[1]LANDSLIDE RISK MANAGEMENT CONCEPTS AND GUIDELINES AUSTRALIAN GEOMECHANICS VOLUME 35, No. 1 RESPONSE TO DISCUSSION BY G. POWELL

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1 INTRODUCTION

The discussion was forwarded to me, as Chairman of the AGS Sub-Committee by the editor of Australian Geomechanics. The members of the sub-committee were forwarded a copy of the discussion paper and asked to contribute to this response if they wished. This response has been prepared from comments received up to 25th August 2000.

2 RESPONSE TO GENERAL ISSUES

The discussion by G. Powell is largely supportive of the Guidelines, and the use of risk management concepts. We thank him for his contribution and elaborating on some issues which were debated within the Sub-Committee. There are some differences of emphasis, but that is normal in risk management matters, which are new to many, and it is a developing art.

We believe that it is worth elaborating on the process which led to the publication of the Guidelines. The Guidelines were developed over a period of 8 years by the Sub-Committee which consisted of four engineering geologists, and four geotechnical engineers, all of whom had extensive slopes experience. There were several drafts of the Guidelines, and they developed as the procedures in risk management in landsliding and other areas matured over that time.

In 1997, three members of the Sub-Committee attended a workshop on landslide risk assessment, at which 25 of the worlds leading practitioners and academics were present. This provided valuable input to the process of developing the Guidelines.

Prior to publication, the final draft of the Guidelines was sent to the AGS National Committee, who asked for review from practitioners and academics in Australia. Responses from those reviews were incorporated into the final Guidelines as considered appropriate by the Sub-Committee.

It is intended that worked examples using the procedures outlined in the Guidelines be presented in workshops to be held in the major capital cities, and published in Australian Geomechanics. These should assist those who find the concepts new, and possibly a little daunting.

3 RESPONSE TO SOME SPECIFIC ISSUES

We do not intend to respond item by item to the issues raised by G. Powell, since many are matters of relatively minor detail, and in some cases, only reiterate what is in fact already in the Guidelines.

The following issues warrant specific response (the numbering refers to that in G. Powell discussion):

3.1 LACK OF EMPHASIS ON GEOLOGY

We do not agree that the Guidelines underplay the importance of good geological, geomorphological and geotechnical inputs. They are critical to any assessment of slope stability whether in a traditional or risk based framework. This aspect is the thrust of Section 3.2.1 of the Guidelines. The Guidelines do not set out to repeat what is already readily available in the literature on the geology and geotechnical engineering of slopes.

The assertion that engineering geologists are the source of all good slope assessments is contrary to the reality. There are many geotechnical engineers who are at least equally able, and who have an excellent feel for slope processes and geology. We agree that experience and competence are important – to both traditional or risk based assessments, and for geotechnical engineers or engineering geologists.

[1] This paper was initially published in AG Volume 35 No 3 September 2000

3.2 OVER-EMPHASIS ON QUANTIFICATION

We do not retreat from the position that quantification should be attempted, where loss of life is an issue. If it is not, decision makers have no viable risk tolerability criteria against which to assess the risk. However, as we point out in the Guidelines, there are situations where qualitative methods will suffice.

3.3 THE LANDSLIDE PAPER IS TOO PRESCRIPTIVE

The quotation by G. Powell, from our Section 3.5.3 is incomplete and fails to point out paragraph 2 "In some situations where risk to loss of life is identified as an issue in semi quantitative analysis, it may be possible to take immediate risk reduction measures without further assessment". Having said that, we do not retract from the position that the potential for loss of life should be considered, and that is best done in a quantified manner, so the risks can be assessed by those responsible. Unless this is systematically introduced into the profession, there is a likelihood that high risk loss of life situations will be overlooked, as they have been in the past, to the detriment of the public, and to the potential exposure of the professionals involved to legal proceedings.

3.4 THE APPLICABILITY OF EXAMPLE TERMS AND RISK MATRIX IN APPENDIX G

(a) Appendix G is an example of a risk matrix approach. It is headed such. The Guidelines clearly state other matrices may be used, provided they are defined by those using them. However, there would clearly be advantages in all adopting the Appendix G approach so far as practicable, so assessments are comparable. This is particularly the case where one authority, such as a local council, receive reports from a number of practitioners. Uniformity of terminology and definitions makes comparison and understanding significantly easier. Appendix G was developed after much discussion, and several iterations. Simpler (e.g. 3 x 3) matrices were preferred by some, but a viable simplified scheme could not be developed.

The use of dual descriptors (e.g. VL-L) is intended to allow some latitude (which for a specific case may be isolated to a single term), and in reality, the outcome may span a wider range, e.g. from VL to M, when the uncertainty in the inputs are allowed for. This may simply highlight that more detailed investigations are needed to refine the answer, or in some cases, the wide range may not be an issue.

(b) G. Powell is incorrect in asserting that it is not possible to make a qualitative judgement as to likelihood, and to use this judgement to assign a probability. Risk analysis, particularly where expert panels are used to assess conditional probabilities within event trees, commonly use such approaches.

(c) It is agreed that it is not necessary to use risk matrices – they were provided as an aid, not as a prescriptive requirement that they be used. For a quantitative analysis a matrix is unnecessary.

(d) It is agreed that stakeholders must be involved in the risk assessment process, as shown on Figure 1 of the Guidelines. However many stakeholders seek guidance from the risk analysist on what are tolerable risks, particularly for loss of life. It is for this reason that we have included some information on this issue.

4 SUMMARY

(a) Our Guidelines are directed primarily at skilled practicing geotechnical professionals. We are expecting that the IE Aust/AGS Landslide Taskforce will prepare guidelines for Slope Management and which will be presented in a format more readily used by owners and regulators.

(b) Example reports –

Example 1. This is a useful example, which could have been readily quantified for loss of life and damage, and hence enabled evaluation relative to acceptance criteria rather than simply accepting "No risk".

Example 2. The approach taken produced an apparently good outcome, to what appears to have been a fairly obvious case of relatively high risk. If the parties had not agreed to temporary support on the grounds the risk level had not been demonstrated, a quantitative approach would have assisted.

Example 3. In the first table, the risk levels are arbitrary and not quantified, and there is no "acceptable" criteria i.e. Is remedial work needed on risk levels 1 to 6 inclusive, or only 1 to 4. Our experience is that such simple index schemes have greater limitations when loss of life is involved.

In the second table, loss of life is ignored even though it is clearly an issue. It is specifically because of this sort of approach that we recommend life loss be considered in all assessments. The highway authority may be

quite satisfied with the potential, for example, of a low likelihood of large damage, but the loss of life risks to society could be well beyond normally accepted limits. Since the likelihood had been quantified, it would be relatively straightforward to complete the quantitative analysis.

Example 4. The argument that a risk based quantification would have been misleading assumes the person doing the assessment would have ignored what is apparently vital information. There is no reason why that should be the case. Again there is no mention of loss of life, which may have been the critical issue.