of the business, past experience, the maturity of the insurer or valuation unit, and changes to underwriting, pricing, claim-management and marketing over the previous few years. Whatever approach is taken to the assessment of premium liabilities, the consistency of assumptions and methods between outstanding claims and premium liabilities need to be considered.

4.3.2 In a stable environment there is an expectation that the assumptions and methods for outstanding claims and premium liabilities will be consistent, after adjusting for trends, claim inflation and investment earnings. However the environment, whether internal or external to the insurer, is typically not static.

4.3.3 If premium liability assumptions are arrived at independently of outstanding claim assumptions, then the assumptions and valuation results for the outstanding claim and premium liabilities should be compared. Significant differences between the assumptions and methods should be explained on the basis of the available information and data.

4.3.4 In forming a view of appropriate premium liability valuation methods and assumptions, an understanding of changes within an insurer's business needs to be considered.

4.4 Provisions for Adverse Development (PADs)

4.4.1 In most cases, some judgement will be required in establishing appropriate PADs. It is the actuary's responsibility to support this judgement with such formal analysis as is practical.

4.4.2 If PADs have been calculated on the basis of individual classes of business viewed in isolation, it will usually be appropriate to allow for a reduction in PADs resulting from the diversification across different classes of business written by the insurer. The amount of such allowance should be determined consistently with the overall principles used in the determination of risk margins.

4.4.3 In estimating PADs by class of business the actuary may, if deemed appropriate, have regard to recent research papers. Two relevant papers prepared for the Institute of Actuaries of Australia are:

- "APRA Risk Margin Analysis" – Scott Collings and Graham White; and
- "Research and Data Analysis Relevant to the Standards and Guidelines on Liability Valuations for General Insurance" – Robyn Bateup and Ian Reed.

4.4.4 If PADs are based on internal analysis, then details of this analysis should be provided. If PADs are based on external work, then the source of that work should be disclosed.

4.4.5 When advising on PADs, the actuary should have regard to their reasonableness and consistency over time, between classes of business and between reports for different purposes

4.5 Stochastic Claim Experience Models

4.5.1 The actuarial literature contains a number of stochastic claim experience models. Those most likely to be useful in the quantification of PADs include:

- stochastic forms of the chain ladder;
- generalised linear model (GLM); and
- credibility models.

- 4.5.2 Some of these models (for example, Mack's stochastic chain ladder) explicitly produce estimates of no more than the first two moments of liability. Others (for example, GLM based models), are conceptually able to give the distribution in full detail, may require prohibitively extensive computation to produce this level of detail.
- 4.5.3 In cases where only the first two moments of liability are estimated, it will be necessary to supplement these with an assumption as to the form of the probability distribution of liability, if estimates are to be converted into the confidence limit required to produce a PAD.

4.6 Practical considerations for PADs

- 4.6.1 If a published industry study is used as a basis for estimates of uncertainty, it is important that the actuary should take note of the context of the study and modify the results of the study if special features of a specific insurer indicate this. Examples include:
 - 4.6.1.1 Risks concentrated in a particular geographical area or industry, relative to the data which on which the study was based.
 - 4.6.1.2 The insurer's type of business being different from the industry average. Examples include a portfolio of small commercial business compared to industry data dominated by more volatile large corporate business; and excess business compared to primary business.
 - 4.6.1.3 Differences in reinsurance arrangements, such as lower or higher retention levels, or different types of reinsurance.
 - 4.6.1.4 Variation in the reliance placed on intermediaries in underwriting.
 - 4.6.1.5 Changes in underwriting conditions, such as a change in the legislation governing a line of business.
- 4.6.2 It is not necessary (depending upon the method used) to form an explicit view as to the shape of an underlying probability distribution, either for a particular valuation unit or of the aggregate liability. What is required is a view as to the mean and 75th percentile, separately for outstanding claims and unexpired risks for each line of business.
- 4.6.3 The purpose of the diversification allowance is to recognise that, when two or more classes of insurance are combined, the risk margin required to meet the 75% level may be less than the sum of the risk margins required to meet that criterion for each class taken in isolation. The uncertainties, which give rise to the need for a risk margin, can be crudely classified as either independent or systemic.

Independent variation is, by definition, not correlated to anything and it always give rise to a diversification benefit. Systemic uncertainty can be correlated to varying degrees between classes. Some sources of systemic uncertainty are only relevant to a single class, but most affect more than one class. Caution should be exercised in assuming a low degree of correlation, in the absence of empirical evidence.

5 UNCERTAINTY

5.1 Treatment of Uncertainty

5.1.1 Elements of uncertainty include, but are not limited, to the following:

- random fluctuations in the data;
- errors in the claim data, resulting in errors in selecting assumptions;
- extent of allowance for claim handling expenses in case estimates
- allowance for indirect and direct expenses relating to unexpired periods of cover;
- complexities of actual claim process;
- fluctuations in claim experience result in uncertainty in selecting appropriate actuarial and non-actuarial assumptions for the valuation model;
- risk of reinsurance failure;
- possible distortions to the analysis due to changes in past balance dates, or early closing of year end accounts;
- future economic and environmental factors that impact upon future claim payments: uncertainty in the discounted value of the cost of claim, even if the undiscounted cost of the claim is more certain; and
- treatment of unclosed premiums.

5.2 Quantifying Uncertainty

5.2.1 To capture or quantify the uncertainty, the actuary will be required to use of one or more of the following:

- Statistical analysis;
- Sensitivity analyses, changes to claim experience assumptions e.g. loss ratios or the valuation models;
- Scenario analyses; and
- Comparison with previous valuations.

5.2.2 Clearly, some uncertainty will always be unquantifiable, and the actuary will be required to adopt a reasonable approach to deal with this.

6 BUSINESS ISSUES

- 6.1 An actuary may consider sending an operational questionnaire to the relevant departments before assessing the liabilities in order to gain a better understanding of current development or changes in the company's operation. This will result in gaining more insight into the relevance of historical data and help in developing a view to any adjustments that may be needed in the valuation model. Appendix A sets out a sample of an operational questionnaire.

- 6.2 In order for the actuary to obtain a good understanding of the company's business, it is important for the actuary to conduct face-to-face meetings with key company personnel (e.g. management, finance, claims and IT).

7 REPORTING

7.1 Format

If the investigation of the policy liability is carried out for a specific requirement, then format of the actuarial report should follow the headings prescribed by the requirement if any. The format of the report may deviate from the prescribed format only if this can improve the flow of the report. In so doing, the report should signpost the prescribed requirement, and should point the reader to where these deviations appear in the report.

7.2 Content

7.2.1 The actuarial report should include definition of terms and expressions used in the report that may be ambiguous or subject to wide interpretation. The actuary should disclose the extent of compliance with the requirements specified by MAS and reasons for not complying fully with the requirements.

7.2.2 The report should address key issues. It should be sufficient to allow any other suitably experienced actuary to form a view as to the appropriateness or otherwise of the work carried out.

7.2.3 The actuary should prepare, date and sign a written report. The report should state:

- who has commissioned the report and, if different, the addressee(s) of the report;
- the name of the actuary and the capacity in which the actuary is acting;
- the purpose of the report or the terms of reference given;
- any potential conflict of interest and how this has been resolved;
- the extent, if any, to which the report falls short of, or goes beyond, its stated purpose;
- the extent of compliance with regulatory requirements and any professional standards and the reasons for not complying fully with this standard; and
- any restrictions on the actuary.

7.2.4 The report should deal with:

- the nature, accuracy and interpretation of the data;
- the analysis of experience;
- the valuation model and key assumptions;

- any changes in the method and key assumptions since the last similar report;
 - comparisons of actual experience with that expected under the assumptions in the last similar report;
 - the results of the valuation; and
 - uncertainty of the valuation result.
- 7.2.5 In dealing with these issues, the steps taken by the actuary to comply with the considerations given in this guidance note should be disclosed in the report. Any deviations, if the actuary does not regard as appropriate to follow the guidance given here, should also be made clear in the report.
- 7.2.6 Where applicable, the report should also contain recommendations or comments, if any, to improve the reliability of future valuations of insurance policy liabilities arising from the valuation, and the insurer's responses to those comments and recommendations, if any, and any follow-up actions taken.
- 7.2.7 If there are material differences in the assumptions or conclusions between the current valuation and previous valuations the actuary should justify the change. He should quantify the financial implication arising from such changes in assumptions.
- 7.2.8 Where the principal requires the actuary to use specific assumptions or the actuary is relying upon an interpretation of legislation, accounting standards or other rulings supplied by the principal or its advisers, the actuary must clearly state the circumstances, discuss whether or not the assumptions are reasonable and consistent with this standard, and discuss the implications of divergence from this standard.

8 SUPPORTING APPENDICES

8.1 Summary of Information

8.1.1 The actuary should prepare a detailed summary of all the data and other information used to arrive at the valuation results. This could include information on:

- Accounting (e.g. financial statements) and other internal financial information/reports
- Reinsurance arrangements
- Underwriting and claims management
- Other recoveries (e.g. subrogation)
- Summary of claims data provided (more detail in another appendix)
- Sources used to set financial assumptions (e.g. discount and inflation rates)

8.1.2 Information sought will include both quantitative (e.g. electronic claims data and financial statements) and qualitative information (e.g. information gleaned from discussions with management, finance department, underwriting or claims management).

8.2 Summary of Data

8.2.1 The actuary should include a summary of the data used in the valuation of liabilities. This would typically include data on historical claims (e.g. claim payments, case estimates) and premiums.

8.2.2 Data should be presented where possible and practical, in the form of standard “run-off” triangles or other basis which reflects the valuation method used. Data for the different groupings of risks or business lines used in the valuation should be shown separately.

8.3 “Clean vs. Un-Clean” Data

8.3.1 As part of the valuation, the actuary will analyse the raw data to identify any major deficiencies or errors, as well as to identify any aspects that may require the data to be modified or adjusted (e.g. for the impact of large claims or catastrophes).

8.3.2 In such cases, a summary of the data after any modifications or “cleaning” should be included, together with a detailed description and explanation of any modifications made.

8.3.3 Data can be shown net or gross of reinsurance to reflect the approach taken in the valuation.

8.4 **Workings of Valuation Method**

8.4.1 The summary of the valuation results should be sufficiently transparent to allow another actuary to review the adopted methodology, assumptions and results. For the generally accepted triangulation methods, this would include providing a summary of each step of the valuation.

8.4.2 For example, where a chain ladder approach is applied to incurred claims, the appendix should include for each group of risks or business lines:

- triangle of paid claims
- triangle of case estimates
- triangle of incurred claims
- chain ladder factors and selected factors for projection
- projection of ultimate incurred claims
- projected loss ratios
- assessment of outstanding claims liability allowing for inflation and discounting if appropriate

Appendix A – Sample of Operational Questionnaire

Underwriting

1. Have there been any changes in the underwriting policy in terms of:
 - i. changes in premium rates Yes / No
 - ii. changes in average deductible amounts and policy limits Yes / No
 - iii. selection of risks Yes / No
 - iv. delegation of authority Yes / No
 - v. changes in key personnel in charge of underwriting Yes / No

Claims Handling

2. Have there been any significant changes in claims recognition and initial case provision, possibly from changes in:
 - i. when claims are recognised Yes / No
 - ii. guidelines for setting initial case reserves Yes / No
 - iii. guidelines applied in the reserving of large or catastrophic claims Yes / No
3. Have there been any significant changes in case provision revision, possibly from changes in:
 - i. guidelines for reviewing case reserves Yes / No
 - ii. time lapse to re-review the provisions for outstanding claims Yes / No
 - iii. rules for establishing bulk or formula reserves for reported claims Yes / No
 - iv. size of the caseload of the average claims adjuster Yes / No
4. Have there been any significant changes in claims settlement practices, possibly from changes in:
 - i. when to close a claim Yes / No
 - ii. key personnel in charge of claims Yes / No

- iii. employment of adjusters (in-house to independent vice versa) Yes / No
- iv. degree of legal involvement Yes / No
- v. level of deductibles Yes / No

Data Processing

- 5. Have there been any significant impacts on the rate of claims recording or processing, possibly from:
 - i. changes in data processing systems Yes / No
 - ii. system problems or failure Yes / No
- 6. Have there been any changes in coding procedures which would affect the data supplied? Yes / No

Other

- 7. Have there been any significant changes in reinsurance arrangements? Yes / No
- 8. Did the company experience any financial problems in the last two years, in terms of
 - i. solvency Yes / No
 - ii. cash flow Yes / No
- 9. Have there been any events that may have significant impact on your portfolios' experience (e.g. recent large individual claims, natural disaster, reinsurance failures, etc.) Yes / No

If you have answered "Yes" to any of the above questions, please provide us with the details.

I, _____, hereby declare that I have answered the above questions truthfully and to the best of my knowledge.

Name:

Position:

Date: