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No. 44

AUGUST 1992

A NEWSLETTER OF THE N.Z. GEOMECHANICS SOCIETY

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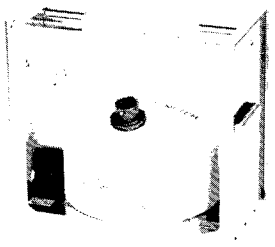

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NZ GEOMECHANICS NEWS
NO. 44 AUGUST 1992

A NEWSLETTER OF THE NZ GEOMECHANICS SOCIETY

CONTENTS

THIS IS A REGISTERED PUBLICATION

"NZ Geomechanics News" is a newsletter issued to members of the NZ Geomechanics Society. It is designed to keep members in touch with recent developments. Authors must be consulted before papers are cited in other publications.

Persons interested in applying for membership of the Society are invited to complete the application form at the back of the newsletter. The basic annual subscription rate is $35.00 and is supplemented according to which of the international societies, namely Soil Mechanics ($15.00), Rock Mechanics ($15.00) or Engineering Geology ($35.00) the members wishes to be affiliated. Members of the Society are required to affiliate to at least one International Society.

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EDITORIAL

The past six months since our last issue of Geomechanics News has seen a peak and a hiatus in the Society's activity, with an understandable relaxation after the frantic effort of our two conferences in February. Local Group reports are somewhat apologetic and there is some hope that each area will soon wind up to more active status.

The past few months have also seen the power crisis come and not-quite go. Politicians and pressure groups have taken full advantage of this opportunity to posture and proclaim, and the media have sought out the disgruntled public to point the accusing finger at the obvious villain. Clearly the concept of a one-hundred-year-event is neither understood nor believed. Someone must be at fault! Even now, the people are crying for a public enquiry into this terrible event, convinced that those to blame will escape retribution if not fully exposed in front of the cameras. Yet, has it been so bad? We have had to put up with the minor irritation of limited hot water and have voluntarily out back on our normal electricity usage. No "brown-outs" or "black-outs" have occurred. Have we really suffered for two months in a period of (how many?) years?

But the "crisis" has handed us some valuable experience. We now know what can be saved with the necessary effort and we have useful cause-and-effect data for some future energy conservation policy. The general will to conserve is conceived if not yet born. As engineers, however, we must take note of the public's perception of a design event. Are we likely to suffer the same credibility problem with (say) the hundred-year earthquake as Electricorp is now experiencing with the hundred-year drought? We must beware! Someone must be at fault!

With this in mind, this issue of Geomechanics News provides material which may help us as we sink more into confrontation with our clients, the public and each other. "Experts in Dispute" was an excellent seminar put on by the Arbitrators' Institute of New Zealand. It deals mainly with our roll as expert witness in disputes between other parties. The advice, if not obligation, that experts remain impartial and not fall into the advocacy trap is clear. It does not consider that experts can themselves be the subject of dispute and that they then must be advocates on their own behalf.

Tim Sinclair
EDITOR

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NOTES FOR CONTRIBUTORS

NZ Geomechanics News is a newsletter for which we seek contributions of any sort for future editions. The following comments are offered to assist contributors:

- Technical contributions can include any of the following:
  - Technical papers which may, but need not necessarily be of a standard which would be required by the international journals and conferences
  - Technical notes
  - Comments on papers published in Geomechanics News
  - Descriptions of geotechnical projects of special interest
- General articles for public may include:
  - Letters to the NZGS
  - Letters to the Editor
  - Articles and news of personalities

Submission of text material in camera-ready format is not necessary through typed copy is encouraged. Diagrams and tables should be of size and quality for direct reproduction. Photographs should be good contrast black and white gloss prints and of a suitable size for mounting to magazine format. Authors and other contributors must be responsible for the integrity of their material and for permissions to publish.

Tim Sinclair
EDITOR

****

REPORT FROM THE MANAGEMENT SECRETARY

1. MEMBERSHIP

The following new members are welcomed to the Society:

Shao Chun Cong
Michael Hughes
Warren Lewis
Peter Lilley
Ross Roberts
Scott Vaughan

2. ANZ AND ISL CONFERENCES

The 6th Australia-New Zealand (ANZ) Conference on Geomechanics and the 6th International Symposium on Landslide (ISL) were held in Christchurch in February. Both Conferences were most successful with a surprisingly large number of overseas participants. I would like especially to thank the Organising Committee under the Chairmanship of David Bell (ISL) and N.L. Traylen (ANZ) for all their hard work over the last 2 years. Both Conferences have surplus and the Management Committee is currently considering the best way in which the surplus can be used to the benefit of members.

3. 1993 IPENZ CONFERENCE

The 1993 IPENZ Conference is to be held in Hamilton and the Geomechanics Society has been seeking papers from members. The theme of this year's Conference is "Sustainable Development".

4. MANAGEMENT COMMITTEE

John Sekula has recently stepped down from the Management Committee to take up a position in Hong Kong working on the new airport tunnel. We wish John and his family all the best with his move. His work on the Management Committee as Vice-Chairman ISRM and Auckland liaison officer has been most appreciated. Geoffrey Faqhuar and Mark Plested have taken over responsibility for organising the Auckland Branch activities for the remainder of the year.

5. BUILDING ACT AND NATIONAL BUILDING CODE

The Building Act became law on 1 July 1992. The new national Building Code is performance based. Specific guidance is provided by 25 Approved Documents including one on Foundations.

The New Zealand Geomechanics Society recently formed a small group to provide review comments on the Approved Document for Foundations. The group included C. Graham, T. Matuschka, M. Pender, T. Sinclair, D. Taylor and L. Wesley. A member of problems were identified with the draft document, which hopefully will have been resolved before publishing.

It is noted that the development of Foundation Codes has generally been problematical worldwide. This arises because of the difficulty in defining foundation conditions and properties compared with, for example, building structures where the geometry and material properties are better defined. There are many unique situations which arise that cannot practically be codified. Rigorous application of the Approved Document could create problems in certain circumstances. Hopefully, Territorial Authorities will take a pragmatic view.

Members of the Society are encouraged to adopt a positive attitude to the new code. Any comments or experiences with the code will be welcomed and will be useful in formulating revisions or amendments.

6. MEMBERSHIP BOOKLET

The Society has been planning to publish, for some time, a Membership Booklet. This is now close to fruition and members can expect to receive a copy before not too long.

Trevor Matuschka
MANAGEMENT SECRETARY

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REPORT FROM THE VICE CHAIRMAN FOR ISSMFE

XIII International Conference on Soil Mechanics and Foundation Engineering

The above conference is to be held in New Delhi in January 1994. NZGS has been asked to select papers for New Zealand's contribution to the conference. Our Society has an allocation of 32 pages and we have accepted the three papers submitted to date. If anyone else is interested in submitting a paper please contact the Vice Chairman. Completed papers must be in India by January 1993.

Stuart Palmer
VICE CHAIRMAN

****

REPORT FROM THE VICE CHAIRMAN FOR IAEG

My files and records are packed away in cartons at present as we have just shifted from Cromwell back to Lower Hutt, so unfortunately I can only make the following general report:

1. The opportunity provided by the Sixth Aust-NZ Conference on Geomechanics and the Sixth International Symposium on Landslides, both held in Christchurch in February, was used to establish contacts with overseas members of IAEG. In particular, useful discussions were held with John Braybrooke our Australasian Vice-Chairman of IAEG, on topics ranging from the registration of Engineering Geologists issue to the workings and plans of IAEG.

2. On the question of registration of Engineering Geologists, I am pleased to be able to report that a group of Geologists have taken the initiative and have decided to form the Professional Geologists Association of NZ (PGANZ), a professional body having the objectives of protecting and promoting the interests of geologists (see the following draft proposal). It is my recommendation that Engineering Geologists give their full backing to PGANZ, although membership of PGANZ will not mean that Engineering Geologists are "registered" officially. The topic will be discussed in some detail on the next issue of Geomechanics News.

Dick Betham
VICE-CHAIRMAN

****

DRAFT

PROFESSIONAL GEOLOGISTS ASSOCIATION OF NEW ZEALAND
PGANZ

1. PGANZ is proposed as a professional body to protect the interests of geologists and related professionals. Because of the limited numbers of professional geologists in New Zealand PGANZ will be open to professionals from all branches of geology, geophysics, geochemistry and experience which will be comparable with the standard set by IPENZ it is suggested that membership be restricted to those with seven years relevant experience following a four year or higher degree. A membership committee will decide what constitutes relevant experience.

2. PGANZ will have a constitution and code of ethics generally similar to those of the Australasian Institute of Mining and Metallurgy.

3. In view of the limited number of professional geologists in New Zealand it is suggested that there be one class of membership only.

4. PGANZ will maintain a register of members in two sections. Section 1 of the register will consist of an alphabetical list of members and their addresses. Section 2 of the register will consist of one page summarises of the expertise and specialisation of those members who act as principals of consulting companies, self employed consultants and contractors. The register will be circulated annually to all relevant SOE's and private sector companies, and the trade commissions of all New Zealand diplomatic posts.

5. PGANZ will at all times act to promote the geological and related professions, the mineral and oil industries, hydrogeology and environmental geology, and engineering geological input to civil engineering construction and land development. The education of central and local government will be an important role.

Expressions of interest are invited. Enquiries, suggestions and comments on this draft should be made to:

Richard Barker
P.O. Box 54094
Bucklands Beach
Auckland Fax: (9) 537 0463

Gary Jones
79 Hudson Street
Hamilton Fax: (7) 839 1775

Roger Dewhurst
P.O. Box 2142
Rotorua Fax: (7) 332 3484

Keith Hay
Cyprus Minerals
Waitekauri Road
Waihi Fax: (7) 863 6252

****

REPORT FROM THE VICE CHAIRMAN FOR ISRM

There is to be an ISRM Symposium on ROCK CHARACTERISATION in Chester, UK on the 14-17 September 1992. It has been organised by the British Geotechnical Society and is the 1st EUROCK ISRM sponsored Symposium. The Symposium has five themes of Rock Properties, Site Investigation, Input to Design, Monitoring and Back Analysis, and Rock Engineering and the Environment.

Eighty six papers from 26 countries have been received for the Symposium.

Prior to the Symposium, an ISRM Council Meeting is to be held. If any NZGS members are attending and could act as proxy, could they please contact the Vice-Chairman.

Colin Newton
ACTIVE VICE-CHAIRMAN

****

REPORT ON ISRM CONGRESS AACHEN
16 - 20 SEPTEMBER 1991

The ISRM is governed by a board and a council. The board consists of a secretary-general, president and the regional vice-presidents whereas the council comprises the board and a representative from each national group. In effect, it operates as a cabinet and a parliament with the board taking executive decisions and preparing recommendations for ratification by the council.

The ISRM Council Meeting was held in conjunction with the 1991 Aachen Rock Mechanics Congress. I attended as NZGS national group representative and Professor Pender attended as an observer.

Council business included:

- Election of officers with the highlights being the election of Professor Pender as Australasian Vice-President and the election of Charles Fairhurst as President of the Society.
- Presentation of an 8 year plan for ISRM. A copy of this document is available if members wish to view it.
- Endorsement of regional ISRM symposium for 1992 including the 6th ISL symposium in Christchurch.
- A debate on whether to create a division within ISRM to accommodate a blasting group. The proposal was not well thought out and failed to win sufficient support.

The Rock Mechanics Congress followed the council meeting and included three days of papers followed by a day of workshops. The conference was attended by a small NZ contingent (Mick Pender, Stuart Read and myself) and two expatriates (Laurie Richards and Ian Johnstone). The quality of paper presentation was mixed but Evert Hoek's Mueller Lecture was excellent. He questioned the validity of using Factors of Safety as a measure of reliability in Rock Mechanics and used examples from underground power house design and large landslide remedial works to demonstrate the limitations of reliance on Factor of Safety.

After a slow first day the remainder of the conference contained some very good technical papers and the two workshops on Thursday were well run and interesting.

LOCAL GROUP ACTIVITIES

All local groups report much reduced, if not minimal activity. Auckland have managed some meetings but regrettably our Auckland Group convenor, John Sekula, has been tempted to the warmer and busier climate of Hong Kong and so we don't have a report for this issue. Wellington promise an exciting second half, starting with fireworks in Parliament and then making the earth move for the new National Museum. Christchurch are still busy wrapping up the conferences, producing discussion reports and counting the money! Bruce Riddalls assures us that geotechnical engineers are still watching Clyde despite the lack of headlines in the national papers. We are still trying to locate our Otago liaison member. There is a rumour that he is trying to find the School of Mines and take it back to Dunedin after Auckland borrowed it and lost it somewhere in the University.

Watch this space next issue!

Editor

LETTERS TO THE EDITOR

The Editor,
Geomechanics News

Dear Sirs,

I was interested in your comments on the effect of Section 35 of the Resource Management Act 1991.

I have been greatly helped in the past by study of the 1:25,000 Industrial Series maps of the NZ Geological Survey, which although they may not tell you precisely what you will find, give you a good indication of what to look out for. A great deal of the information upon which these maps have been based has come from borehole records supplied both by government departments and private sector consulting firms. The maps have been available to the general public at nominal cost, and I have seen them freely quoted in the site reports of many consulting geotechnical practices.

The purpose of s35 is to ensure that this sort of information is kept up to date and made generally available. I believe that this is to the benefit of public and practitioners alike.

The questions you raise are less easily answered. Where does the rightful ownership of the information given in the NZGS maps lie? I say "who cares?" The strata revealed by the technician's auger were not laid down by his employer - they are there for all to discover, and the less repetitious work necessary to make that discovery, the better for all. How often does the geotechnical engineer make an ex-gratia payment to the drainlayer for providing a clear cross-section of the surficial material on site?

The law courts are supposed to protect the engineer against the defaulting party who has commissioned the investigation, assuming that he has already protected himself by his arrangements with his client.

Professional liability is an altogether different matter. Case histories abound with the bitter experiences of engineers who were unmindful of the way in which the legal system brushes aside the variability inherent in natural soils. We try to overcome this with disclaimers, saying that the information supplied is not to be relied upon by parties other than those to whom it is supplied, nor for other purposes. Should not these disclaimers have the same force when attached to information which we are obliged to supply to the public domain?

I support the idea that geotechnical reports should be provided in two sections. I believe that the "findings" made available to the public, including borehole logs, should be limited to the facts of what is found, and that they should be accompanied by a disclaimer as to the use to which they may be put. They cannot escape the possibility that a written description is also an interpretation, but it would be ludicrous to try to store all the extracted samples for posterity. If the recording is carried out with due diligence then why are we more at risk than previously?

The section of the report containing the recommendations and design solutions contain the stock-in-trade of the geotechnical engineer, and should in my opinion remain confidential to the engineer, the client, and the local authority. I am not even sure that the Building Act does not relieve the local authority of having to burden themselves with the knowledge.

W. G. Thomson
Brown & Thomson, Consulting Engineers

FORTHCOMING CONFERENCES

1. **GEO-FILTERS'92!**
International Conference on Filters and Filtration
Phenomena in Geotechnical and Hydraulic Engineering

October 20-22, 1992

University of Karlsruhe
Federal Republic of Germany

Contact:
GEOFILTER'92 - Secretary
C/- Bundersanstalt für Wasserbau
Kussmaulstr. 17/P.O. Box 21 02 53
D-7500 Karlsruhe FRG

Tel. +49-721-9727-382
Fax. +49-721-9726-454

2. **Conference on probabilistic methods in geotechnical engineering**

February 10-12, 1993

Australian Defence Force Academy
Canberra

Contact:

PMGE'93 Conference Secretariat
Department of Civil and Maritime Engineering
University College, University of NSW
Australian Defence Force Academy
Campbell ACT 2600, Australia

Tel. (06) 268-8335
Fax. (06) 268-8337

3. **Conference on Geotechnical Management of Waste and Contaminations**

March 22-23, 1993

Eagle House
Sydney

Contact:
The Conference Manager
Geotechnical Management of Waste & Contamination
The Institution of Engineers, Australia
11 National Circuit
Barton, ACT 2600
Australia

Tel: (06) 270-6555
Fax: (06) 273-1488

4. **Sixth International Conference on Soil Dynamics and Earthquake Engineering**

June 14-16, 1993

Bath Assembly Rooms, UK

Contact:
Elizabeth Cherry : Conference Secretarial - SDEE'93
Wessex Institute of Technology
Ashurst Lodge, Ashurst
Southhampton S04 2AA
U.K.

Tel: 44 (0) 703-293-223
Fax: 44 (0) 703-293-853

5. **Conference Diary**

1992

September 10-11
Nancy, France. Conference in memory of Professor René Houpert on "Structure and Mechanics Behaviour of Geomaterials".

September 14-17
Chester, UK. Eurock'92 ISRM International Symposium on Rock Characterisation

September 21-24
The Hague, The Netherlands. + + 4th Int. Conf. on the application of stress-wave theory to Piles.

September 22-24
London, UK. International Conference on offshore Site Investigation and Foundation Behaviour

September 29-October 1
Paris, France + International Conference on Geotechnics and Computers

October 1-3
Hanoi, Vietnam. Hanoi International Geotechnical Conference

October 20-22
Karlsruhe, Germany. GEO-FILTERS'92 Int. Conf. on Filters and Filtration Phenomena in Geotechnical Engineering.

November 6-7
Tokyo, Japan. International Symposium on Recent case Histories of Permanent Geosynthetic-Reinforced Soil Retaining Walls

November 11-13
Fukuoka, Japan. Int. Symp. on Earth Reinforcement Practice (IS Kyushu'92).

1993

February 8-11
Wollongong, Australia. Conference on Geo-Water and Engineering Aspects.

April 6-8
paris, France + International Conference on the Environment and Geotechnics

April 19-22
Amsterdam, The Netherlands. International Congress "Options for Tunnelling" 1983

May 2-6
Ontario, Canada. Sixth Conference on Shotcrete for Underground Support

May 4-8
Singapore + 11th Southeast Asian Geotechnical Conference.

June
Copenhagen, Denmark + + Specialist Symposium on Limit State Design in Geotechnical Engineering

June 1-4
Ghent, Belgium. 2nd International Seminar - Deep Foundations on Bored and Auger Piles

June 1-5
St Louis, USA + Third International Conference on Case Histories in Geotechnical Engineering.

June 28
Kobe, Japan. KIGForum '93. 2nd Kansai International Geotechnical Forum on Comparative Geotechnical Engineering

June 28=July 2
Anchorage, Alaska + + 2nd International Symposium on Frost in Geotechnical Engineering

July
Bolton, England: European Symposium Environmental Geotechnology (ENGINE'93)

July 12-16
Birmingham, UK 2nd International Conference on Micromechanics of Granular Media - "Powders and Grains 93"

September 6-10
Krakow, Poland 4th International Symposium on the Reclamation, Treatment and Utilization of Coal Mining Wastes

September 20-24
Athens, Greece. + + International Symposium on Hard Soils - Soft Rocks

1994

January 3
New Delhi, India. + + International Symposium on Underground Construction in Soft Ground

January 5-10
New Delhi, India. **XIII International Conference on Soil Mechanics and Foundation Engineering.

September 5-9
Singapore. 5th International Conference on Geotextiles. Geomembranes and Related Products.

September 21-23
Mamaia, Romania. + + Xth Danube-European conference on soil Mechanics and Foundation Engineering

1995

May 28=June 1
Copenhagen, Denmark. *11th European Conference on Soil Mechanics and Foundations Engineering

1996

June 17-21
Trondheim, Norway. + + 7th International Symposium on Landslides

The term Residual Strength

M. J. Pender

In geotechnical engineering I am aware of the term residual strength being used in three quite distinct situations. The purpose of this note is to plead for purity in our terminology and to argue that the original definition of the term is the only one that can be defended and that other situations need the benefit of appropriate specific terms.

The three situations I am aware of are: the drained shear strength of clays after large displacement along a failure surface as proposed by Skempton in his 1964 Rankine lecture (Geotechnique, Vol. 14 No. 2, pp. 77-101), the post liquefaction undrained strength of saturated sands silts as used by Seed in 1987 (Journal of the Geotechnical Engineering, Vol. 113 No. 8, pp. 827-845), and the regrettable all to frequent usage of the term for interpreting the post peak strength of shear box and triaxial tests.

(i) Skempton

Skempton in his Rankine lecture proposed the term residual strength for a very specific application. He had in mind the drained shear strength available on a shear surface after large relative displacements of the opposite sides of the surface. As is well known this gives a lower bound on the available strength of a clay soil. The important feature of this aspect of soil strength is that it is drained and that the displacement is large enough to produce the minimum value. As the conventional shear box and triaxial apparatus are not able to generate the required large displacements a special piece of apparatus is used to measure shear strength for this case: the ring shear apparatus.

(ii) Seed

An aspect of the behaviour of soils that liquefy under seismic shaking is the amount of undrained strength that is available after the end of the earthquake excitation. Before the excess pore pressures generated in the earthquake are dissipated the available strength is controlled by the undrained strength of the material which has liquefied. We immediately get into difficulties here because the question pops up as to what we mean by strength after liquefaction. The strength are we talking about is unclear as the idea of liquefaction is that the soil has no shear strength. This is answered by pointing out that the phenomenon of liquefaction is in fact a complex mix of several different phenomena and it is not necessary that there be a total loss of shear strength. In many situations, possibly the majority, the strength is not necessarily reduced to zero. Clearly some term is needed to describe the strength available in this case.

(iii) Post peak strength

An overconsolidated clay when sheared exhibits a peak followed by a decrease with further shear displacement. Standard triaxial and shear box apparatus are able to apply only very limited shear displacements but there is nevertheless a temptation to refer to the shear resistance available at the maximum displacement of the apparatus as the residual strength.

These three usages of the term residual strength are all quite different and quite confusing. We do no good to our profession by adopting such confusing and sloppy terminology.

In my opinion priority for use of the term must go to Skempton, thus residual strength is associated with drained, large shear displacement, post peak behaviour of cohesive soils.

For the second case, undrained post earthquake strength I have heard the suggestion of *post seismic undrained strength.*

For the third I tend to use the term *post-peak.*

These terms are suggestions only and may not necessarily be the best terms but they do have the important advantage of referring to three very different phenomena with distinct labels. This seems to me to be the essence of good procedure and promotes clear communication between members of the geotechnical community.

TRENCH STABILITY AND WORKER SAFETY (AND REGISTERED ENGINEER'S CERTIFICATES)

L. D. Wesley

I was recently at a one day "seminar" on trench stability and the safety of workers carrying out pipe or cable laying operations or any other sort of work in trenches. The seminar was organised by the Auckland Electric Power Board, primarily for the purpose of educating their own staff and outside contractors about trench stability. In the course of the discussion following formal presentations I was asked how I would regard a registered engineers certificate which stated that it was safe for workers to work in a 5m deep unsupported trench dug in soil somewhere in the Auckland area. The question came from a representative of the Labour Department who was clearly very concerned about such certificates. A second questioner expressed similar concern saying he had also had engineer's certificates presented which approved workers carrying out pipe laying in unsupported trenches 3m to 4m deep.

I wonder what answers readers of this journal would give to the question. My own very categorical answer was that I would have no regard at all for such "certificates", and on no account would I approve workers entering unsupported trenches in soil deeper than about 1.5m, and with some soils even 1.5m would be unacceptable.

This question of worker safety in trenches is a serious matter. I do not know what the statistics are, but newspaper reports of deaths from trench collapses are relatively common and suggest that too many unnecessary risks are being taken. The publication "EXCAVATION 1988" put out by the Occupational Safety and Health Service of the Department of Labour is basically a good document and states that all excavated vertical faces higher than 1.5m must be shored "unless precautions have been taken certified by a registered engineer to be adequate" or unless no workers are going to be working at the bottom of such a face. It is this clause about registered engineers which gives rise to the certificates mentioned earlier, and in my opinion there are good reasons for taking this clause out of the document.

I was invited to address the seminar as a representative of the engineering profession and the gist of my remarks was as follows.

(1) Trenches are deathtraps.

They usually collapse without warning, they provide no means for quick escape, and the trapped worker is crushed between the two sides of the trench when one side collapses. They are far more dangerous than a single bank alongside an open level area; in this latter case there is the possibility of escape for any workers at the bottom of the bank and in any case they are likely to be pushed sideways rather than squeezed against an adjacent face.

(2) There are no reliable methods for predicting whether trenches will stay stable or collapse.

It is not possible, either on the basis of theory or of experience, to say whether a particular trench will remain stable. There is probably no area of soil mechanics where predictive ability is more limited. Judgement cannot be brought to bear with any great degree of reliability. Far too many lives have been lost because people worked in trenches which appeared "perfectly stable".

(3) Two items of theory from soil mechanics (or geotechnical engineering) are likely to be quoted in relation to trench stability.

The first item purports to give something called the "critical height". This is the maximum height to which a vertical bank will remain stable, and formulae can be derived (and are given in most soil mechanics textbooks) for determining this critical height. For the undrained situation in clay it can be shown that the critical height (H_c) is given by

$$H_c = \frac{4c}{\gamma} \quad \left[\text{or should it be } \frac{2c}{\gamma} ?\right]$$

These formulae are based on theoretical concepts and assumptions almost never found in practice and for the purpose of predicting trench stability they should be ignored as a piece of irrelevant theory.

The second item of theory relates to the design of bracing systems. Various empirical methods are available for calculating strut capacity so that a properly shored excavation can be designed. In contrast to the "critical height" estimate, these methods do not have a theoretical basis; they have been developed from direct field measurements and should therefore be reasonably reliable. However they still need to be used with care and with an appropriate measure of judgement.

These are the main points made in my presentation. Maybe there are readers of this journal who have been involved in this question or have given similar presentations, and might care to contribute to discussion of this issue.

Laurie Wesley

EXPERT IN DISPUTE

WITNESS, ADVOCATE OR ARBITRATOR?

The following papers and notes were presented at a seminar with the above title, held by the ARBITRATORS' INSTITUTE OF NEW ZEALAND Inc. on 1 July 1992 at the Pan Pacific Hotel, Auckland.

(1) Keynote address by Sir Duncan McMullin, retired judge of the Court of Appeal.

(2) Notes by John Hagen, Accountant and arbitrator from Deloitte Ross Tohmatsu (Introduced by Tony Frankham in John Hagen's absence).

(3) "The presentation of technical evidence" by Brian Wilson, Consulting Engineer.

The written material is reproduced by kind permission of the Arbitrators Institute of New Zealand Inc. The Editor of Geomechanics News attended the seminar and found the proceedings to be particularly relevant to the field of geotechnical engineering. However, the real value of such seminars lies in the visual presentations, additional case studies and general discussion from floor and panel, and clearly any person taking up the role of "expert in dispute" would benefit by attending the seminars.

Traditionally, the courts have relied upon the spoken and written word in evidence. Visual aids in the court room have been discouraged because of the difficulty in recording the spoken word when a witness speaks (ad lib.) to the visual aids. What became clear at this seminar, however, was that, at least for arbitration tribunals, large poster diagrams and physical models (and even computer models) can simplify and clarify the technical issues, and are now actively encouraged. Brian Wilson demonstrated several physical models, ranging from very low budget home-made examples to more complex, professionally made models. To explain in writing what was shown to us in just two minutes, would not only have taken the "thousand words" but would probably have left most of us no wiser.

EDITOR

EXPERT IN DISPUTE

Keynote Address by Sir Duncan McMullin

Introduction:

If I were a Minister of Religion and you, the audience, my captive congregation, my text for today would be found in the Book of Zechariah Chapter 8 vs.16:-

> "These are the things that ye shall do; speak ye every man the truth to his neighbour; execute the judgment of truth and peace in your gates."

I say that because the various topics listed for discussion are components of a larger issue concerned with the establishment of the truth in judicial and arbitral situations.

With the exception of the use of a Court appointed expert, a matter which I will shortly mention, the English and New Zealand legal systems do not permit of Judges or arbitrators engaging in a truth-seeking exercise of their own in which they make their own enquiries in the course of a case. Under our system the facts of a case are established from the evidence tendered by the parties in what is essentially an adversarial exercise. Much of that evidence will be given by witnesses of fact who have a knowledge of events which occurred in the past and were perceived by physical senses. Some may be given by experts. In the context in which we are speaking the arbitrator finds the facts after hearing the evidence, both factual and expert, and examining all relevant documents and then applies the applicable law to reach a decision in what is essentially a judicial process.

The Expert:

The evidence we are here concerned with is that of the expert. An expert is one who, by reason of his particular knowledge, skill and experience, is qualified to express an opinion on a matter within his specialty where persons without such experience are unlikely to prove capable of forming a correct judgment on it. The qualification of the expert as such is a matter for the Judge or arbitrator relying to a large extent on the alleged expert's

self-evaluation. But in cross-examination the alleged expert may be shown to have no real expertise in a particular field. In that case his opinion will not count or, at least, his evidence will be downgraded.

Court Appointed Expert:

I do not propose to deal with the topics in the order in which they have been set out nor will I deal with all of them. It is convenient at this stage to deal with the question "what is a Court appointed expert?" Such an expert is a rare bird. Provision is made for his or her appointment by statute or regulation. The most notable is that contained in Rule 324 of the High Court Rules. This Rule provides that in any proceeding which is to be tried without a jury and in which any question for an expert witness arises, the Court may at any time, of its own motion or on the application of any party, appoint an independent expert or, if more than one such question arises, two or more such experts, to enquire into and report upon any question of fact or opinion not involving questions of law or of construction. Such a person is called a "Court expert". The question to be submitted to the Court expert shall, failing agreement between the parties, be settled by the Court. The Court expert in due course makes his report direct to the Court and copies are supplied to the parties. Any part of the Court expert's report which is not accepted by all the parties to the proceeding in which it is made shall be treated as information furnished to the Court and shall be given such weight as the Court thinks fit. Any party may apply to the Court for leave to cross-examine the Court expert on his report and any party may call one expert witness to give evidence on the question reported on by the Court expert.

Rule 324 is relatively new, introduced in New Zealand only in 1985, and I do not think that it is likely to be very much used. That has been the experience with its counterpart in England which has been in force for many years. The reasons for this are fairly obvious, and need no expansion

There is also the power under s.14 of the Arbitration Act 1908 for the Court to refer any question arising in any cause or matter (other than a criminal proceeding) for enquiry or report to any official or special referee and in

s 38 of the Matrimonial Property Act 1976, to appoint any person to make an inquiry into the matters of fact in issue between the parties and to report thereon to the Court.

Responsibility to the Tribunal or Client:

Whether the expert is a Court appointed expert or one whose opinion is sought by one of the parties, the expert has a responsibility to the Tribunal. Indeed that responsibility is paramount. The expert must acquaint himself with all the relevant facts, put them before the Tribunal and express his true opinion. He must tell the truth, give his honest opinion and not withhold any relevant material even though it may be detrimental to the side which calls him. That much must be apparent from the oath or affirmation which the expert, along with other witnesses, must take - to tell the truth, the whole truth, and nothing but the truth.

Surprisingly, this view is not universally held and some experts consider that their only duty is to bring out facts which support the side which seeks their opinion. That is not to say that the expert has no duty to the side which calls him. His duty is to assist that side by any legitimate means in the preparation of the case, informing his client of all the factors which will assist that case and of any which stand in its way, assembling his evidence in a competent manner, formulating reasoned opinions and presenting his evidence accurately and clearly. But once the expert is on the stand and indeed at the earlier stage where his brief of evidence is prepared, the expert owes a duty to himself and the Tribunal to assist in arriving at a just decision.

Allowing for the fact that there is sometimes room for a range of views, particularly in matters of valuation which is not an exact science, the expert's opinion should be the same no matter which side calls him. Of course, I allow for the fact that there is often room for genuine differences of opinion and approach and a diversity of viewpoint in the opinion of the witnesses may illustrate this. In valuation matters particularly, there may be a range of figures because one is there dealing with an estimate, to a large extent subjective, of market forces. As was said in Singer & Friedlander Ltd v. John D Wood & Co. (1977) 243 EG 212 by Watkins J:-

> "The valuation of land by trained, competent and careful professional men is a task which really, if ever, admits of precise conclusion. Often beyond certain well-founded facts so many imponderables confront the valuer that he is obliged to proceed on the basis of assumptions. Therefore, he cannot be faulted for achieving a result which does not admit of some degree of error. Thus, two able and experienced men, each confronted with the same task, might come to different conclusions without anyone being justified in saying that either of them has lacked competence and reasonable care, still less integrity, in doing his work."

But, while noting that observation, if an expert alters his tune according to who calls him, he is not acting as an expert but as an advocate. One can remember experts in the days of common law claims who would give evidence before juries for whatever side sought their opinion. Some of them had the appearance of respectability and no doubt persuaded juries that the views they expressed were right although the Judges who saw these people give evidence on a number of occasions had their own assessment of their credibility.

Regrettably experts have too often felt free to take on the role of an advocate tailoring their evidence to meet the side which calls them. This may in part be the fault of our adversary system. As the Secretary of the British Medical Association once opined:-

> "But as far as expert (or opinion) evidence is concerned, the system permits important evidence to be concealed because the right questions may not be asked of the evidence by Judge or counsel and the expert himself may be misled because important evidence which might modify his opinion may be withheld from him. It is not suggested that this happens intentionally ..."

> "Where Anglo-Saxon law went wrong was to try to resolve the dilemma by subjecting the outside experts to the rules of an adversary procedure. The result has inevitably been a battle of the experts fought within rules which were never designed to deal with conflicts of scientific opinion."

Relationship between Expert and Advocate:

I move now to the relationship between expert and advocate. As already mentioned, the duty of a witness is to tell the truth, the whole truth, and nothing but the truth and that is the basis upon which his brief of evidence should be prepared.

The role of the advocate is different. The advocate is there to present the evidence in a way which is most likely to persuade the Tribunal of the acceptability of his case and, conversely, the weaknesses of the case of the opposing party. It is not even the duty of the advocate to put before the Tribunal all the facts of which he is aware and he can, if he so wishes, select in his submissions those parts of the evidence which support his case and ignore those parts which do not. Mind you, if he is too one-eyed, this may be self-defeating and his submissions may fail to persuade.

If, in the preparation of the brief of evidence a conflict arises between advocate and expert as to the content of the expert's testimony, the view of the expert must prevail because it is the expert's opinion which is being expressed, not the advocate's. It is the expert who puts his credibility on the line and renders himself subject to cross-examination. If he allows himself to be persuaded to advance an opinion which is untenable and which he truly does not hold, the fallacy in his brief may be exposed and he may not only lose the case for the party who calls him but he may damage his own credibility in all cases in which he will be called to give evidence in the future. The word will go around that the expert flys a flag of convenience, tailoring his evidence to suit whatever side calls him. It is better from the expert's view that he should be honest even if his honesty loses him the custom from one source. It may bring him business from others. There are as many fish in the sea as ever were taken out of it.

In the result the expert is clearly entitled to insist that any qualification which he believes should be made to his prepared brief of evidence is made and he can and should insist on the deletion of anything which lends a false colour to it. He is not, however, obliged to include in his brief a reference to every contingency or possibility which, if it happened, would qualify his testimony. Such contingencies and possibilities can be brought out in cross-examination if thought to be relevant. But matters which lie at the base of the expert's testimony must be stated.

Very often the writing of the brief will be a joint effort. The usual sequence of events is this; one party or its legal representative will seek an opinion from an expert placing before the expert all the relevant material. The expert will then write a report identifying the issues as he sees them and give it to the party. The party's legal representative will then examine that report in the light of the issues as he sees them. He may regard some of the comments of the expert as irrelevant to the issue, think that additional comment should be made and he will see the report in the context of a whole range of issues on only one of which the expert may be required to comment.

For these reasons the lawyer and the expert will need to meet. The lawyer may wish to examine his expert to test the consistency of his thesis and explore it further and in the end the advocate may prepare a brief which brings out the new approach. That process is quite permissible and is probably more the rule than the exception. It is quite acceptable, so long as the final brief accurately reflects the views of the expert to which he can in all conscience adhere. As the Law Reform Committee (UK) said in its 17th Report, para. 60:-

> "The function of an expert in litigation is not limited to giving evidence. He will help solicitors and counsel on his specialty, warn them of pitfalls, make suggestions as to cross-examination of witnesses, factual as well as expert."

But the expert must guard against being leaned on by the lawyers or his client. Criticism of the way in which the report of experts was prepared was expressed by Lord Denning in Whitehouse v. Jordan [1980] 1 All ER 650 at 655. That was a case in which two eminent gynaecologists had submitted a report which showed that a medical specialist was negligent in the delivery of a child. Initially one of them made a report saying that the medical specialist was not negligent but later joined with the other in holding that he was. The joint report was criticised by the Court of Appeal for the way in which it was prepared. It was a result of long conferences between the two doctors and counsel in London and it was actually "settled" by counsel. Lord Denning said:-

> "Whenever counsel settle a document we know how it goes. "We had better put this in", "We had better leave this out", and so forth."

Lord Wilberforce in the same case put it in these words:-

> "While some degree of consultation between experts and legal advisers is entirely proper, it is necessary that expert evidence presented to the Court should be, and should be seen to be, the independent product of the expert; uninfluenced as to form or content by the exigencies of litigation. To the extent that it is not, the evidence is likely to be not only incorrect but self defeating."

That brief reference will illustrate the dangers into which a witness may get himself if he allows counsel to take over and shape his testimony with a view to securing what he perceives to be the right result.

Can the expert express an opinion on the very question which the Court has to decide?

The question of whether an expert witness may be asked to express an opinion on the very question which the Court itself has to decide is a difficult one. For many years it was the rule that the expert could not express such ;an opinion. That rule was based upon the undesirability of allowing the expert to become directly involved in the decision-making process and so usurping the role of the Court. Hence, in recognition of this rule, in a case alleging negligence against solicitors, accountants, engineers or valuers, the expert should not be asked whether he or she thinks that the defendant has been negligent. But the witness should properly be asked what are the steps which would be expected of a prudent or competent practitioner in one of those fields leaving it to the Court to decide whether in the circumstances the defendant has fallen short of them or displayed some want of skills. But this rule, that a witness cannot give evidence on the ultimate issue, has been very much eroded and there is now a greater willingness than there was in former times to recognise the necessity of allowing a question going to the heart of the matter in certain circumstances. This is particularly so in cases involving the psychological condition of an accused person in criminal trials.

Counsel should endeavour to see that the expert's final conclusion avoids usurping the very function of the Tribunal although, in some cases, the matter will become a play upon words.

Discussions between Experts - without prejudice:

There is no harm in such discussions taking place although counsel should be advised that they are to take place. In many cases the practice is to be encouraged in an endeavour to establish what matters are common ground between the parties. It is also useful in getting rid of matters of arithmetic so that, in the end, if the experts are not able to reach agreement on substantial issues, they can at least agree on the amounts involved if liability is established.

It is important, however, to establish the basis upon which such discussions are held. If agreement is not reached, then a witness who has made statements in those discussions as to how far he or she is prepared to go or what he or she thinks on liability will not want those statements revealed in evidence which they can be if they are not treated as "without prejudice". It is in the public interest that disputes should be settled and litigation reduced to a minimum and so "without prejudice" discussions are encouraged. No magic formula of words is necessary to preserve the confidentiality of what was said in the discussions should the break down but it is safer to preface them with a clear statement that the discussions are to be "without prejudice" to the case of either party.

Should Experts become arbitrators or mediators:

I now deal with the distinction between the roles of arbitrator and expert. An arbitrator is one, other than a Judge, who settles a dispute or difference between two or more parties as to their rights and liabilities and with binding effect by the application of the law to facts in a judicial process. In New Zealand, the definition of 'arbitrator' is a wide one. Section 2 of the Arbitration Act defines "arbitration" as including "a referee and valuer" and "submission" means "a written agreement to submit present or future differences to arbitration, whether an arbitrator is named therein or not, or under which any question or matter is to be decided by one or more persons

to be appointed by the contracting parties or by some person named in the agreement".

An "expert", on the other hand, is one who expresses an opinion on a subject on which he is qualified by learning, training and practice to do so.

With really one exception, and that is the Public Bodies Leases Act 1969, an arbitrator and an expert remain two separate persons. But the Public Bodies Leases Act sets up its own procedure. It refers to the appointment of persons on each side to make a valuation as arbitrators and there is provision for the arbitrators before making their valuation to appoint an umpire. In rent reviews under this Act, and leases which adopt the same format, the valuers make a valuation and endeavour to reach agreement which, more often than not they do, on what should be the appropriate value and rent. The decision of the two arbitrators, if they agree, is binding on the parties. The duty of the umpire, if the arbitrators do not agree, is to make an independent valuation which becomes binding on the parties. There are disadvantages in this system which merges the roles of valuer and arbitrator.

Hence valuers often agree to the appointment of an umpire who, in effect, becomes a sole arbitrator with the valuers taking on the role of experts tendering evidence on valuation matters. But that exception apart, an arbitrator is an arbitrator and an expert an expert each discharging a different function. Never should the twain assume a dual identity.

Whether a person is an arbitrator or an expert depends on what he does, not merely on what he is called. The fixing of a tag or label is not conclusive. Those who make the appointment of an arbitrator or expert should understand the difference. An arbitrator makes a judicial decision on the issue before him, on the evidence which he hears and the submissions made to him. An expert, however, forms a view on his own judgment. Consequently he is not obliged to take notice of the opinions of others or any submissions made to him. I have said that the tag or label is not sufficient and that to determine whether a person sits as an arbitrator or expert, one must look at the nature of the function which he or she discharges. This is illustrated by the case of Re Dickinson & Ors; Board of Trustees of the National Provident Fund v. Dickinson & Ors (1991) 1 NZ

Conv. C.191.1037. It was held in that case that the proceeding was an arbitration even although a clause in a lease provided that the valuers or umpire were deemed to be acting as experts and not as arbitrators. That decision was reached because the parties had become engaged in a formal hearing before the umpire, the valuers being unable to agree.

The question as to which category it is into which the nominated person falls can be decided by reference to the questions listed by Mars-Jones J in Palacath Ltd v. Flanagan [1985] 2 All ER 161 at 166:-

> "... how was he to arrive at his decision? Was he obliged to act wholly or in part on the evidence and submissions made by the parties? Or was he entitled to act solely on his own expert opinion? If the answer to the question is the latter, then the defendant could not be exercising a judicial function or a quasi judicial function, if there is any such distinction."

There are numerous cases where persons have been held to be acting as experts and not as arbitrators. In Baber v. Kenwood Manufacturing [1978] 1 Ll.LR 175, the fair selling value of shares was to be certified by auditors acting "as experts and not as arbitrators". It was held that since the parties had provided that the auditors "shall be considered to be acting as experts and not as arbitrators" it would be entirely wrong in principle that one party, having so agreed, should be entitled to frustrate the agreement by alleging mistakes in the expert's opinion. This is not unfair. It is quite common sense. The parties accepted the risk which was that the expert might err one way or the other but they chose to accept that risk rather than the alternative whereby either party would have the right to add to the delay, expense, and uncertainty of proceedings in Court by the allegation that the expert had erred. As the matter was put by Lord Denning in Campbell v. Edwards [1976] 1 All ER 785:-

> "If two persons agree that the price of property should be fixed by a valuer on whom they agree, and he gives that valuation honestly and in good faith, they are bound by it. Even if he has made a mistake they are still bound by it. The reason is because they have agreed to be bound by it. If there were fraud or collusion, of course, it would be different. Fraud or collusion unravels everything."

The result is that expert determinations are not subject to challenge, whether or not reasons are given. (It was once said that the immunity given to experts was given to non-speaking determinations but that distinction no longer exists). There is, however, an exception to this rule. In Arenson v. Arenson [1977] AC 405, the House of Lords, contrary to earlier authority, said that where an expert had disregarded his instructions or misconceived them or done something fundamentally and plainly wrong, the expert's determination could be upset.

Liability for negligent or careless advice:

A person who gives an opinion which is negligently formed may be liable for that negligence to persons who are within a relationship which is recognised by the law as one in which a duty of care is owed. There are hosts of recent judicial pronouncements on this topic, many involving auditors and accountants. These cases turn on the relationship between the expert advisers and those claiming to be injured economically as a result of their advice. The cases, and the principles to be extracted from them are, however, a study on their own and beyond the scope of this paper.

This paper reflects the law as it is today. It takes no account of the proposals made in a discussion paper (Preliminary Paper No. 18) - Evidence Law: Expert Evidence and opinion Evidence - released by the Law Commission in December 1991.

DW McMullin
July 1992

EXPERTS IN DISPUTE
ARBITRATORS' INSTITUTE OF NEW ZEALAND INC
1 JULY 1992

Comments by John C Hagen

1. The purpose of this seminar is to examine the role of the expert witness in a dispute situation.

2. The particular areas which I intend to address include:

   a) the expert's role in claim formulation;
   b) the relationship between expert and advocate;
   c) the expert's responsibility to the tribunal;
   d) the role of discussions between experts.

3. Firstly - what is an expert?

   How does one qualify as an expert?

   Really, it is too easy, in my opinion, to be "held" as an expert. For example, almost any accountant is regarded as an expert share valuer by lawyers but that accountant may not be regarded by accountant peers as such an expert.

4. What should happen?

   It is my opinion that before one is accepted as an expert one should be considered such by one's peers in an area. Evidence of this should be exhibited before the tribunal.

5. Turning now to the expert's role in the formulation of a claim.

6. I believe that:

   - An expert should have a thorough knowledge of all aspects of the claim before giving evidence. Unfortunately this is not always the case.

   - An expert should read all the evidence to be submitted so as to reduce the chance of being surprised at any stage during the hearing with new evidence.

   - An expert can be invaluable to an advocate in preparing for cross examination of other witnesses and experts.

   This thorough immersing in the evidence certainly adds to cost but the pay back, in my experience, makes it worthwhile.

But what about the expert actually participating in the early stages of the formulation of a claim?

A. CLAIM FORMULATION

7. There is probably nothing wrong with an expert being involved in formulation of claim as it may:

- assist in the claim being supportable by expert evidence
- reduce extremes of claims and allegation
- ensure the sustainability of a claim

[Consider Australian practice of expert saying claim viable at the writ stage]

8. However, it also may:

- lock the expert into a structure of thinking
- increase the chance of the expert being biased
- seriously compromise the expert's independence

9. After considering the pros and cons I am of the view that on balance it is preferable not to be involved in claim formulation as:

- the advantage of abstinence is independence
- the disadvantage may be the introduction of bias and prejudice

B. RELATIONSHIP BETWEEN EXPERT AND ADVOCATE

Another quite common source of bias is pressure from the advocate upon the expert.

10. An expert must be careful to stay within his or her area of expertise. It is my experience that advocates often try to stretch a good expert beyond the confident/comfort level.

11. The relationship between advocate and expert can be difficult. It is not a master/servant relationship as some advocates would see it.

Ideally it is a co-operative role with the advocate using the knowledge of the expert to both support the case to be agreed and also in some cases to weaken the other's case.

12. The challenge is for the expert to maintain intellectual independence at all times. Independence is in the end the experts main asset.

13. Sometimes there is pressure from the advocate to bias evidence or to omit balancing evidence. This is usually manifested in the preparation of briefs of evidence. Most times, solicitors wish to prepare the briefs themselves - I guess mostly through habit of dealing with those not experienced in the practice. But this sometimes leads to a biased brief with unfavourable evidence or issues not addressed and major favourable issues stretched to the limit.

14. Personally, I prefer, if time permits, to prepare my own briefs and resist strongly any attempt to omit passages that I think are fair and unbiased but perhaps not entirely favourable. I also resist the inclusion of overemphasis or emotive language which can be evidence of a lack of balance.

15. This is not always an easy process and often I fail to achieve my aim. But the absence of bias is essential - a hired gun is no expert at all and will not have a long career in the expert witness business.

16. A relationship of mutual respect between expert and advocate is to be commended - it will maintain independence and facilitate a team approach. However, it is not easily achieved.

C. RESPONSIBILITY TO THE TRIBUNAL

This leads me to the issue of the expert's responsibility to the tribunal itself.

Whose property is the expert?

17. Normally the expert is engaged and remunerated by just one of the parties to the dispute. That party will presume to have property in the expert. However, such a simple loss of independence will seriously reduce the use of the expert to that party.

18. As mentioned previously, independence is the expert's major asset.

Thus the experts should regard themselves as the property of the tribunal, if anyone's.

There is therefore, in the purest sense, a responsibility to advise the tribunal of factors or opinion relevant to both sides of the dispute and not to put only that which supports the argument of the remunerating party.

19. This is perhaps the most difficult ethical aspect of giving expert evidence. It will often be resisted by Counsel for the remunerating party but the responsibility is still there.

20. Perhaps it is also the role of Counsel in cross examination to ensure that they extract from the expert a balanced view and one which uncovers doubts, other views, etc.

21. Also, perhaps the adjudicator has a role to play in ensuring that an expert is given the opportunity, and perhaps is required, to provide a balanced view.

D. DISCUSSIONS BETWEEN EXPERTS

Finally, what about clarifying and reducing the issues in dispute before the hearing begins?

22. The role or purpose of prehearing discussions between experts is to see if they can clear up and eliminate some of the matters at issue thus narrowing down the areas of dispute.

23. In my experience, Counsel are often reluctant to agree to experts getting together without Counsel being present. This I can understand if the experts are not experienced in the dispute process. However, where the experts are experienced much can be achieved by a meeting between experts.

24. In my experience disagreements between experts arise from three situations, in the main:

i) where they have a different set of facts on which to form their opinion;
ii) where the environment in which the opinion is formed is different;
iii) where the experts have a different framework upon which their opinion is based.

25. Thus a discussion between fair minded, unbiased experts not driven by advocacy, can lead to reasonable and appropriate compromises which can greatly simplify the dispute process.

26. Much of the time spent before a tribunal cross-examining experts could be avoided if a pre-hearing meeting was to be held (between experts) to:

i) clarify the issues in dispute, and
ii) compromise where appropriate on mere opinion differences;

It can be a most productive exercise.

27. However, before such meeting occurs the experts need to be clear on their authority, if any, to commit to agreement. Also the legal position relating to "without prejudice" discussions needs to be well understood.

Thank you.

EXPERT IN DISPUTE

THE PRESENTATION OF TECHNICAL EVIDENCE AND COMMENTARY

Brian Wilson - Consulting Engineer

1 - July 1992

I particularly address the Engineers present. But a lot of what I have to say will benefit others in preparing expert testimony for a hearing.

The objective of the hearing is for the court/arbitrator/tribunal (the trier of fact) to make a decision based on the truth as it perceives it. The expert witnesses of all parties are there to assist the trier of fact to that end. The only basis on which you can agree to be an expert witness is that your client accepts that you will speak the whole truth as you see it and that you will not go beyond the limits of your expertise.

Now the truth is rarely absolute. There has to be an interpretation of data and observations which may not themselves be the whole truth. So there is some conjecture and inevitably differences of opinion between interpreters of fact, in this instance, the expert witnesses. The trier of fact has to choose the opinions which in its view are the most probable as being the truth of the matters.

Now as an honest, impartial, objective expert of integrity and professional approach you are certain that your opinion in your evidence in chief is the truth. Furthermore you are ready to be tested in that opinion by crossexamination.

But first the trier of fact and the various counsel must understand your opinion on, perhaps, highly complex technical matters, whether on strength of materials, or calculation of tax liability or value of a plot of land on the open market.

If the prehearing preparation has been properly and carefully done, your counsel should fully understand your evidence. If he doesn't, then he is not serving his client's best interests. Together you should prepare your evidence in a way which can be readily understood by, firstly, the trier of fact and, secondly, the opposing counsel. You should therefore pitch your presentation to the likely degree of expertise of the trier of fact in your discipline. If the arbitrator or assessor is an Engineer experienced in the subject of your evidence then you can couch it in technical terms which he would know. On the other hand if the arbitrator is not of your profession and has little knowledge of its practice then your delivery must be

at an appropriately simpler level. Your presentation to a High Court Judge may be somewhere between these two extremes.

What you must avoid is a switch off and consignment to the too hard basket where it carries little or no weight. So try to make the evidence interesting. Use good graphics - charts, photographs, slides and if appropriate, models. But don't be light hearted; you are on serious business. Only the guy you are addressing is allowed to make the jokes - and when he does you laugh!

It is said that the human mind remembers only 35% of what it hears but 85% of what it sees. So this points to the worth of pictorial presentation and confirms the old adage of a picture being worth a thousand words. Engineers find it easier to take part in a discussion with a pencil and paper, or if on a large scale, chalk on a blackboard. By all means have a whiteboard available for ad hoc sketching to amplify a point or respond to a question but have your diagrams for your evidence in chief prepared beforehand and to a high standard.

I have some examples from actual hearings to show you. Notice that the print is big enough to be easily read from the back of the room. But also give the trier of fact a reduced size copy to take away rather than these A1 sheets.

Some artifices
- an excerpt from a drawing, which was a contract document, enlarged until it is legible from a distance
- an extract from a reference book enlarged many times and doctored with twink and letraset

You must have your reference sources available at the hearing for counsel and other expert witnesses to check your reference if they wish.

This transparent overlay illustrates progress with time. I have borrowed it for this occasion. It shows dramatically how the intent of the contract was destroyed by the late delivery of items for which the Principal was responsible. It became known as the measles chart and was used by both sides in the dispute.

Simple models can be very interesting. Here is one made of six cotton reels, elastic bands and match sticks. It was used to illustrate the principles of prestressing - a method of joining concrete units together to become one structure.

Here is another made from 2 beer cans and polystyrene in a couple of hours on a Saturday afternoon. It is true to scale. It illustrates the unexpected problem which had to be overcome in an extremely adverse environment at great time and cost which led to the dispute.

In a more recent hearing the defending counsel asked for a pictorial presentation of how a wharf was constructed and how the contractor's purpose built equipment was used. When it became apparent that drawings or sketches were less than adequate I suggested a model.

This is a much more elaborate model. But it had to be able to clarify a more difficult concept and the inter-relationships between parts of the structure and the temporary works.

It is nominally to scale. It is not precise in every detail. I introduced it as a three dimensional sketch for illustration. The temporary works are coloured brown (rust), the permanent works white. There is at least one of each type of pile group, only verticals, verticals with longitudinal rakers and verticals with transverse rakers.

The model was introduced at the start of the hearing and left there for any witness or counsel, whether for the plaintiff or defendant to use to make clear to everybody what was intended. I believe it greatly helped comprehension of a difficult project.

When preparing my evidence for my first appearance as an expert witness a good friend of mind reminded me that the expert witness was there to assist the court which would not be helped by shielded testimony or half truths. It made me go back to square one and analyse from first principles the technical aspects of the case. Engineers get so involved in the intricacies of their profession that frequently they distance themselves from the fundamentals. They get caught up in methods which are generally applicable but not universally so. It pays dividends to sit down and say - what are the fundamental principles of the natural order which govern in this case? Remember most engineering is based on Newton's three laws - the foundation of much subsequent engineering knowledge. So my advice to you is - go back to first principles and start from there. If your evidence is not founded on all the relevant fundamental principles then like a house of cards it will collapse when you are in the witness box. I cannot imagine a worse fate for an expert witness.

Now you have to commit yourself to print. I firmly hold that only you as an expert can write your evidence in chief. It is a great discipline to have to sit down and write out the argument. It applies equally to an engineering report or specification. It is the time when you find any weaknesses or gaps in the argument.

You have plugged the gaps, explained the weaknesses and now you have to present the technical argument in a way that the trier of fact and the legal counsel can comprehend.

Do not presume that if the Arbitrator is an Engineer that you need not dwell on the fundamentals. He, like any other Engineer, may not have been back to first principles for a decade. Remember that it is important that counsel for both parties must understand the technical principles and the arguments based thereon.

Start with the main features. Use simple language that can be readily understood. Then lead on to the more complex matters in a logical way. Do not be dogmatic. Your evidence should be appropriately simple, as brief as possible, as straight as possible and as interesting as possible. Be meticulous in its preparation. It should be well written and complete, needing no modification during the hearing. Complete means just that, even to the extent of including aspects that may be unfavourable to your clients cause. It is far better to face up to such adverse aspects than have them put to you in crossexamination.

You must anticipate counter arguments by opposing counsel. Deal with them in your evidence as part of the completeness of your evidence. Your evidence will carry more weight if it is seen to be balanced and complete.

Having prepared your first draft of your evidence, your clients counsel will review it. Now here is a potential conflict. Counsel is an advocate and wants favourable evidence put forward in the best light and not too much emphasis on the unfavourable.

Because of your obligation to be honest, impartial, objective and complete you cannot agree to any fundamental part of your evidence being excised. The substance must be inviolate. But there is room for a compromise in style - in the way it is presented and perhaps in the subconscious weight you have given it, possibly through bending over backwards to be absolutely honest. So in presenting your evidence you don't have an absolutely free hand. Counsel is conducting the case, not you. Compromise on presentation but not on completeness.

Remember that your evidence should be the same no matter which party has called you.

COMMENTARY

I agree with John Hagen's views on discussions between experts.

I am not convinced that a judicial hearing is a satisfactory way to resolve a dispute which has a complex technical content. I favour an exchange of expert evidence before a hearing and perhaps a meeting of experts to try to reduce the extent of technical differences to be resolved in the hearing. But my experience is that once proceedings have got as far as drafting expert evidence, counsel are unwilling to agree to experts meeting.

I take a contrary view to John, though, on experts formulating a claim. It is unreasonable to expect counsel to be an expert in the technical matter which is in dispute. If an expert is not alongside, justice for the party to the dispute is unlikely to be found. In a construction dispute there can be original documents which can occupy 10 or more drawers of standard filing cabinets. Most of the papers are irrelevant. But only a person experienced in the field can recognise papers which could have relevance. I remember one instance in which I noted that the soils report in the contract documents was not a complete copy of the data held by the Principal which were found under discovery. The data had been edited quite innocently to reduce its bulk, but in doing so some very relevant and important data had been omitted. Within a month of that finding and because of it the parties settled out of court after the dispute process had gone on for almost five years.

I do not believe that a soundly based claim can be formulated without expert opinion which must then be presented in court and tested in crossexamination.

As to an expert expressing an opinion on the ultimate issue my view is that I would prefer to do so only if asked by the court and only after hearing all the evidence. I would decline to do so in my evidence in chief.

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APPLICATION FOR MEMBERSHIP
of
New Zealand Geomechanics Society

A TECHNICAL GROUP OF THE INSTITUTION OF
PROFESSIONAL ENGINEERS OF NEW ZEALAND

The Secretary
The Institution of Professional Engineers of New Zealand
P O Box 12-241
WELLINGTON

I believe myself to be a proper person to be a member of the N.Z. Geomechanics Society and do hereby promise that, in the event of my admission, I will be governed by the Rules of the Society for the time being in force or as they may hereafter be amended and that I will promote the objects of the Society as far as may be in my power.

I hereby apply for membership of the N.Z. Geomechanics Society and supply the following details:

NAME: _____(in full in block letters, surname last)

PERMANENT ADDRESS: _____

_____

QUALIFICATIONS AND EXPERIENCE: _____

_____

NAME OF PRESENT EMPLOYER: _____

NATURE OF DUTIES: _____

Affiliation to International Societies: (All members are required to be affiliated to at least one Society, and applicants are to indicate below the Society/ies to which they wish to affiliate).

I wish to affiliate to:

International Society for Soil Mechanics for Foundation Engineering	(ISSMFE) Yes/No	($15.00)
International Society for Rock Mechanics	(ISRM) Yes/No	($15.00)
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	(with Bulletin)	($35.00)

SIGNATURE OF APPLICANT: _____

DATE: ____/____ /19 ____

NB: Affiliation Fees are in addition to the basic Geomechanics Society membership fee of $35.00 which is reduced to $29.00 if member of IPENZ.

PLEASE DO NOT SEND FEES WITH THIS APPLICATION. AN ACCOUNT WILL BE SENT ON YOUR ACCEPTANCE INTO THE SOCIETY.

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MESHWALL	HIGH TENSILE WIRE MESH AND PVC COATED PANELS FOR RETAINING WALLS
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