HIRD B.J. (Swinburne College of Technology, Melbourne, Australia):

How can civil engineers, particularly academics, be convinced of the need for geological knowledge. (Comment: Geology forms a very small part of the course content in many, if not most, of civil engineering courses in Australia).

STAPLEDON D.H. (in reply):

It is considered that the unfortunate attitude of some civil engineers to geology has been developed in the past largely because of the unfortunate attitudes of the academic geologists who taught them geology, when they were engineering students. For instance many academic geologists have been scornful of soil mechanics, and very few have bothered to learn about it. Few geological courses have ever included any soil mechanics, although soil mechanics has a lot to offer in the fields of sedimentary and structural geology. In short, engineering students have not generally had geology presented to them in ways which show them its values and limitations.

I believe that this situation is slowly changing. It will not change drastically for the better, however, until a much higher percentage of geology and engineering teachers at tertiary institutions is com-

posed of persons who have had appreciable experience in industry, i.e. engineers (or geologists) who have worked with engineering geologists (or engineers) in the field, as members of the type of geo-technical team referred to in the Paper.

GORDON F.R. (F.R. Gordon & Associates, Consulting Geologists, Perth, Australia)

I hate to close this symposium on a cynical note but I would like to put forward an alternative to the Author's stages of development of a project, such as reconnaissance, feasibility, etc. The alternative system which sometimes seems to be followed, is as follows:

Stage	Title
1	Enthusiasm
2	Disillusionment
3	Search for a culprit
4	Punishment of the innocent
5	Decoration of those not involved

Paper by M. Arnould

FRANCIS K.W. (Australia):

Unfortunately a number of geological hazards, e.g. landslides and land subsidence are frequently caused by man's actions (often the person being insured). How is this accounted for in the stated insurance schemes?

ARNOULD M. (in reply):

It depends on the insurance scheme itself. As an example in the Japanese earthquake insurance, eruptions and tsunamis (which could hardly be caused by man's action!) are insurable only if they are caused by earthquakes.

But in my opinion, when man's action is clearly the origin of a geological phenomenon (landslides, for example) the risk (or event) cannot be considered as a "natural" one.

STEVENSON P.C. (Tasmania):

Publication of the potential for hazards by governments is necessary and then banks will not lend money for building in doubtful areas. We can illustrate this in action in Tasmania.

NO REPLY

ARMSTRONG D. (Queensland, Australia):

It appears that for the smaller scale hazards such as landslides, floods produce losses which could be partially avoided by

prohibiting or limiting occupancy of areas where a high hazard has been identified.

Do you feel that prohibition insurance premium rates could serve to make potential land users in identified hazard areas aware of the hazards?

ARNOULD M. (in reply):

Certainly it is one possible action for prevention or better to refuse any insurance for new construction. But in such cases prohibiting occupancy by legal non aedificandi areas is also a solution.

MOELLE K.H.R.:

To what extent do you think an Actuary should be trained in Engineering Geology and how do you envisage a working relationship between an Actuary and an Engineering Geologist?

ARNOULD M. (in reply):

I don't think an Actuary has to be trained in Engineering Geology. Relationships between the two can be improved in common panels for preparing convenient insurance schemes (for geological hazards), heads of such panels being administrative or political authorities.

Another forms of relations can be for estimating the "natural" character of hazards having produced losses. The Engineering Geologist acting as an expert.

CLOSING REMARKS

In our symposium we have been privileged to hear outstanding papers, several of which will be reference studies for years to come. We started by considering the relative destructiveness of geological hazards in terms of loss of human lives, and Professor Arnould further considered material damage as an index of destructiveness.

However, in the ultimate even one human life is sacred and if our discussions have made any contribution towards saving life in the future we will be justified. I must again emphasise the need for our

continuing involvement with planning as politicians forget even major disasters and the need for preparation, prediction and prevention.

I will sum it up as "The Acts of God of Yesterday are the Acts of Criminal Folly of Tomorrow".

Thank you for your attention and your attendance.

F.R. GORDON
Convener of Symposium 113

Vice President for Australasia IAEG
Perth, Australia