



AEES Newsletter

No 2/93

The Society - David Rossiter (Treasurer)

The current membership of the Society is 248. We have a widely scattered membership with 98 members in NSW, 47 in Queensland, 31 in Victoria, 19 in Western Australia, 15 in South Australia, 13 in the ACT and 2 in each of the Northern Territory and Tasmania. There are 4 members in each of Singapore and Papua New Guinea, 3 in each of Hong Kong, UK and New Zealand and 1 each in Fiji, Tonga, Japan and the USA.

If you have not yet renewed your subscription for this year, please use the form in this newsletter, though if you are a member of the Institution of Engineers, you can renew through your annual Institution subscription system. Please note the subscription year is from 1 December 1992 to 30 November 1993.

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President's column - Charles Bubb

Some duties of an expert witness

There is no doubt that it will only be a matter of time before expert witnesses will be called to appear in a major civil action in Australia involving the various specialist skills of Earthquake Engineering. Acting as an expert witness raises some ethical duties and responsibilities.

Those of us who are members of IEAust are both bound by the code of ethics 1992 and are able to seek guidance from it. Those of us who are not IEAust members could do worse than follow it both for themselves and their clients.

Refer especially to Page 9 of the Guidance Notes. Note that the error of bias is particularly raised so let me concentrate on that. The 1992 Ethics Code, Interpretation and Guidance states:

At all times the expert witness owes the proceedings total objectivity....This duty to the court is not inconsistent with the duty the expert owes to the client. In fact the best way to discharge this duty is to be completely bi-partisan.

An expert is not an advocate. Advocacy by an expert diminishes the value of advice both to the client and to the proceedings.

Indeed I would add in some cases the value of the advice is diminished to no value at all, or worse.

The Australian Law Society journal Dec 1986 addressed the subject of bias in an article by Wade A Wyatt entitled 'Technical evidence - the role of the expert witness'. Wyatt stated: *It is said that expert witnesses should be free of bias. However it is really a matter of degree since some subjectivity is inevitable as a result of differences in training, procedures and experience. The person who appears regularly as an expert on the basis of fees or other remuneration appreciates that the testimony given is useful only if accepted. A scientist involved for the first time in litigation is prone to exhibit more bias and may attempt to usurp the judicial function.*

He also remarks that: *Use of scientific witnesses not able to meet the court's requirements for qualification is uncommon but can be a shattering experience for both the scientist and counsel.*

There is also another common source of dispute; Codes!! A world expert on Construction law, Max Abrahamson, said in a keynote address to an Australian Building and Construction Industry Conference on Avoiding Disputes: *So many disputes are due to problems in the code of practice. Some time ago I had*

to cross-examine (two) experts on the concrete code who had served on the committee that had produced one of the main concrete codes in the UK and they gave absolutely conflicting views of what the code meant!!

In conclusion then, we must hope that we will not have the same trouble in Australia.

If you want to read up on this subject I can suggest *The trial of the expert A study of expert evidence and forensic experts.* by Ian R. Freckleton, OUP Melbourne 1987.

But at least I suggest you follow the *Interpretation and Guidance for Members* in the absence of specific advice.

Intensity - Kevin McCue (Hon Sec)

As a result of the International Geophysical Year in 1957 and deployment of the Worldwide Standardised Seismographic Network through the 1960's, *Intensity* is not now routinely used by ASC seismologists to locate earthquakes. It is used however to determine the size and location of historical or pre-instrumental earthquakes by comparing their felt areas with those of recent earthquakes for which the magnitude can be measured. Other regular users of the scale in Australia are the insurance assessors, engineers and builders.

A committee of the NZ National Society for Earthquake Engineering has recently revised the MM scale (Eiby, 1966) in use there (Bull NZNSEE, 1992). A committee has been formed at the Earthquake Engineering Research Institute to revise the MM Intensity scale in the US, which culminated in a workshop on 5 May 1993 in Memphis. The workshop has invited international participation to get agreement on proposed changes to the scale.

The MM scale is obviously still a very useful tool for the earthquake engineering and insurance professions.

The time is overdue for a rethink of Australian practice. Do we still need an intensity scale? If so - should we adopt the new NZ scale, adapt it for Australian earthquakes and local construction practice and materials, develop a local product or adapt something else - say the MKS scale?

The executive believes that the AEES is the appropriate organisation to lead the debate here, it is in our charter as a learned society. We propose to form a national committee to investigate these questions and provide a national representative to the US committee.

A number of members familiar with the scale have already volunteered to participate, others are welcome. Please ring or fax me by the end of June. (ph: 06 249 9675, fax: 06 249 9969).

AEES'92 Conference Proceedings

The attractively bound proceedings have now been published and can be purchased from the Hon Sec (at address above) for \$15 which includes post and packaging to anywhere in Australia.



Figure 2. Maximum felt intensity in modified Mercalli Scale in the Sydney Basin, 1900-1990.

* from Denham, AEES '92 Conference Proceedings

News items

•AGSO review The long awaited Richards review into AGSO has been published. The

Ministers, Crean and Lee, are expected to respond in the Budget. The report recommends that AGSO become a Statutory Authority, the Australian Seismological Centre be merged into an Observatory Group but the Nuclear Monitoring function be returned to Foreign Affairs (the client) and likewise the Antarctic functions to the Antarctic Division.

Splitting up the ASC would severely damage the ASC's earthquake monitoring capability, both of Australia and the World.

- **PCEE '91** - Proceedings are available. The 1120 page 3-set volume contains the 87 programmed papers, 3 on the 1989 Newcastle earthquake, and addresses of the keynote speakers on theme issues: Microzoning, Non-structural elements, Areas of low seismicity and reinforced concrete design. Price \$NZ150.00 incl post. from: NZNSEE, PO Box 17-268, Karori, Wellington, NZ.

- The **Loma Prieta Earthquake Reconnaissance** report is published as a supplement to vol 6 of the journal *Earthquake Spectra*. (Ed. L Benuska). A video of its effects is available on loan to members of IEAust, from IEAust Canberra.

Professional 'crooks' selling their names and signatures...

The following article (pertinent to the President's column above) appeared in the Canberra Times Wed April 8, 1992 p20: Professional consultants are 'crooks' and lawyers 'prostitutes' if they tell clients only what they want to hear, ICAC Commissioner Ian Temby QC said yesterday.

Mr Temby, speaking at an ethics symposium, questioned whether there was such a thing as an impartial consultant who gave the same advice regardless of who was paying for it.

'The views of experts with appropriate qualifications are constantly sought, obtained and placed before decision makers whether they be counsels or appellants tribunals,' Mr Temby said.

'More than one witness before me in concluded matters has stated or accepted that if they pay then they expect to, and do get, the advice that suits their cause.

Perhaps they exaggerate but if to an extent they are right, then the advice is coming from crooks'

Mr Temby said truth was an absolute and should not be allowed to become a relative concept. He said all human

relations were best served by honest dealing.

Earthquake Engineering in Australia - John Wilson, University of Melbourne

The new Australian Earthquake Loading Standard AS1170.4 is due for release in the second half of 1993. The Standard is based primarily on North American experience with some modifications for local Australian seismicity conditions.

The earthquake loads imposed on a structure are given in terms of the seismic base shear force V , where:

$$V = (ICS/R)W, \text{ and}$$

$$0.01 \leq V \leq (2.5 a I/R)W$$

W = The gravity load (dead load plus a proportion of live load)

I = Importance factor recognising essential and hazardous facilities. $I = 1.0$ for ordinary structures; 1.2 for essential facilities.

CS = Elastic response spectrum which provides an estimate of the earthquake loads in the elastic range.

$$CS = 1.25 a S/T^{2/3} \leq 2.5 a$$

a = Acceleration coefficient representing the site peak effective ground acceleration (as a fraction of gravity) associated with a 500 year return period earthquake. (eg. $a = 0.08$ for Melbourne and Sydney; 0.11 for Newcastle).

S = Site factor reflecting the soil profile ($S = 0.67$ for hard rock; 2.0 for soft soil)

T = Building fundamental natural period.

R = Structural response modification factor reflecting the ductility or energy absorbing characteristics of the structural system. (R ranges from 1.4 for unreinforced masonry to 8.0 for special moment frames of steel and concrete).

Whilst the peak effective ground acceleration values have been developed from Australian data, the shape of the elastic response spectra (CS) and the magnitude of the R factors are essentially based on North American recommendations.

A wide range of research projects are currently being undertaken by the Department of Civil and Environmental Engineering at both The University of Melbourne and Adelaide University and the Seismology Research Centre at the Royal Melbourne Institute of Technology, to investigate the applicability of

using Californian information and recommendations for Australian conditions. A description of some of the areas being investigated is discussed below.

1. Interplate and intraplate earthquake ground motions

Researchers at AGSO, RMIT and The University of Melbourne are conducting a study of a wide range of interplate and intraplate earthquake records in order to investigate the shape of the response spectrum generated by each of these types of earthquakes.

2. Aseismic behaviour of steel frames structures

2.1 Light Gauge steel framing. The response of light gauge steel framing to earthquake excitation is being investigated at The University of Melbourne in collaboration with BHP. Both analytical and experimental techniques are being used in the investigation, including the use of a 2.5m x 2.5m two-directional earthquake shaking table facility. The aseismic performance of the light gauge steel framing is being studied for both the local and international markets.

2.2 Ductility of steel moment frame structures. The elastic and inelastic earthquake response of a 10 storey moment frame steel building is being investigated at The University of Melbourne using both Californian and local Australian earthquakes. The aim of the research is to investigate the appropriateness of the 'R' values used in AS1170.4 for steel moment frames.

3. Ductility of reinforced concrete structures

3.1 The behaviour and energy absorbing capabilities of moment frame beam column joints under cyclic loading is being investigated at The University of Melbourne.

3.2 The aseismic behaviour of medium rise reinforced concrete shear wall and moment framed structures is being investigated using the uniaxial earthquake shaking table facility at Adelaide University. The moment frames have been detailed in accordance with AS3600 and the study aims to investigate the 'R' factor associated with this type of structural system.

3.3 The inelastic behaviour of reinforced concrete moment frame and shear wall high rise structures under earthquake excitation is being investigated at The University of Melbourne. The non-linear structural analysis program ETABS and DRAIN-2D are being used in the theoretical study, together with typical interplate and intraplate earthquake ground motions.

4. Aseismic performance of unreinforced masonry

4.1 The in-plane behaviour of unreinforced masonry shear walls subject to earthquake loading are being investigated at Adelaide University. Both the strength and stiffness characteristics of the masonry walls are being examined.

4.2 The out-of-plane response of unreinforced masonry parapet walls to earthquake loading is being investigated at The University of Melbourne using the earthquake shaking table facility. The aim of the investigation is to develop some cost effective retrofitting techniques for reducing the vulnerability of unreinforced masonry structures to earthquake forces.

5. Non Structural Components

The performance of flexibly mounted equipment located on the ground and elevated in a structure to earthquake ground motions is being investigated by the spring manufacturer G.P. Embelton and Co. in collaboration with The University of Melbourne. Both analytical and experimental techniques are being used to carry out the study and compare the equipment response with the recommendations in AS1170.4

6. Torsional Effects in Earthquake Response of Buildings

An international research program investigating the non-linear torsional behaviour of buildings subject to earthquake ground motion is being carried out at The University of Melbourne in collaboration with London University in the U.K.

This is a selection of the research projects currently being undertaken. The editors would like to hear of other research or consultancy projects being carried out

locally or internationally for inclusion in future editions of the newsletter.

**Gary Gibson reports on the Newcastle conference:
Uncovering the Mysteries
Seismology Research Centre, RMIT**

Another workshop on the 1989 Newcastle earthquake was held from 4-6 April 1993 at the University of Newcastle. It was convened by the Newcastle City Council, the University of Newcastle and CERA and attracted almost 100 participants from a wide range of backgrounds.

The workshop emphasised the impact of the earthquake on local government and emergency services. Review papers on seismology and earthquake engineering provided an introduction for participants from other backgrounds.

Harold Stuart, Director of Health and Building Services for the Newcastle City Council, demonstrated his unique experience to provide a review of the impact of the earthquake on local government. This covered the period immediately after the earthquake, the recovery phase, and implications for those urban areas that have not yet experienced their earthquake.

Detailed papers were presented on an increase in pipe breaks in the Newcastle area over the years following the earthquake. It was suggested by Konrad Moelle, Harry Cattle and others that the brittle nature of underground pipes makes them sensitive to short and long term changes in ground stress and strain.

A number of speakers discussed the implications of earthquakes for emergency management. Senior emergency services staff are now well aware of the possibility of earthquakes in Australia. The development of appropriate and credible education and training programs will require considerable effort.

An interesting display was presented by the Newcastle Region Public Library which has created a Newcastle Earthquake Database. This covers geology, seismology, engineering, insurance, social services, disaster management, building damage and other areas from a wide variety of information sources. The Database will be a one stop information source on the Newcastle

earthquake. It has a computerised bibliographical listing, and it is hoped to include the full text of cited documents where possible.

There were some lively discussions on use of the maximum credible earthquake to shock people into consideration of earthquakes in planning and design. Some speakers believed that seismologists should, and in fact have the duty, to describe the largest earthquakes that can occur in an area. Others believed that presentation of rare, dramatic and uncertain events will reduce the credibility of seismologists and engineers who are attempting to quantify earthquake hazard and vulnerability and to reduce earthquake risk.

The workshop ended with a tour of Newcastle in perfect weather, then lunch and a concluding forum in the rebuilt Workers Club.



Cartoon courtesy of Sydney Morning Herald.

1993 US National Earthquake Conference - Mike Griffith (Civil Engineering Department, Adelaide University)

Earthquake Hazard Reduction in the Central and Eastern United States: A Time for Examination and Action

Summary The conference was well attended with over 600 participants including a strong contingent from Australia. The conference was of particular interest to Australia because of its focus on problems relevant to the Eastern and Central U.S. where the geological, seismological, and structural aspects of

**Membership renewal
to 30 November 1993
or
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Occupation (Please circle the appropriate category)

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Geotechnical Geomechanics
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\$25 annual subscription fee or
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\$10 for IEAust members who
nominate AEES as preferred Society

please note: could all members - please
complete & return this form to the Treasurer,
address at the header of first page for our records.

Earthquake Engineering and Structural Dynamics

The Journal of the International Association
for Earthquake Engineering

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