

PERSATUAN GEOLOGI MALAYSIA

WARTA GEOLOGI

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CATATAN GEOLOGI

(GEOLOGICAL NOTES)

VOLCANIC ASH BEDS AT KAMPONG TEMONG, KUALA KANGSAR, PERAK

Basir Jasin, Ahmad Jantan, Ibrahim Abdullah, Uyop Said, Jabatan Geologi, Universiti Kebangsaan Malaysia, Bangi and Mohammad Harun, PUSPATI

Introduction

About 2.5 m thick of horizontally-bedded volcanic ash was discovered at a roadcut outcrop at Kampong Temong, (Fig. 1). The bottom part of the ash unit is not exposed, the upper part has been weathered into soils. Six layers of volcanic ash ranging from 0.2 m to 0.7 m were identified, each exhibiting reverse graded bedding, fine and friable in the lower part and coarse and firm in the upper part. The boundaries between the beds are sharp (Fig. 2 and pl. 1).

Mineral Compositions

A very high percentage of the ash is made up of silica in various shades of glass and pumice shards and is therefore a vitric ash. The shards are isotropic. Other identifiable minerals are biotite and muscovite. The interstitial material consists of more minute fragments of glass. X-ray diffraction analysis indicates the presence of sanidine.

For each ash layer the lower part consists of very fine sand-sized glass shards and fine pumice shards (Pl. 2) which gradually coarsens into medium sand-sized glass and pumice shards in the upper part (Pl. 3).

Vitric Particles

Vitric particles consist of glass shards and pumice fragments. Many glass shards are of the silicic varieties which are formed from shattered bubbles. Four types of shards are recognisable in the present material: (1) cusped shards (Pl. 4, a, b) - these are broken bubble walls represented by two or three concave plates that formed the wall between adjoining bubbles. (2) Platy shards (Pl. 4, c) - these are the glass walls separating large flattened vesicles. (3) Bubbles shards (Pl. 4, d, e) - these are spheroidal shaped bubbles. (4) Pumice shards (Pl. 4, f, g) - these are pumice fragments with a fibrous structure composed of minute elongate cavities enclosed by glass walls. Other minerals such as biotite and muscovite are very rare (Pl. 4, h).

Chemical Composition

Two samples of the volcanic ash, one from the lower fine layer and another from the upper coarse layer were analysed by using X-ray fluorescence spectrometry (Table 1).

The composition of the ash is comparable to that reported from the Kota Tampan area (Ninkovich *et al.*, 1978), just several kilometers to

the north of this locality. This suggests that they probably came not only from the same source but were from the same eruption and deposited at about the same time.

Table 1. Composition of volcanic ash by X-ray fluorescence spectrometry.

	<u>Fine layer</u>	<u>Coarse layer</u>
SiO ₂	74.50	75.00
TiO ₂	0.16	0.16
Al ₂ O ₃	14.70	14.80
Fe ₃ O ₄	1.76	1.75
MnO	0.078	0.073
MgO	0.30	0.25
CaO	0.90	0.90
K ₂ O	5.00	5.05
P ₂ O ₅	0.027	0.031
Na ₂ O	2.30	2.00
Jumlah	99.72%	100.014%

The Age of Volcanic Ash

On the basis of proximity of occurrence and similarity of chemical composition, this volcanic ash is thought to be similar to that of the Kota Tampan area and its age therefore is approximately 75,000 years (Ninkovich *et al.*, 1978). The source of the ash was probably from the Toba eruptions which was considered to be the largest magnitude explosive eruption documented from the Quaternary. The widespread ash layer has been recorded in the north-east Indian Ocean and Bay of Bengal (Ninkovich *et al.*, 1978).

Environment of Deposition

The volcanic ash is interpreted to have been deposited as subaerial fallout tephra on the river-bank of Sungai Perak. There was no aqueous reworking or sorting. Individual beds of this ash have no internal structure except reverse graded bedding. The cause of this reverse graded bedding is probably a progressive increase in initial gas velocity during the eruption, ejecting coarser fragments to greater height in the later phase, thus promoting a wider dispersal by wind. The finer ash was rapidly dispersed and deposited first followed by the deposition of coarser ash. The occurrence of six layers may indicate the fluctuation of wind energy as a transporting agent.

Acknowledgement

We are most grateful to Mr. Abd. Aziz Ngah and Mr. Abd. Ghani Idris for their help in chemical analysis and in preparing plate and photographs.

References

- Ninkovich, D., Shackelton, N.J., Abdel-Monem, A.A., Obradovich, J.D., and Izett, G., 1978. K-Ar age of the late Pleistocene eruption of Toba, North Sumatra. *Nature*, 276, 574-577.
- Fisher, R.V. and Schmincke, H.U., 1984. *Pyroclastic rocks*. Springer-Verlag, Berlin, 472 p.

Manuscript received 15 June 1987

Plate 1. Photograph showing the outcrop of the volcanic ash.
(scale 1 m stick)

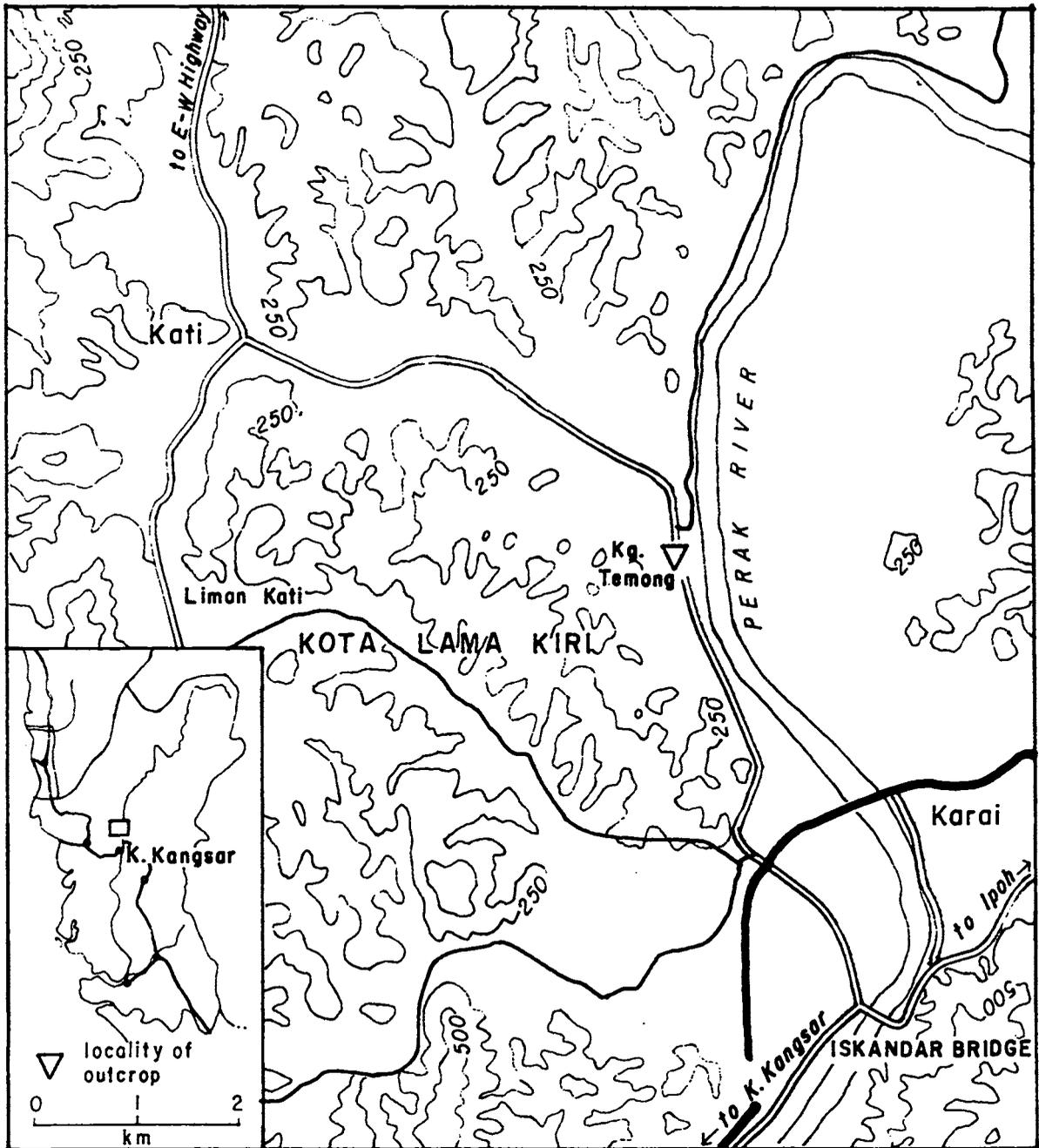


Fig. 1. Map of Kota Lama Kiri Area, showing the locality of the volcanic ash beds outcrop.

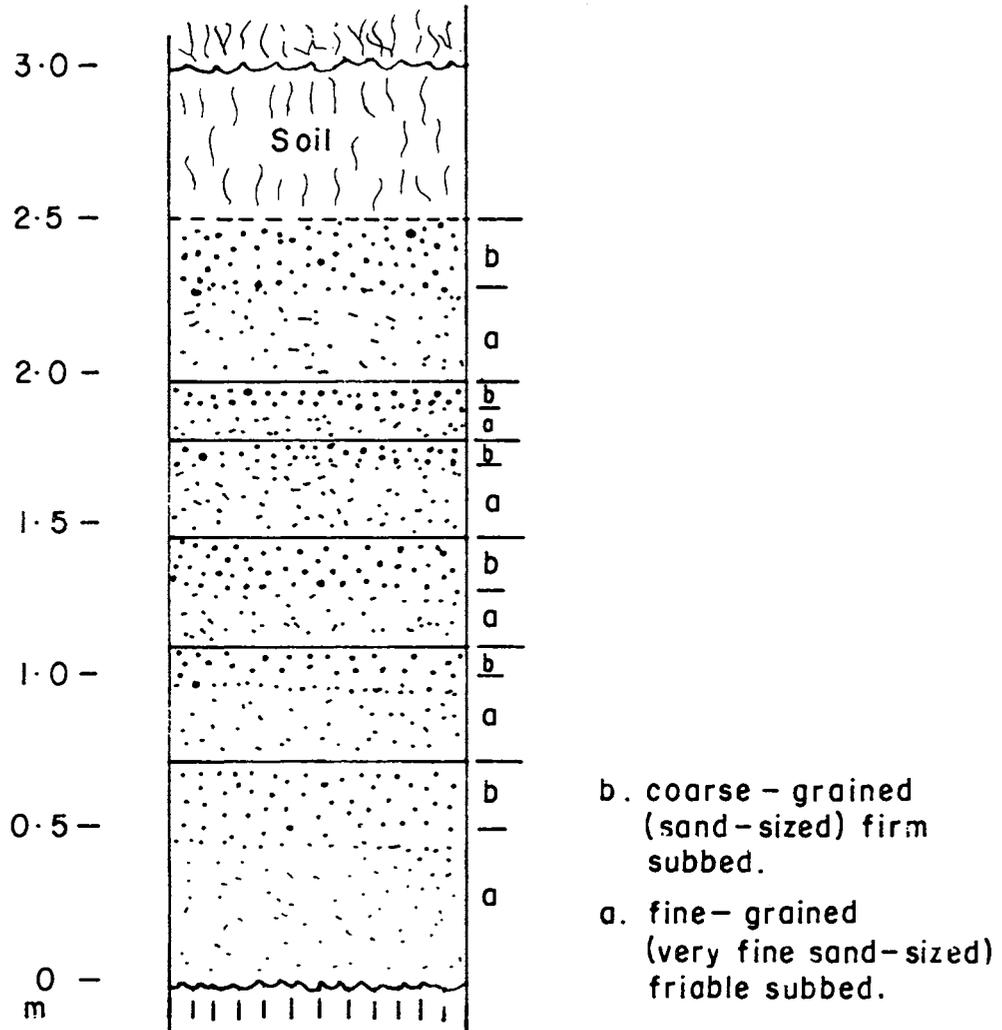


Fig. 2. Lithologic log of volcanic ash beds at Kg. Temong, Kota Lama Kiri, Kuala Kangsar.

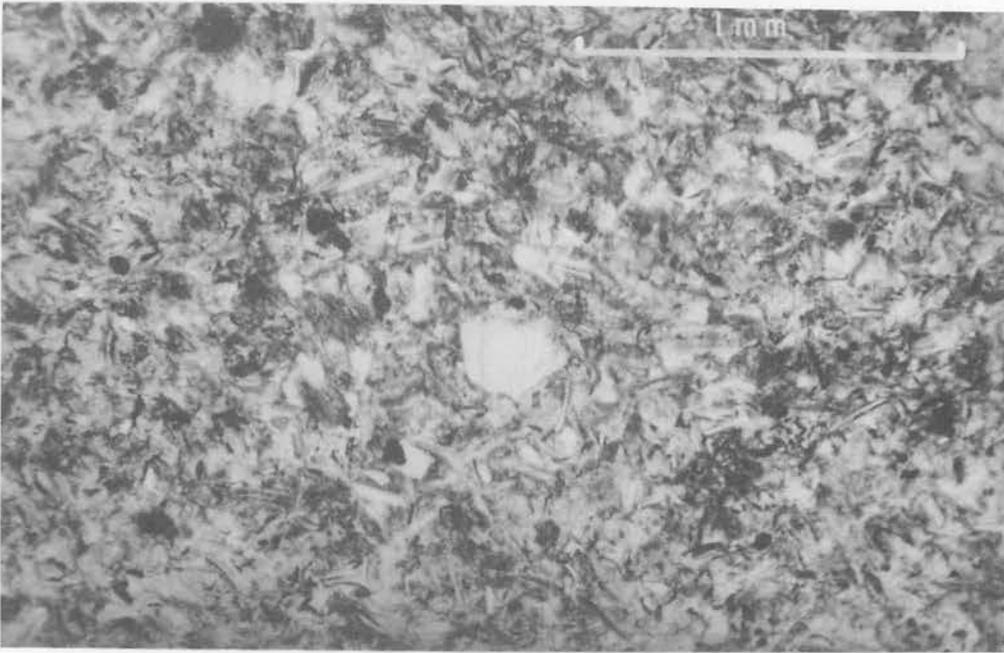


Plate 2. Photomicrograph of fine grained volcanic ash.

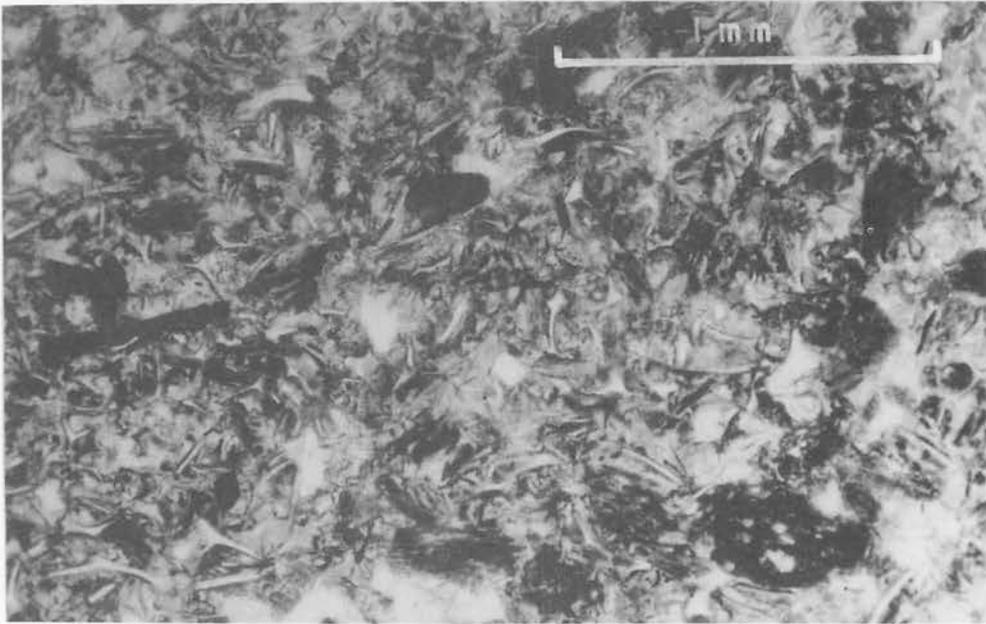


Plate 3. Photomicrograph of coarse grained volcanic ash.

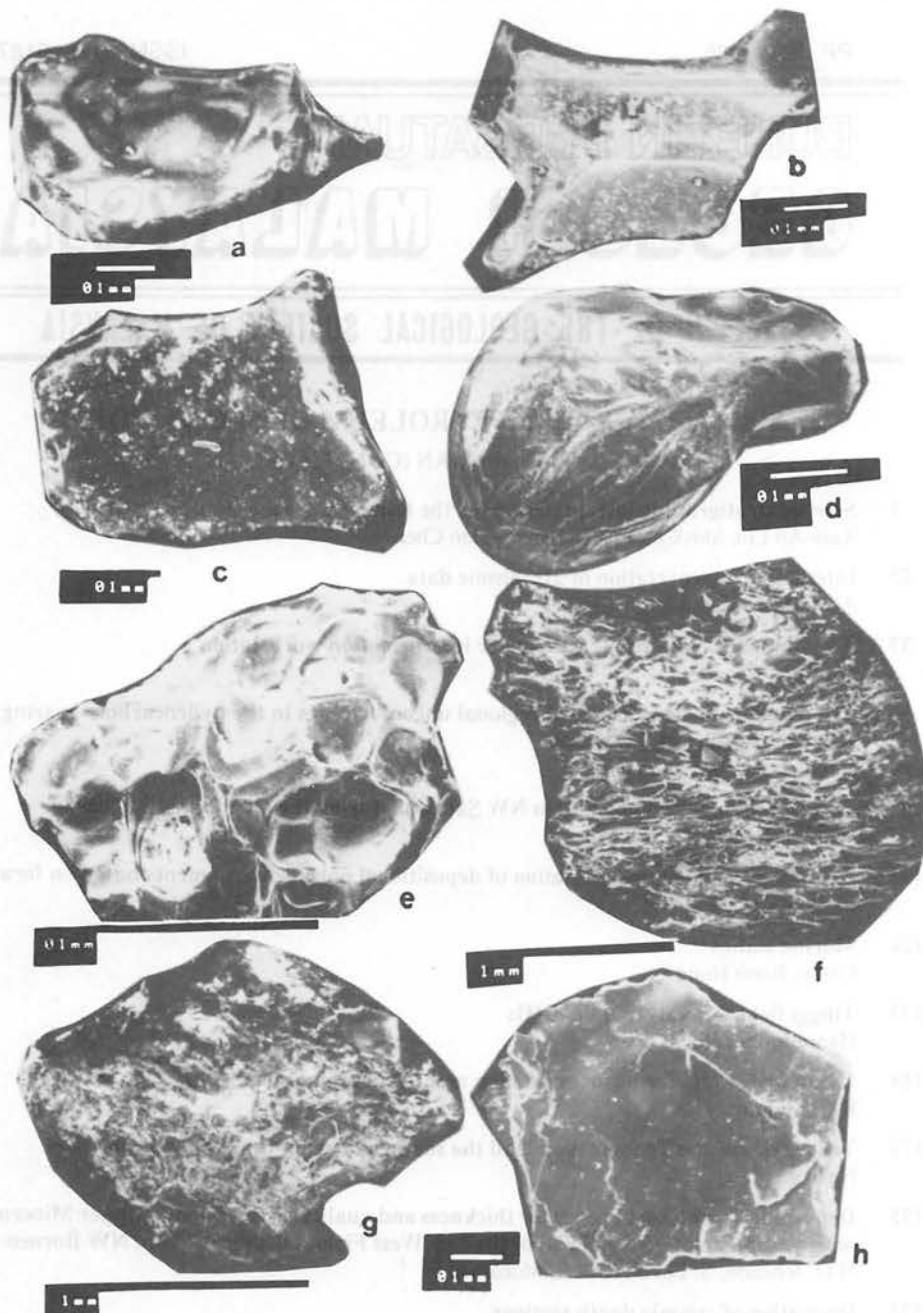


Plate 4. Scanning Electron Micrographs of some glass shards, pumice shards and biotite flake.

- a & b. Cusped shards (scale bar 0.1 mm)
- c. Platy shard (scale bar 0.1 mm)
- d. Bubble shard, an elongated bubble shaped shard
- e. Bubble shard showing some vesiculations
- f. Pumice shard showing various elongated cavities enclosed by glass walls
- g. Pumice shard showing fibrous structure of glass with some flaky mineral biotite
- h. Biotite flake

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SPECIAL ISSUE ON PETROLEUM GEOLOGY VOL. II

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Editor
G.H. TEH



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CLAY MINERALS IN WEATHERED SHALES OF RED BEDS ALONG THE PALOH - KLUANG BYPASS HIGHWAY

J.K. Raj, Jabatan Geologi, Universiti Malaya

In a recent investigation of slope failures along the Paloh-Kluang Bypass Highway in central Johore (Fig. 1), it was found that they largely only affected slope cuts exposing partly to completely weathered, inter-bedded sequences of sandstones and shales. These sequences, of a probable Upper Jurassic - Lower Cretaceous age (Loh, 1979), show variable individual bed thicknesses (of about 0.2 to 3 m) and generally strike E - W with moderate to steep dips (of about 30° to 50°) towards N. In deeper slope cuts, the sandstones and shales are seen to be generally reddish in colour, though individual beds show variable colours ranging from buff through orange and pink to red, green and purple. In shallower slope cuts, however, the strata are usually pinkish white to orange in colour with many red mottles. Residual soils developed over these strata are furthermore, usually shallow (< 2 m thick) and characterized by the development of lateritic concretions.

The slope failures that have occurred have essentially involved the 'flowage' of certain shale beds and that has in turn led to the slumping of the overlying slope material (both residual soil and weathered strata). These failures are of variable sizes and have only affected cuts where bedding dips towards the slope cut face. The failures have mainly occurred during rainy periods and are considered to have resulted from the infiltration induced saturation of the shale beds. In view of this role of the shales in influencing slope stability, it was decided to determine their clay mineralogy as this could have been a contributing factor. Samples of partly, and completely, weathered shales were thus collected at two sites along the highway, where slope failures had occurred (Fig. 1).

X-ray diffractograms of the clay fractions of the various samples performed under different conditions show somewhat similar features (Figs. 2 to 8) including:-

1. the occurrence of several reflections at low 2θ angles - indicating the presence of more than one clay mineral type,
2. the occurrence of shifts in some reflections at low 2θ angles as a result of different treatments - indicating the presence of some form of swelling clay mineral type, and
3. the occurrence of diffraction bands and asymmetrical reflections at low 2θ angles - indicating the presence of some form of randomly interstratified clay mineral.

Kaolinite is present in all of the samples and is identified from the symmetrical reflections on the untreated diffractograms at about 12.2° and 25.0°, corresponding to d-spacings of 7.2 Å and 3.6 Å respectively; the 12.2° (2θ) reflection persisting on the glycolated diffractogram but disappearing on the 500°C heated diffractogram (Thorez, 1975). Illite is also present in all of the samples and is identified from the reflections on the untreated diffractograms at about 8.5°, 17.6° and 26.7° (2θ), corresponding to d-spacings of 10.3 Å, 5.0 Å and 3.3 Å respectively; the reflections at 8.5° and 17.6° (2θ) persisting on the glycolated and

500°C heated diffractograms (Thorez, 1975). Swelling chlorite is present in some of the samples and is identified from the reflection on the untreated diffractogram at about 6.0° (2θ), corresponding to a d-spacing of 14.7 Å, which broadens and shifts to about 5.3° (2θ) (d-spacing of 16.7 Å) on the glycolated diffractogram and drops to about 6.1° (2θ) (d-spacing of 14.5 Å) on the 500°C heated diffractogram (Thorez, 1975). The randomly interstratified clay mineral present in some of the samples has a composition symbolized by (10 - 14Cg) and is mainly identified from the diffraction band between about 8.5° and 5.0° (2θ) (i.e. between the illite and swelling chlorite reflections) appearing on all of the diffractograms (Thorez, 1975). The strongly asymmetrical (towards low angles) illite reflection at about 8.5° (2θ) on the untreated and glycolated diffractograms which becomes symmetrical on the 500°C heated diffractogram also points to the randomly interstratified clay mineral which is considered to consist predominantly of illite layers at 10 Å spacing that are interstratified with 14 Å distended interlayer spaces that have a behaviour similar to that of a swelling chlorite (Thorez, 1975).

X-ray diffractograms of the partly weathered shale samples (Nos. 1, 3, 4 & 5 - Figs. 2, 4, 5 & 6) are closely similar to one another in appearance as are the X-ray diffractograms of the completely weathered shale samples (Nos. 2, 6 & 7 - Figs. 3, 7 & 8). In the partly weathered shales, the main clay mineral types present are illite, swelling chlorite and the randomly interstratified clay, while the lesser clay mineral types present include kaolinite and swelling chlorite (Table 1). In the completely weathered shale samples, however, the main clay mineral type present is kaolinite, while the lesser clay mineral types present include illite, the randomly interstratified clay mineral and swelling chlorite (Table 1).

At this point it should be noted that although interstratified clay minerals are of a common occurrence, they have often not been recognized or described (Thorez, 1975). This is particularly true of Peninsular Malaysia where no published data exists concerning the presence or occurrence of randomly interstratified clay minerals.

In view of the dominance of illite, the randomly interstratified clay mineral (10 - 14Cg) and swelling chlorite in the partly weathered shale samples, and the dominance of kaolinite in the completely weathered shale samples, it can be concluded that illite, the (10 - 14Cg) randomly interstratified clay and swelling chlorite are the original clay minerals present in the shale beds, while the kaolinite is a weathering product of the shales.

References

- Loh, C.H., 1979. The geology of the Kluang area (Sheet 124), Johore. *Geol. Survey Malaysia Ann. Report for 1979*, Ministry Primary Industries Malaysia, 142-146.
- Thorez, J., 1975. *Phyllosilicates and Clay Minerals - A Laboratory Handbook for their X-ray Diffraction Analysis*. Editions G. Lelotte, Dison, Belgium. 579 p.

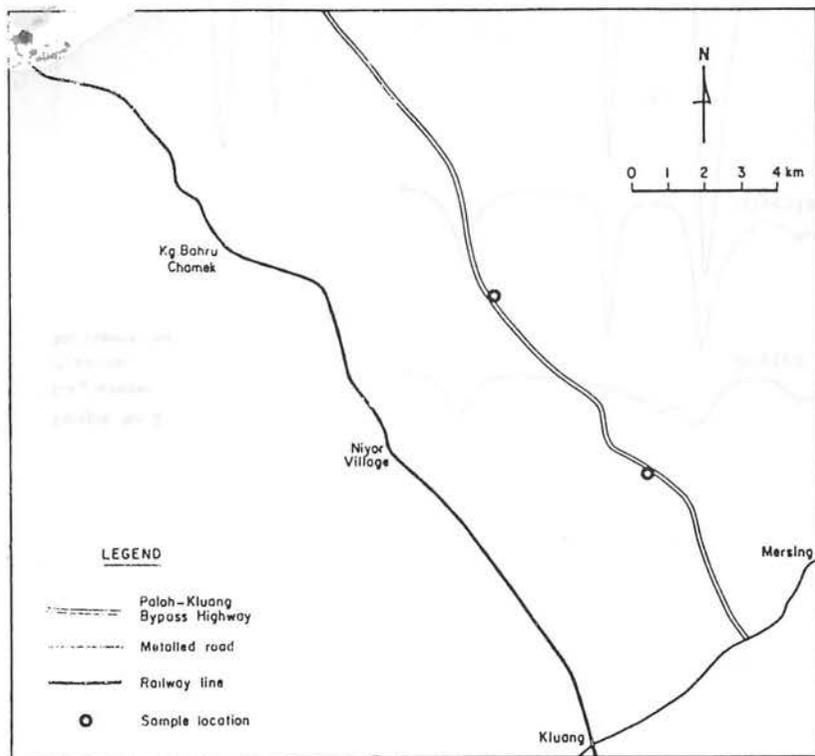


Fig. 1: Location of the Paloh-Kluang Bypass Highway.

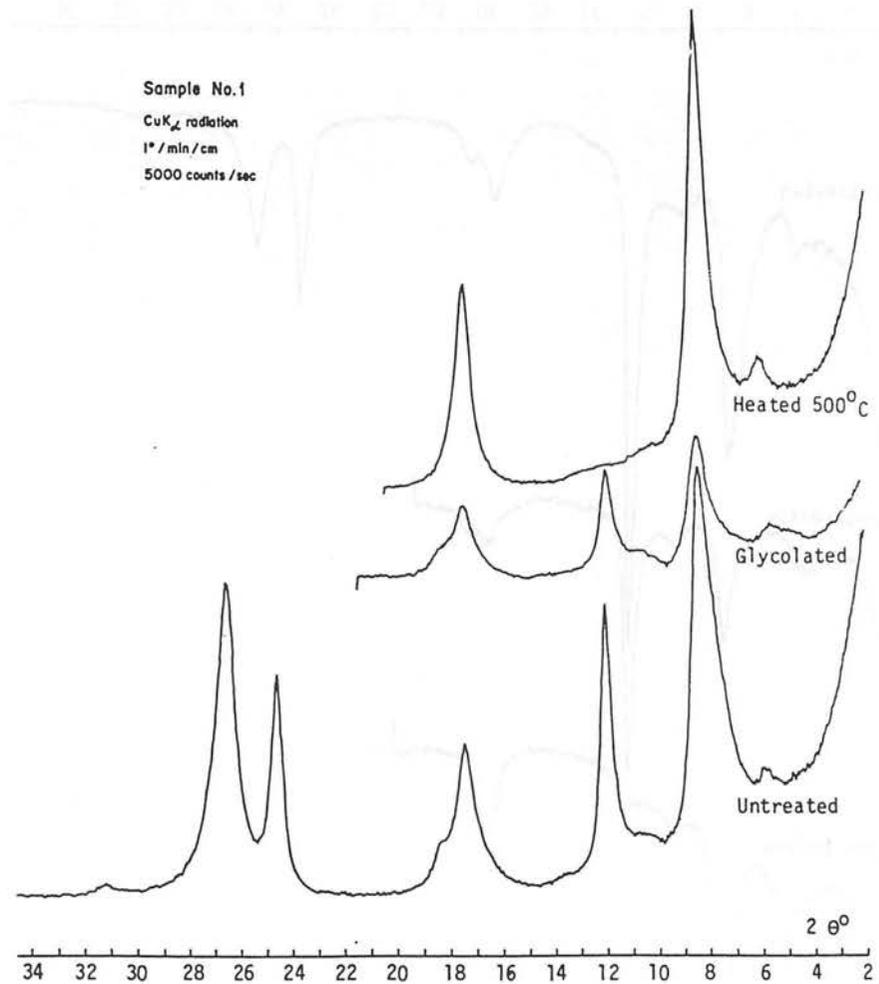


Fig. 2: X-ray diffractograms of sample number 1.

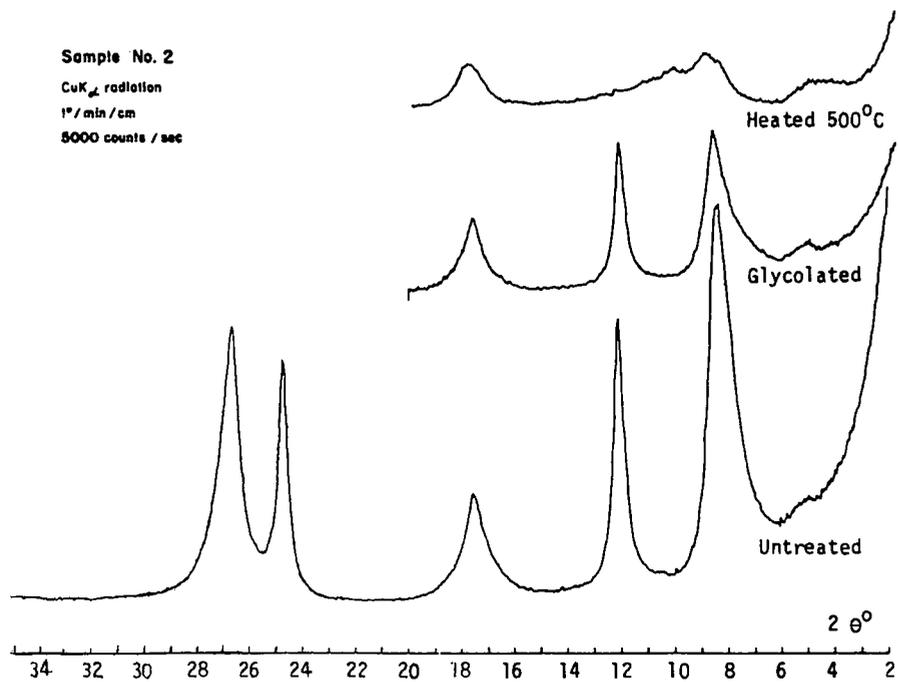


Fig. 3: X-ray diffractograms of sample number 2.

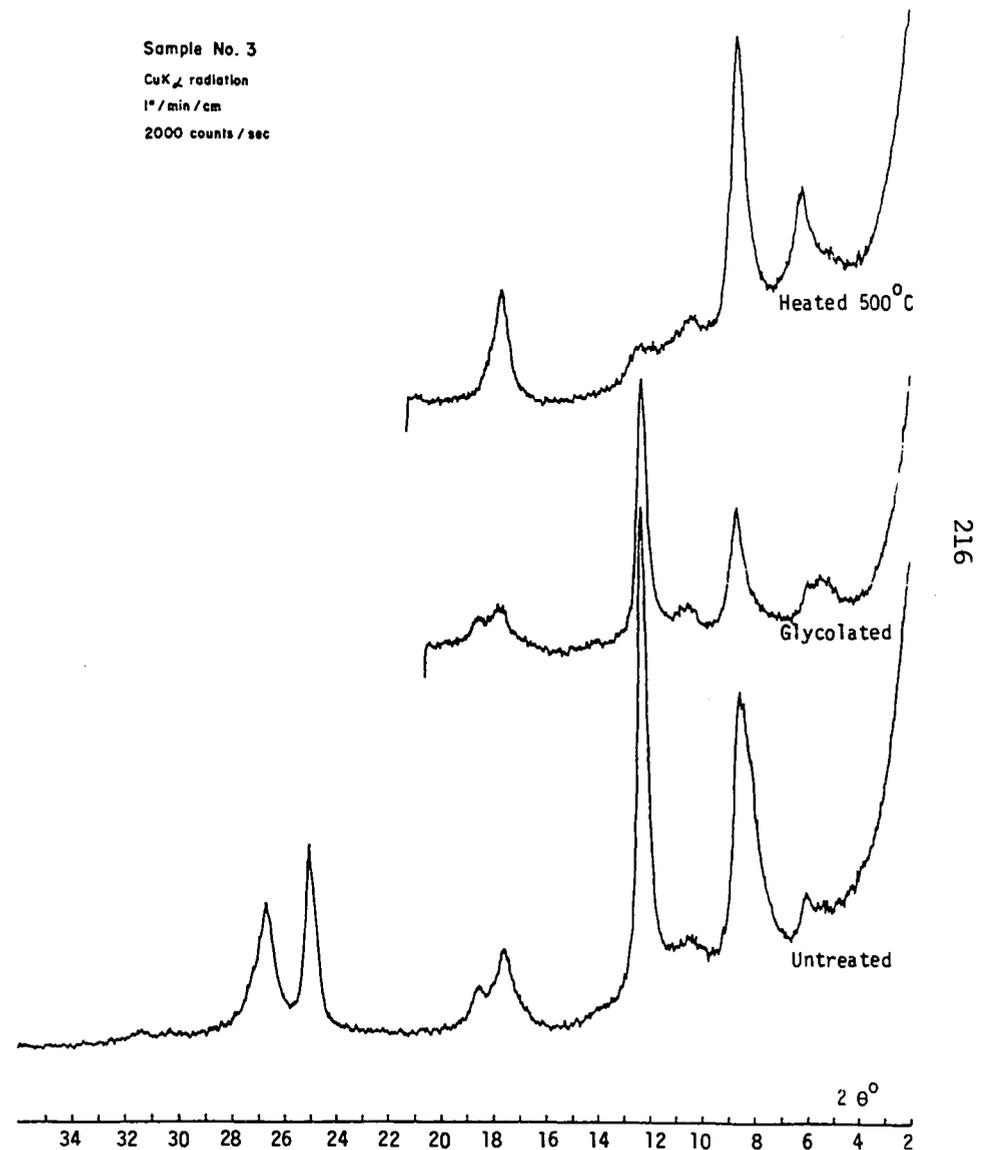


Fig. 4: X-ray diffractograms of sample number 3.

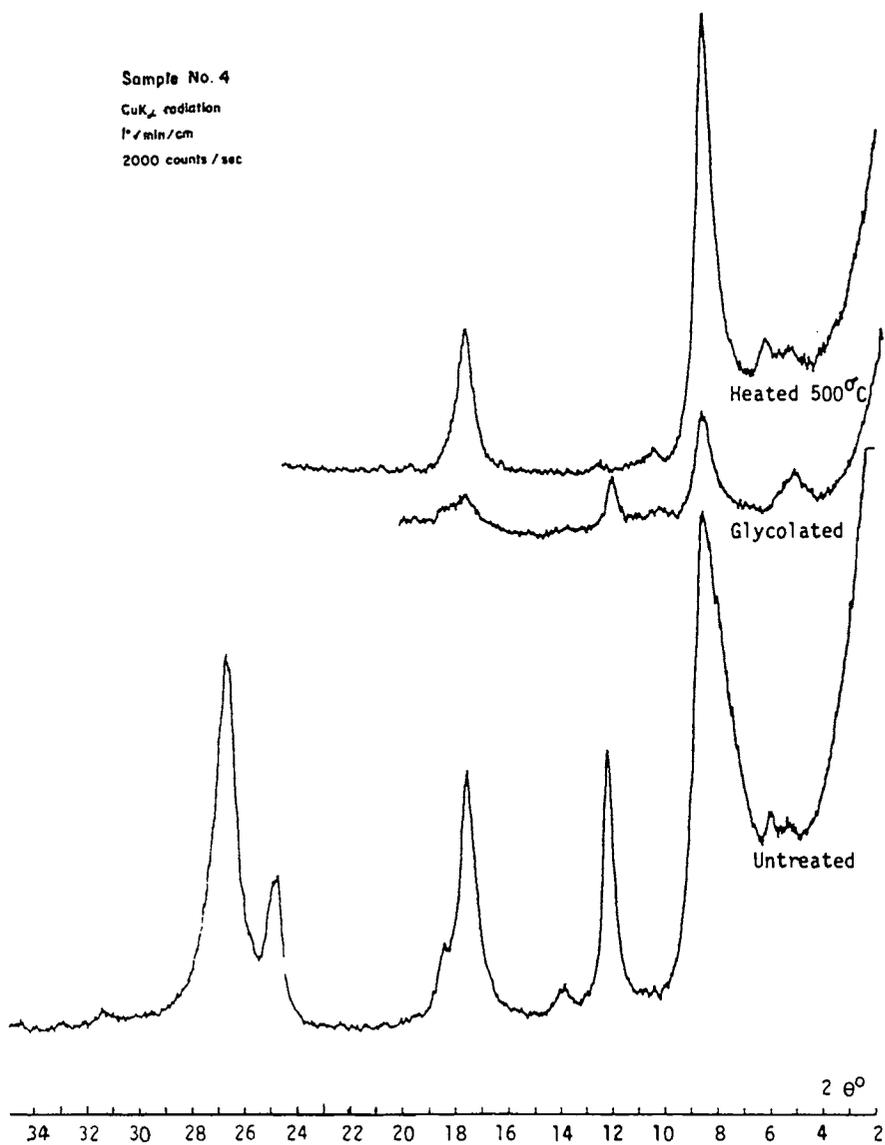


Fig. 5: X-ray diffractograms of sample number 4.

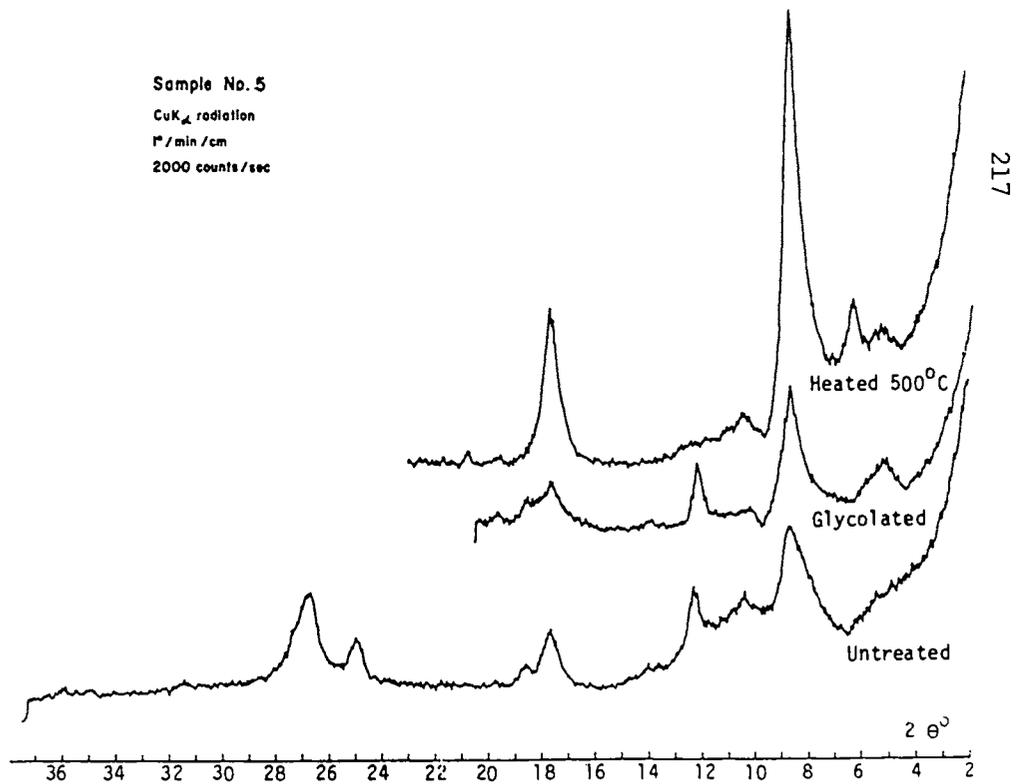


Fig. 6: X-ray diffractograms of sample number 5.

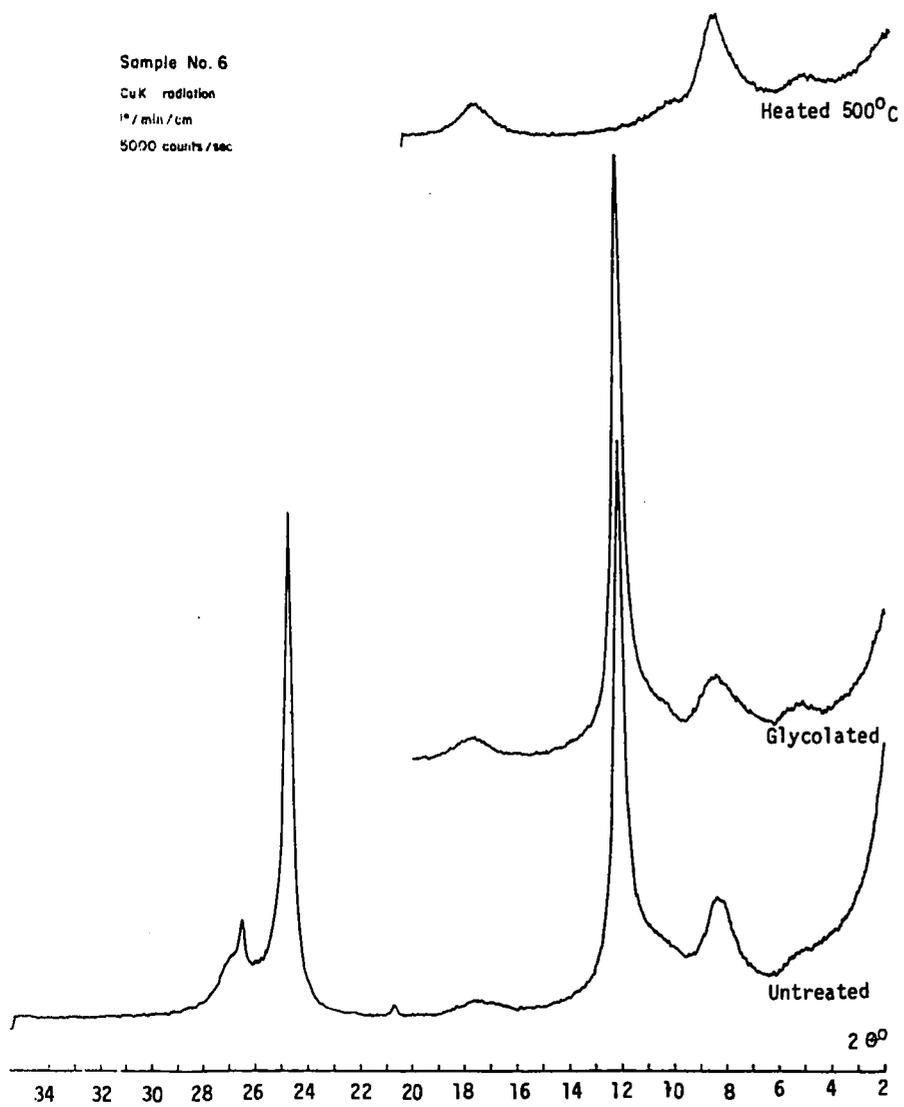


Fig. 7: X-ray diffractograms of sample number 6.

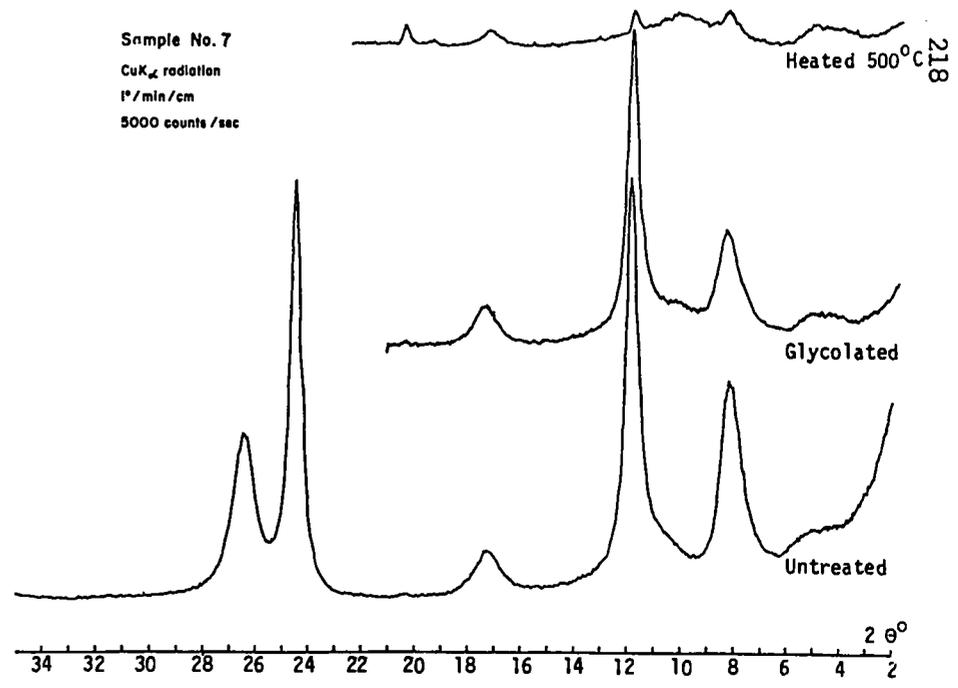


Fig. 8: X-ray diffractograms of sample number 7.

Table 1. Clay mineral types present in the different samples.
 Note: relative amounts of clay mineral types (i.e. xxx : lot, xx : some, x : least, - : absent) based on relative intensities of reflections in untreated diffractograms.

Clay Mineral Sample Type Number	Kaolinite	Illite	Randomly Interstratified Clay (10 - 14 Cg)	Swelling Chlorite
1	xx	xxx	xx	x
2	xx	xx	x	-
3	xx	xx	xx	xx
4	x	xxx	xxx	xx
5	x	xxx	xxx	xx
6	xxx	xx	-	x
7	xxx	xx	-	x

P E R T E M U A N P E R S A T U A N
(M E E T I N G S O F T H E S O C I E T Y)

CERAMAH TEKNIK (TECHNICAL TALKS)

James Taylor: Uranium exploration in Peninsular Malaysia.

Laporan (Report)

Mr. James Taylor gave the above talks which was jointly sponsored by the Society and the Geological Survey of Malaysia on 17 September 1987 at the Geological Survey in Ipoh. A total of 49 members and guests, including two council members attended the talk which was preceded by tea at 10.30 a.m.

Mr. J. Taylor, an IAEA expert on uranium is presently attached to the Geological Survey of Malaysia in Ipoh. He has been with the International Atomic Energy Agency (IAEA) since 1974. Prior to joining the IAEA he was with British Geological Survey and from 1966 to 1974 he was exploration manager for United Uranium and JOC Mineral Resources in Australia.

Mr. Taylor first reviewed the major types of uranium deposits in the world:

Quartz pebble conglomerate, proterozoic strata bound and unconformity related deposits, sandstone basins and granitic deposits are the most important from the production point of view. Others of less significance are calcretes, acid volcanic and black marine shale related occurrences. Uranium is also produced as a by-product of marine phosphorite beneficiation and exploitation of gold from S. African quartz pebble conglomerate.

He then reviewed the exploration methods for uranium and concluded that geochemistry was the most suitable method based on the local climatic conditions. His preliminary results indicated that the Late Mesozoic sediments show little promise and that the Main Range granites are the most favourable geological environment for uranium exploration.

P.C. Aw

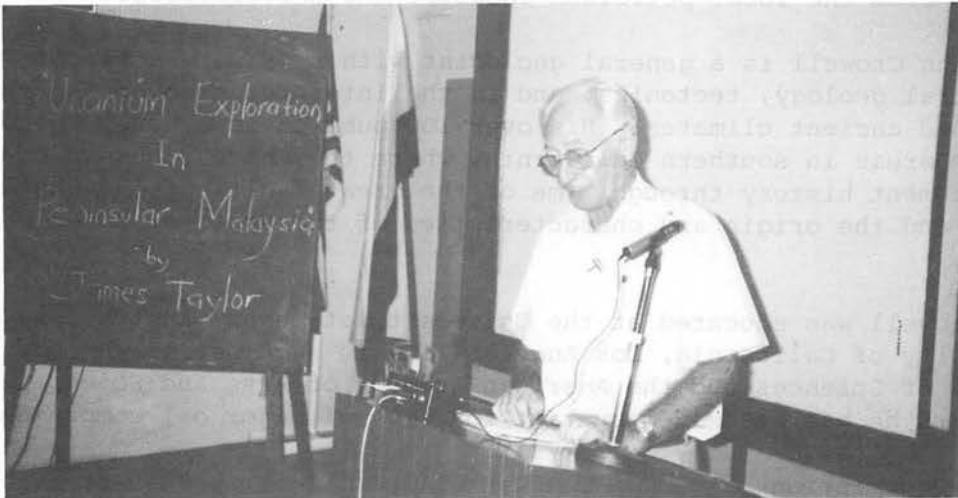
John C. Crowell: The San Andreas Fault System.

In addition to conducting the AAPG Continuing Education Programme training course entitled "Tectonics, structure and sedimentation along strike-slip and oblique-slip mobile belts", Dr. Crowell gave the above talk to about 20 members at 5.30 p.m. at Hotel Merlin, Kuala Lumpur, on 13th October 1987.

TECHNICAL TALK BY JAMES TAYLOR,
Jabatan Penyasatan Kajibumi Malaysia



Penolong Ketua Pengarah Senathi Rajah, introducing the speaker.



James Taylor with his talk.



A section of the audience.

Dr. Crowell, who has worked extensively on the displacement history through time of the great faults of the San Andreas System, gave a most informative and interesting talk punctuated by most appropriate slides and data.

Dr. Crowell has indicated that he will be writing up his talk for publication in the WARTA GEOLOGI. We will publish the paper as soon as we receive it.

G.H. Teh

JOHN C. CROWELL: TECTONICS, STRUCTURE AND SEDIMENTATION ALONG STRIKE-SLIP AND OBLIQUE-SLIP MOBILE BELTS - TRAINING COURSE

The above course in the Continuing Education Programme, American Association of Petroleum Geologists (AAPG), was sponsored by the Geological Society of Malaysia and held on October 12 & 13 1987, at Hotel Merlin, Kuala Lumpur. All available places (40) were taken up by participants from the local petroleum industry and universities.

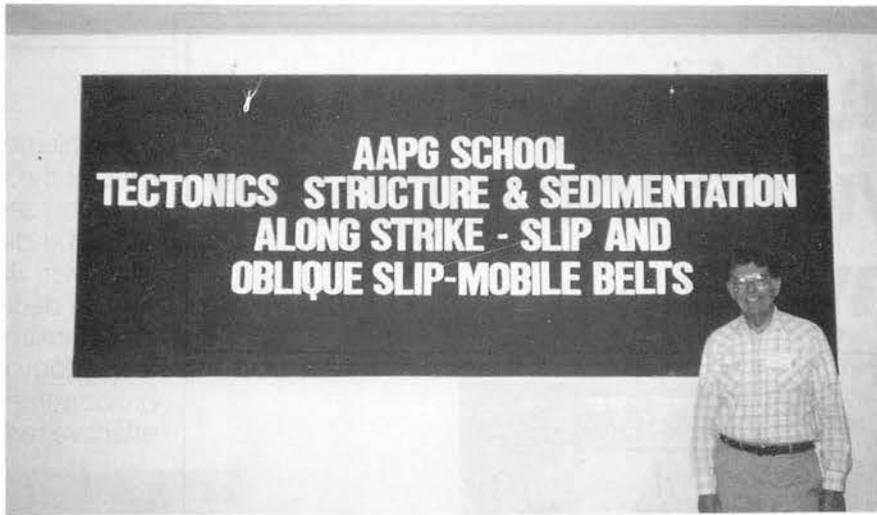
John Crowell is a general geologist with a primary interest in structural geology, tectonics, and in the interpretation of sedimentary rocks and ancient climates. His over 100 publications have dealt with complex areas in southern California, where they have focussed on the displacement history through time of the great faults of the San Andreas system and the origin and characteristics of the associated sedimentary basins.

Crowell was educated at the University of Texas, Austin, and the University of California, Los Angeles. He is a member of the U.S. National Academy of Sciences and the American Academy of Arts and Sciences. Over the years he has been a consultant for several major oil companies.

Course Description

Mobile belts mark the transform boundaries between lithospheric plates, especially within continental terranes, where source areas for sediment derivation stand high, and basins to receive sediment stand low. Such belts occur in the North Sea, in New Zealand and elsewhere. They are also deeply buried or eroded at many places of interest in hydrocarbon exploration. Basins along such belts include pull-aparts, marginal sags, irregular and triangular depressions, and others. Geologic structures along such transform belts commonly display characteristics associated with simple shear, several of which are illustrated. Clay-cake experiments and diagrams help in understanding the orientation and evolution of such structures, and the problems of working with continental fragmentation and dispersion, tectonostratigraphic terranes, detachment faulting, are included as well as evidence for regional shortening, extension, rotation, displacement, and decollement. Sedimentation styles and facies associated with such basins, and problems faced by the explorationist and the production geologist in working with them, are described and discussed. An effort will be made to translate Californian experience to other regions.

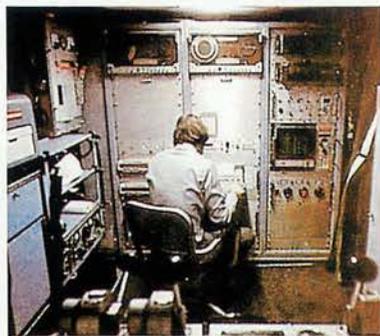
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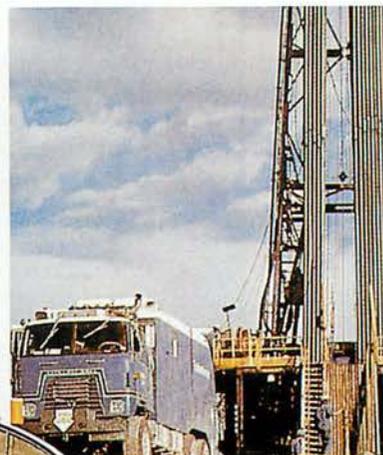
JOHN C. CROWELL

Schlumberger: services throughout Malaysia.

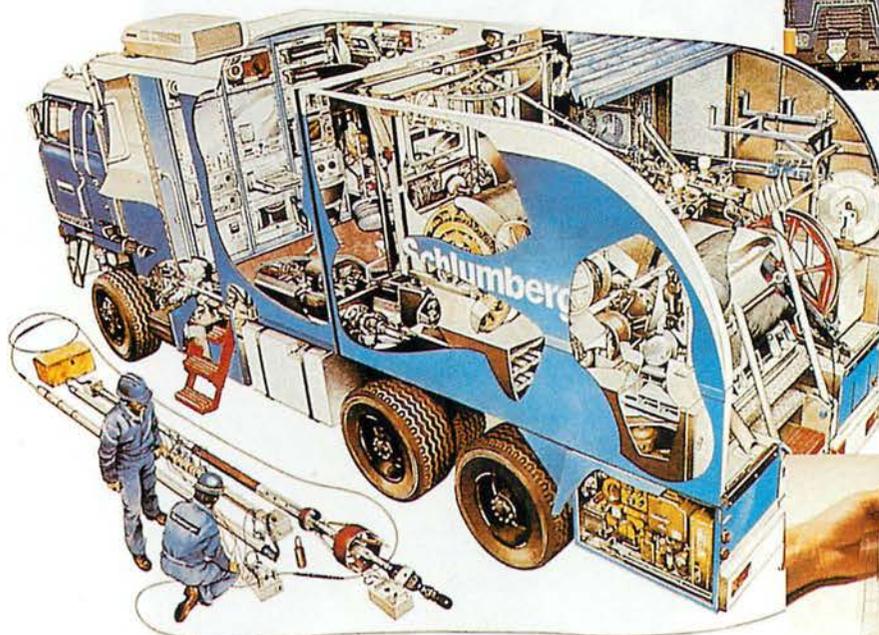
Schlumberger, the eyes of the oil industry, has provided services since the discovery of oil in Miri, Sarawak, several decades ago. Its commitment to high technology continues to provide the most cost effective results.



Schlumberger engineer at work with the Cyber Service Unit system inside a wireline logging Unit

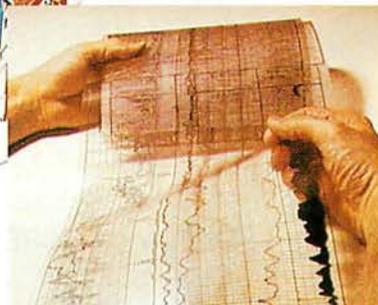


Cyber Service Unit on location.



Schlumberger crew checking a logging tool.

Cyberlook, an interpreted log prepared at the wellsite by the CSU computer.



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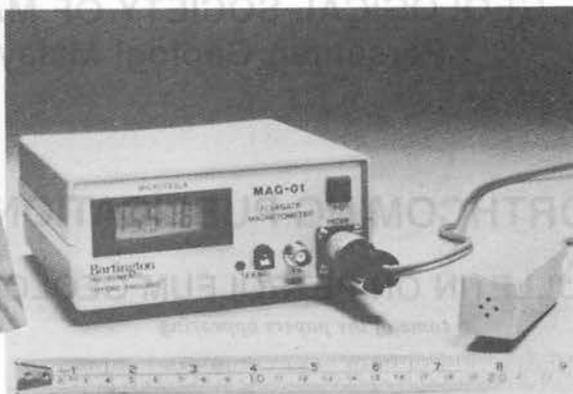


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FORTHCOMING PUBLICATION

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some of the papers appearing

The role of carbonate diagenesis in exploration and production from Devonian pinnacle reefs, Alberta, Canada

N. R. Watts (Texaco)

Significance of stylolite development in hydrocarbon reservoirs with an emphasis on the Lower Cretaceous of the Middle East

R. B. Keopnick (Mobil)

Studies of carbonates of the Tembesi River Basin, Sumatra

L. Beavais (Univ. Paris)

Tectonic evolution and structural styles of Cenozoic basins around Taiwan area

Frank Fu-Wen Huang (CPC)

Advances in Diplog data processing for stratigraphic analysis

C. Carter Waid *et al.* (Dressler)

Habitat of Hydrocarbons on the Norwegian Continental Shelf

Odd R. Heim *et al.* (Statoil)

Stratigraphic tectonic model for Eastern Borneo

C. S. Hutchison (Univ. Malaya)

Stratigraphy and palaeofacies development of Blocks PM 6 and 12 Offshore Peninsular Malaysia

Md. Nazri Ramli (PETRONAS Carigali)

The geological configuration of the Betty Field, Baram Delta Province, offshore Sarawak

H. D. Johnson *et al.* (Sarawak Shell Berhad)

Better accuracy from sidescan records: The Object-Chord Method

Malcolm James and P. M. Tong (Racal)

Enquiries : Editor

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c/o Dept. of Geology
University of Malaya
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MALAYSIA
Tel : 03-7577036

BERITA - BERITA PERSATUAN (NEWS OF THE SOCIETY)

INSTITUTE OF PROFESSIONAL GEOLOGISTS MALAYSIA - CONSTITUTION

The drafting of the Constitution for the Institute of Professional Geologists Malaysia is now completed and in the process of being translated to Bahasa Malaysia before despatch to the Registrar of Societies.

KEAHLIAN (MEMBERSHIP)

The following applications for membership were approved:

Full Members

1. Mustaffa Kamal Shuib, Jabatan Geologi, Universiti Malaya, Kuala Lumpur
2. Philip Peng Lip Yeo, 131 Birrell St., Waverley, NSW, Australia
3. Fauzi Zainuddin, Malaysia Mining Corp., 9th Floor, Teruntum Complex, 25000 Kuantan, Pahang
4. Koo Sing, 25 Forest Avenue, Rostrevor, South Australia 5073
5. Wan Anuar Hj. Wan Ibrahim, JOMIS Sdn. Bhd., P.O. Box 102, 81600 Pengerang, Johor
6. Kadderi Md. Desa, Jabatan Geologi, 43600 Universiti Kebangsaan Malaysia, Bangi

Student Members

1. Cheong Khai Wing, A325a, Kolej Za'ba, Universiti Malaya, Kuala Lumpur
2. Sivagnanam s/o Sivalingam, Dept. of Geoscience, Texas Tech. University, P.O. Box 4109, Texas 79409, USA

Institutional Members

1. Idemitsu Sarawak Oil Exploration Co., Ltd., 26th Floor, UBN Tower, No. 10 Jalan P. Ramlee, 50250 Kuala Lumpur
2. JTO Operating Co., 12th Floor, KL Tower, 179 Jalan Bukit Bintang, 55100 Kuala Lumpur

PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The Society has received the following publications:

1. Yukiangian (Early Emsian, Devonian) brachiopods of the Nanning-Liujing District, Central Guangxi, Southern China by Wang Yu and Rong Jiayu. 1986
2. Memoirs of Nanjing Institute of Geology and Palaeontology, Academia Sinica, no. 23, 1987
3. Bulletin of the Nanjing Institute of Geology and Palaeontology, no. 10, 1986
4. Episodes, vol. 10, no.2, 1987
5. Journal of stratigraphy, vol. 10, 1986, vol. 11, (1987)

6. Acta Palaeontologica Sinica, vol. 26, nos. 1 & 2, 1987
7. Acta Micropalaeontologica Sinica, vol. 4, nos. 1-2, 1987
8. The Science Reports of the Tohoku University, vol. 57, no. 2, 1987
9. Contributions from the Institute of Geology & Paleontology,
Tohoku University, no. 90, 1987
10. Small mammal fossils & correlation of continental deposits, Safford
& Duncan Basins, Arizona, USA by Y. Tomida. 1987
11. Transactions of the Institution of Mining & Metallurgy, Section A,
July 1987
12. Chronique de la recherche miniere, no. 487, 1987
13. The University of Kansas, Paleontological contributions, Paper
119, 1987

BERITA - BERITA LAIN (OTHER NEWS)

17TH CONFERENCE ON MATHEMATICAL GEOPHYSICS BLANES (COSTA BRAVA, SPAIN), 20-25 JUNE 1988

Sponsored by the International Union of Geodesy and Geophysics (IUGG),
through the Committee on Mathematical Geophysics

Nonlinear Dynamical Systems in the Geosciences: Geophysical fluid dynamics, earthquake dynamics, cellular automata, fluid flows in the earth, turbulence, transport phenomena, self-organisation, percolation, electromagnetic fields in nonlinear media, molecular dynamics

Philosophies and Applications of Inverse Theory: Bayesian inference or not, Monte Carlo Methods, against linearization, neural networks, nonlinear inversion of waveforms, the accuracy of 3D earth models, helioseismology, geodesy

Structure and Dynamics of the Core and Adjacent Mantle: Physical properties and phase changes at the inner core boundary and core-mantle boundary, lower mantle structure and convection, core-mantle topography and interactions, core structure and oscillations, dynamo energetics and dynamics, velocity and magnetic fields at the core-mantle boundary .
... (this topic corresponds to SEDI Symposium).

President of the Organizing Committee: Antoni Correig, Facultat de Fisica, Universitat de Barcelona, Diagonal 645, E-08028, Barcelona, Spain. Tel: (34) (3) 330.73.11 (Ext. 1565).

FIFTH INTERNATIONAL SYMPOSIUM ON FOSSIL CNIDARIA INCLUDING ARCHAEOCYATHA AND SPONGIOMORPHS

Brisbane, Queensland, Australia, July 25-29, 1988

The Fifth International Symposium on Fossil Cnidaria will provide specialists not only with the first opportunity to assemble in the Southern Hemisphere and examine this region's important fossil corals and allied groups, but also offers a unique chance to visit Australia's fossil reefs and the Great Barrier Reef.

Scientific Programme

The Symposium will run over five days and include a number of sessions to address basic questions relating to fossil corals and associated organisms. These will include key papers on contemporary research, review papers, contributed papers, discussions on poster displays and future research. Research papers on other topics will be welcomed and a programme of workshops to include small groups interested in specialised topics will be accommodated. The Symposium venue provides excellent facilities for poster displays, film, video and static presentations.

The theme to be included in the programmes formal sessions or workshops are:

1. Intraspecific variability in corals
2. Distribution patterns of corals and spongiomorphs across so-called extinction intervals
3. Frame-building organisms: associations in ancient and modern environments
4. Early diversification and dispersal in the major coelenterate and archaeocyathan groups
5. Microstructure of corals, archaeocyatha and spongiomorphs.

Enquiries

Enquiries may be addressed to members of the Organising Committee via the Symposium Secretariat, UniQuest Limited, University of Queensland, St. Lucia, Queensland, 4067, Australia. Telephone: (07) 377 2899. Telex: AA40315 (UNIVQLD).

CENTRE FOR ENVIRONMENTAL MANAGEMENT AND PLANNING (CEMP)

Conference and Training Calendar:

3 July - 23 September 1988: 3 months Intensive Training Course on Environmental Impact Assessment at the University of Aberdeen

10 - 23 July 1988: 9th International Seminar on Environmental Impact Assessment at the University of Aberdeen

- 23 - 20 October 1988: Advanced Policy Workshop on Environmental Management and Impact Assessment: Implementation Requirements to be held at the Chandris Hotel, Chania, Crete, Greece
- July - September 1988: 3 month Intensive Training Course on Environmental Impact Assessment based at the University of Aberdeen
- July 1989: 10th International Seminar on Environmental Impact Assessment at the University of Aberdeen.

CEMP has considerable experience in organizing conferences, workshops and specialized training programmes world wide for the WHO, EEC, UNEP and national governments. If you feel that CEMP can assist you with your training requirements, please contact S.ndra Ralston, Centre for Environmental Management and Planning, 48 College Bounds. Old Aberdeen AB 9 1FX, Scotland, U.K. Telephone 0224 272480.

8TH INTERNATIONAL CONFERENCE ON BASEMENT TECTONICS

Montana Tech, Butte, Montana, USA
 August 8 - 12, 1988
 Sponsored by ARCO

Main Theme of Conference

The 8th conference will focus on the CHARACTERIZATION AND COMPARISON OF PRECAMBRIAN THROUGH MESOZOIC CONTINENTAL MARGINS.

Emphasis will be given to western North America. Sessions will concentrate on characterization (geophysical, geochemical, structural, petrologic and metallogenic) of ancient continental margins. Metallogeny will receive special attention with a symposium on the tectonics of gold. Interdisciplinary approaches will be emphasized in presentations on identification and comparison of ancient margins and any subsequent reactivation of their boundaries. The 8th conference will feature longer discussion periods for each session's theme and more poster presentations around related themes. Presentations selected for oral delivery will emphasize theme overviews and processes.

Pre- & Post-Meeting Field Trips (3-4 days)

The eastern field trip will cross a Precambrian margin and will highlight the Stillwater Complex, Archean rocks of both the Beartooth Plateau and foreland block uplifts as well as tectonics associated with the Yellowstone Calderas and the Basin and Range.

The western field trip will cross a Mesozoic collisional margins and will focus on Wallowa-Seven Devils volcanic terrane and the western margin of the Idaho batholithy.

Enquiries

8th International Conference on Basement Tectonics
 c/o M.J. Bartholomew, Chairman
 Montana Tech
 Butte, Montana 59701, USA.

3RD INTERNATIONAL SYMPOSIUM ON PRE-JURASSIC GEOLOGICAL EVOLUTION OF EASTERN CONTINENTAL MARGIN OF ASIA, IGCP PROJECT 224

Date: August 24-30, 1988
 Place: Symposium I: Beijing
 August 24-26, Huilongguan Hotel, Beijing, China
 Symposium II: Xi'an and Qinling Mts
 August 27-30, Northwest University and field excursion

Registration

The attached registration form is required to be filled in and sent back before March 15, 1988.

Abstract

1. Abstracts must be written in English and are requested to be typed single-spaced in a 14 x 21 cm block on plain white paper and to cover full pages for photo-offset printing
2. Make two photocopies of the typed abstract and mail them with the original (do not fold) before April 30, 1988
3. Deadline: April 30, 1988.

Presentation

1. Time: Each oral presentation shall be limited to 20 minutes (including discussion)
2. Slides: Projector for 35 mm slides and OHP for transparent sheets will be available
3. Language: English

Fee

1. Registration fees:
 - (a) Participants: US\$150
 - (b) Accompanying members (spouse only): US\$100
2. Accommodation:

Participants will stay in Beijing from Aug. 23 to 27 morning. Room price is 15-25 US dollars per person per diem. Meals can be taken in the Dining Hall of the Hotel according to private choice, and at your own expenses.
3. Geological field excursion fee: US\$280-300 including

Airticket: (from Beijing to Xi'an US\$70
 Hotel: US\$80 for 4 overnights from 27-30, August inclusive
 Meals: US\$70 (with soft drinks)
 Bus facilities: US\$60
4. We are also delighted to help those who want to visit Beijing before the Meeting, if any, please contact us.

Address of Correspondence

Prof. Ren Jishun, Institute of Geology, Chinese Academy of Geological Sciences, 26 Baiwanzhuang Road, 100037 Beijing, China. Telex: 22531 MGMRC CN; Tel: 831.1547.

SOWAS '88.

INTERNATIONAL SYMPOSIUM ON MODELLING SOIL-WATER-STRUCTURE
INTERACTIONS

Delft, The Netherlands

29 August - 2 September 1988

Organized under the auspices of

- * the International Association for Hydraulic Research (IAHR), Section
Experimental Methods in Hydraulics and Fluid Mechanics

and sponsored by

- * The International Society for Soil Mechanics and Foundation
Engineering (ISSMFE)
- * The International Union of Theoretical and Applied Mechanics (IUTAM)
- * The Royal Institution of Engineers in the Netherlands, Division
for Civil Engineering
- * Delft University of Technology
- * Rijkswaterstaat
- * Delft Geotechnics
- * Delft Hydraulics

The 1988 Symposium is aimed at deepening the interdisciplinary
relationships between hydraulics, soil mechanics and applied mechanics.

Fields where interactions may be important include:

- hydraulic and marine structures
- berthing structures and (bridge) piers
- dikes and dams
- filters under non-stationary conditions
- offshore structures
- anchoring
- pile foundations in marine environment
- landslides, earthquakes and liquefaction
- dredging/dumping

All correspondence concerning the Symposium should be addressed to:

SOWAS '88 c/o KIVI

P.O. Box 30424

2500 GK The Hague

The Netherlands

Telex: 33641 kivi nl

Telephone (national): (070) 919900; (international): +3170 919900

Telegram address: Koninsting, The Hague

INTERNATIONAL SYMPOSIUM ON ENGINEERING GEOLOGY AS RELATED TO THE STUDY, PRESERVATION AND PROTECTION OF ANCIENT WORKS, MONUMENTS AND HISTORICAL SITES

Purpose

During the last years people have become more and more interested in the protection and restoration of ancient monuments and structures and the valorization of historical sites. At the same time there is an increasing public concern in these subjects, due to the direct or indirect damaging effects to that heritage, resulting from the growth of our days society.

This Symposium will give the opportunity to gain the experience acquired so far in a field, not yet fully concerned during the meetings of the International Association of Engineering Geology. It will present a worldwide overview of present-day experience on the above field, promoting the contribution of engineering geology.

It is the intention that the themes and objectives of the Symposium present an attractive venue for scientists interested for ancient works, monuments and historical sites. Specialists from related and other disciplines, as Rock, Soil Mechanics and Foundation Engineering, from ICOMOS and Archaeology are warmly welcomed.

Sponsors

The Symposium will be held under the auspices of the International Association of Engineering Geology (IAEG). It is organized by the Engineering Geology Committee of the Geological Society of Greece, which is the Greek National Group of the IAEG, with the collaboration of the Greek Ministry of Culture. Between the sponsors will be the Institute of Geology and Mineral Exploration and the Democritus University of Thrace. Furthermore, support contributors are: the Bank of Attica, the Commercial Bank of Greece, the National Bank of Greece.

Place and Date

The Symposium will be held in Athens, from September 19 to 23, 1988. It will last for five days and will be followed by excursions to historical sites of geotechnical interest in Greece.

Themes

1. Engineering Geology and the Protection of Historical Sites and Monuments. Site stability and foundations: slope stability, rockfalls, subsidence, settlement, erosion, foundation drainage problems; protection and remedial measures; environmental restrictions; protection from natural hazards
2. Engineering Geology and Building Stones of Historical Monuments. Erosion and decay problems; restoration materials; borrow areas and quarries of the antiquity; prehistorical sites
3. Engineering Geology and Archaeological Exploration. Geophysical prospecting; remote sensing; excavations, especially in urban areas
4. Engineering Geology and Hazards in the Course of History. Great landslides; subsidence, earthquakes, volcanic eruptions; past disappearance of historical sites
5. Environmental Geology and Historical Sites. Environmental geology

in the antiquity; paleogeography; paleohydrography; tectonic deformations; engineering geology mapping

6. Engineering Geology in Engineering Works in the Antiquity. Ground foundation conditions and stability of ancient works; the way of confronting the problems by the ancients; hydrogeological conceptions of hydro-technical works; case histories

Throughout the sessions special emphasis will be given on the interaction between geology and engineering as well as the multidisciplinary approach of research in the field of the protection of archaeological sites and monuments.

Correspondence

All correspondence pertaining to the Symposium should be addressed to: Greek Committee of Engineering Geology
1988 Symposium Secretariat
P.O. Box 19140
GR-117 10 Athens
Greece
Telex: 45 4312 POLX (c/o Prof. Paul G. Marinos)

AN INTERNATIONAL CONFERENCE AND EXHIBITION ON THE APPLICATION OF GEOLOGY IN THE DEVELOPING COUNTRIES

26th-29th September 1988, University of Nottingham Campus, England

Organised by The Association of Geoscientists for International Development, Geological Society, Institution of Geologists and Institution of Mining and Metallurgy.

The Conference will provide an assessment of past experience and also discuss future trends in the application of Geology in the developing countries. Emphasis will be placed on British geological expertise available, both in the public and private sectors, and on the role played by British geologists and geological organisations.

Delegates from the U.K. and (mainly) overseas developing countries are expected, as well as delegates representing governments, industry, banking, international funding agencies and education.

The Conference will be composed of plenary sessions with keynote speakers, workshops and poster sessions, with five themes including:

Aid policies
Role of Governments Agencies
Resources and Development of Energy and Non-Energy minerals
Hydrogeological and Geotechnical Development
Education and Training

Concurrently with the Conference an Exhibition will be held at which a wide range of international companies will display their products and services.

Enquiries about the Conference should be addressed to:
Conference Secretariat, Geosciences in Development Conference,
Department of Geology, University of Nottingham, University Park,
Nottingham NG7 2RD, England. Tel. (0602) 506101; Telex: 37346 UNINOT G.

AAPG MEDITERRANEAN BASINS CONFERENCE AND EXHIBITION

Nice, France, September 25-28, 1988

Technical Program

Monday Morning, September 26

Opening Session

Presiders: J.A. Helwig, L. Montadert

- 0900 J.A. Helwig: Opening Remarks
- 0910 L. Montadert: Introductory Remarks
- 0915 Mayor of Nice: Welcome
- 0920 N.H. Foster, AAPG President: Remarks
- 0930 X. Le Pichon: Plate Tectonics of the Mediterranean
- 1000 D.S. Gorsline: Comparisons of Mediterranean Margins: Morphology, Environment and Processes
- 1030 B. Tissot: Trends in Organic Geochemistry for Petroleum Exploration
- 1100 M.P. Coward: Aspects of Collision Tectonics and Intraplate Deformation
- 1130 K. Hsu, Jr.: Mediterranean Salinity Crisis

Monday Afternoon, September 26

1400-1720 hrs

AAPG Western Mediterranean Basins

Presider: R. Ricateau

AAPG Seismic Stratigraphy

Presider: P.R. Vail

SEPM Onshore-Offshore Coastal Sediments

Presider: O.H. Pilkey

SEPM Carbonate Reservoirs

Presiders: P.F. Burollet, R.N. Ginsburg

Tuesday Morning, September 27

0900-1200 hrs

AAPG North African Basins

Presider: S. Schamel

AAPG Thrust and Foreland Tectonics and Traps

Presider: B.C. Duval

SEPM Shelf-to-Slope Sedimentation and Seismic Stratigraphy

Presider: L.J. Doyle

Tuesday Afternoon, September 27

1400-1720 hrs

AAPG Suez and Western Desert

Presider: J.C. Harms

AAPG Source Rocks, Maturation and Migration

Presider: B. Tissot

SEPM Geometry of Sandstone Reservoirs

Presider: S. Luthi

Wednesday Morning, September 28
0900-1200 hrs.

AAPG Apulian-Adriatic Region
Presider: N. Novelli

AAPG Oil Field Case Histories
Presider: B.M. Reinhardt

SEPM Deposition of Organic Facies
Presider: A.H. Huc

Wednesday Afternoon, September 28
1400-1720 hrs.

AAPG Eastern Mediterranean and Nile Delta
Presider: G. Wind

AAPG Rift Tectonics and Traps
Presider: D.G. Roberts

SEPM Gravity Deposits
Presider: A.H. Bouma

The Conference will also feature poster sessions on the same topics as the oral sessions. Poster sessions will be located inside the exhibits hall.

For further information.

AAPG Mediterranean Basins Conference, P.O. Box 979, Tulsa, Okla. 74101-0979, USA.

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- Bulletin 2 (1968).** 152 p. Bibliography and Index of the Geology of West Malaysia and Singapore by D.J. Gobbett. Price: M\$10.00 (US\$5.00)—Softcover; M\$15.00 (US\$7.50).
- Bulletin 3 (1970).** 146 p. Papers in Geomorphology and Stratigraphy (with Bibliography supplement). Edited by P.H. Stauffer. Price: M\$10.00 (US\$5.00).
- Bulletin 4 (1971).** 100 p. Papers in Petrology, Structure and Economic Geology. Edited by P.H. Stauffer. Price: M\$10.00 (US\$5.00).
- Bulletin 5 (1973).** 70 p. The Search for Tungsten Deposits by K.F.G. Hosking. Price: M\$10.00 (US\$5.00).
- Bulletin 6 (1973).** 334 p. Proceedings. Regional Conference on the Geology of Southeast Asia. A collection of papers, Kuala Lumpur, March, 1972. Edited by B.K. Tan. Price: M\$22.00 (US\$11.00)—hardcover only.
- Bulletin 7 (1974).** 138 p. A collection of papers on geology. Edited by B.K. Tan. Price: M\$12.00 (US\$6.00).
- Bulletin 8 (1977).** 158 p. A collection of papers on geology. Edited by T.T. Khoo. Price: M\$12.00 (US\$6.00).
- Bulletin 9 (1977).** 277 p. The relations between granitoids and associated ore deposits of the Circum-Pacific region. A collection of papers presented at the IGCP Circum-Pacific Plutonism Project Fifth Meeting, 12-13 November 1975, Kuala Lumpur. Edited by J.A. Roddick & T.T. Khoo. Price: M\$25.00 (US\$12.00).
- Bulletin 10 (1978).** 95 p. A collection of papers on the geology of South-east Asia. Edited by C.H. Yeap. Price: M\$10.00 (US\$5.00).
- Bulletin 11 (1979).** 393 p. Geology of Tin Deposits. A collection of papers presented at the International Symposium on 'Geology of Tin Deposits', 23-25 March 1978, Kuala Lumpur. Edited by C.H. Yeap. Price: M\$50.00 (US\$22.00).
- Bulletin 12 (1980).** 86 p. A collection of papers on geology. Edited by G.H. Teh. Price: M\$20.00 (US\$9.50).
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- Bulletin 17 (1984).** 371 p. A collection of papers on geology. Edited by G.H. Teh. Price: M\$35.00 (US\$17.00).
- Bulletin 18 (1985).** 209 p. Special Issue on Petroleum Geology. Edited by G.H. Teh & S. Paramanathan. Price: M\$30.00 (US\$14.00).
- Bulletin 19 (1986).** 652 p. GEOSEA V Proceedings Vol. 1. Fifth Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia, Kuala Lumpur, 9-13 April 1984. Edited by G.H. Teh & S. Paramanathan. Price for Bulletins 19 & 20: Members—M\$50.00 (US\$21.90), Non-members - M\$125.00 (US\$53.20).
- Field Guide 1.** A 7-day one thousand mile, geological excursion in Central and South Malaysia (West Malaysia and Singapore) (1973). 40 p. by C.S. Hutchison. Price: M\$5.00 (US\$2.50).
- Abstracts of papers.** Regional Conference on the Geology of Southeast Asia, Kuala Lumpur (1972). 64 p. 8 figs. 3 tables, many extended abstracts. Edited by N.S. Haile. Price: M\$6.00 (US\$3.00).
- Proceedings of the Workshop on Stratigraphic Correlation of Thailand and Malaysia Vol. 1: Technical Papers (1983).** 383 p. Price: M\$25.00 (US\$12.40). (Members: M\$12.00/US\$6.50).
- WARTA GEOLOGI** (Newsletter of the Geological Society of Malaysia). Price: M\$5.00 (US\$3.20) per bimonthly issue from July 1966.
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1988

June 1988 - August 1988

TECHNIQUES OF HYDROLOGIC INVESTIGATIONS (Washington, D.C. and Denver, Colorado, USA). Annual training course for international participants. For information: Office of International Hydrology, Water Resources Division, U.S. Geological Survey, 470 National Center, Reston, Virginia 22092, USA.

July 1988 - August 1988

SUMMER COURSE ON EARTH SCIENCES; CRYSTALLOGRAPHY, MINERALOGY, METALLOGENY (Madrid, Spain). Annual course organized by the Department of Geology and Geochemistry of the Universidad Autonoma de Madrid and sponsored by Unesco. Language: Spanish. For information: Prof. T. Monseur, Departamento de Geologia y Geoquimica, Facultad de Ciencias, Universidad Autonoma de Madrid, Canto Blanco, Madrid 34, Spain.

September 1988 - July 1989

PETROLEUM EXPLORATION GEOLOGY (Headington, Oxford, UK). An annual diploma course designed by Oxford Polytechnic to prepare post-graduate geologists for the duties of geologists in oil exploration teams. For information: M. Hoggins, Department of Geology and Physical Sciences, Oxford Polytechnic, Headington, Oxford OX3 0BP, U.K.

September 1988 - August 1989

MINERAL EXPLORATION AND EXPLORATION GEOPHYSICS (Delft, The Netherlands). Annual diploma courses organized by the International Institute for Aerial Survey and Earth Sciences and sponsored by Unesco. Language: English. For information: Student Registration Office, ITC (ME), P.O. Box 6, 7500 AA Enschede, The Netherlands.

October 1988 - November 1988

TECTONICS, SEISMOLOGY AND SEISMIC RISK ASSESSMENTS (Potsdam, East Germany). One-month training course organized annually by East German Academy of Sciences in collaboration with Unesco. Language: English. For information: Prof. Dr. H. Kautzleben, Director, Central Earth's Physics Institute, Academy of Sciences of the German Democratic Republic, Telegraphenberg, DDR-500 Potsdam, German Democratic Republic.

October 1988 - July 1989

ENGINEERING HYDROLOGY (Galway, Ireland). Annual diploma and post-graduate courses organized by the Department of Engineering Hydrology, University College Galway, Ireland. Sponsored by Unesco-IHP and the World Meteorological Organization. For information: Prof. J.E. Nash, Department of Engineering Hydrology, University College Galway, Galway, Ireland.

October 1988 - September 1989

HYDRAULIC ENGINEERING AND HYDROLOGY (Delft, The Netherlands). Diploma courses organized annually by the International Institute for Hydraulic and Environmental Engineering and sponsored by Unesco for professionals from developing countries. Language: English. For information: International Institute for Hydraulic and Environmental Engineering (IHE), Oude Delft 95, P.O. Box 3015, 2601 DA Delft, The Netherlands.

October 1988 - September 1990

FUNDAMENTAL AND APPLIED QUATERNARY GEOLOGY (Brussels, Belgium). Annually organized training course leading to a Master's degree in Quaternary Geology by the Vrije Universiteit Brussel (IFAQ) and sponsored by Unesco. Language: English. For information: Prof. Dr. R. Paepe, Director of IFAQ, Kwartairgeologie, Vrije Universiteit Brussel, Pleinlaan 2, B-1050, Brussels, Belgium.

October 1988 - September 1990

GEOLOGICAL EXPLORATION METHODS (Nottingham, U.K.). Two-year M.Sc. course starting every other year with emphasis on applied methodology, data acquisition and interpretations. For information: Dr. M.A. Lovell, Department of Geology, University of Nottingham NG7 2RD, U.K.

1989

May 1989

HYDROLOGY OF FRACTURED ROCKS (Montpellier, France). Annual three-week post-graduate course sponsored by Unesco. For information: Professeur C. Droque, Laboratoire d'Hydrogeologie, Universite des Sciences et Techniques du Languedoc, Place Eugene Bataillon, 34060 Montpellier, France.

August 1989 - June 1991

SOIL SCIENCE AND WATER MANAGEMENT (Wageningen, The Netherlands). A 2-year M.Sc. course organized by Agricultural University Wageningen. Course starts every other year. Language: English. For information: The Director of Studies of the M.Sc. Course in Soil Science and Water Management, P.O. Box 37, 6700 AA Wageningen, The Netherlands.

August 1989 - October 1989

GEOCHEMICAL PROSPECTING METHODS (Prague, Czechoslovakia). Certificate course organized every second year by the Geological Survey of Czechoslovakia and sponsored by Unesco, IAGC and Czechoslovakia. Language: English. For information: GEOCHIM Unesco CSSR, Geological Survey of Prague, Malostranske nam. 19, 11821 Prague 1, Czechoslovakia.

September 1989 - October 1989

GROUNDWATER TRACING TECHNIQUES (Graz, Austria). Five-week course organized every other year by the Institute of Technical Geology, Petrography and Mineralogy and sponsored by Unesco. Language: English. For information: Institute of Technical Geology, Petrography and Mineralogy of the University of Technology, Rechbauerstrasse 12, A-8010 Graz, Austria.

KALENDAR (CALENDAR)

1988

May 30 - June 3, 1988

INTERACTION BETWEEN GROUNDWATER AND SURFACE WATER (International Symposium), Lund, Sweden. (Prof. Dr. G. Lindh, Lund Inst. of Technology, S-22007 Lund, Sweden).

May 31 - June 4, 1988

SEISMIC ANISOTROPY IN THE EARTH'S CRUST (AGU Chapman Conference), Berkeley, Calif., USA. (AGU Meetings, 2000 Florida Av, NW., Washington, D.C. 20009, USA).

June 1-5, 1988

CASE HISTORIES IN GEOTECHNICAL ENGINEERING (2nd International Conference and GSA Penrose Conference), St. Louis, Missouri, USA. (Shamsher Prakash, Room 308, Department of Civil Engineering, University of Missouri, Rolla, MO 65401, USA).

June 5-10, 1988

ENERGY '88 (2nd International Congress), Tiberias, Israel. Language: English. (Miriam Malz Exhibition Services Ltd., 30 Hey B'iyar Street, 62988 Tel-Aviv, Israel).

June 21-24, 1988

FLUID FLOW, HEAT TRANSFER AND MASS TRANSPORT IN FRACTURED ROCKS (4th Canadian/American Conference), Banff, Alberta, Canada. (Dr. Claude M. Sauveplane, ARC, P.O. Box 8330, Station F, Edmonton, Alberta, Canada T6H 5X2).

July 9-15, 1988

MINERALS AND EXPLORATION AT THE CROSSROADS (Annual Conference Australasian Institute of Mining and Metallurgy), Sydney, NSW, Australia. (Bicentenary Conference, c/o The Aus IMM, P.O. Box 122, Parkville, Victoria 3052, Australia).

July 10-15, 1988

LANDSLIDES (5th International Symposium), Lausanne, Switzerland. (C. Bonnard, P.O. Box 83, CH-1015, Lausanne 15, Switzerland).

July 11-16, 1988

GEOCHEMICAL EVOLUTION OF THE CONTINENTAL CRUST (IAGC Conference), Sao Paulo, Brazil. Language: English. (Dr. A.J. Melfi, Institute of Astronomy and Geophysics, University of Sao Paulo, C.P. 30627, Sao Paulo 01000, Brazil).

July 18-20, 1988

RADIOLARIA (International Conference), Marburg, F.R.G. (Prof. Dr. R. Schmidt-Effing, Internad - Conference, Department of Geosciences, Philipps Universitat, Lahnberge, D-3550 Marburg, Federal Republic of Germany; or Dr. J.R. Blueford, U.S. Geological Survey, 345 Middlefield Road, MS 144, Menlo Park, Ca. 94025, USA).

July 18-22, 1988

GONDWANA (7th International Symposium), Sao Paulo, Brazil. Co-sponsored by IUGS (A.C. Rocha-Campos, Instituto de Geociencias, Universidade de Sao Paulo, C.P. 20899, Sao Paulo, SP, Brazil).

July 25-29, 1988

FOSSIL CNIDARIA (5th International Symposium), Brisbane, Australia. (Dr. J.S. Jell, Department of Geology and Mineralogy, University of Queensland, St. Lucia, Queensland 4067, Australia).

July 25-29, 1988

OSTRACODA AND GLOBAL EVENTS (10th International Symposium), Aberystwyth, Wales, U.K. (Dr. R.C. Whatley, Micropalaeontology Division, Department of Geology, University College of Wales, Aberystwyth, Dyfed SY23 3DB, Wales, U.K.)

July 30 - August 4, 1988

SEDIMENTOLOGY RELATED TO MINERAL DEPOSITS (IAS International Symposium), Beijing, P.R. China. Co-sponsored by IGCP 219 and 226. Language: English. (Dr. Wang Shousong, IAS International Symposium, c/o Institute of Geology, Academia Sinica, P.O. Box 634, Beijing, P.R. China).

August 1988

GEOLOGICAL MAPS OF THE WORLD (3rd Exhibition), Edinburgh, Scotland. (Mr. D.H. Land, Hon. Secretary, Edinburgh Geological Society, c/o British Geological Survey, Murchison House, West Mains Road, Edinburgh EH9 3LA, Scotland, UK).

August 9-12, 1988

ORDOVICIAN SYSTEM (5th International Symposium), St. John's, Newfoundland, IUGS Subcommission on Ordovician Stratigraphy and IGCP 216. (Dr. C.R. Barnes, ISOS, Department of Earth Sciences, Memorial University, St. John's, Newfoundland, Canada A1B 3X5).

August 14-19, 1988

THE ORIGIN AND EVOLUTION OF ANORTHOSITES AND ASSOCIATED ROCKS (GSA Penrose Conference), Chugwater, Wyoming, USA. (B. Ronald Frost, Department of Geology, University of Wyoming, P.O. Box 3006 University Station, Laramie, WY 82071, USA).

August 28 - September 2, 1988

INTERNATIONAL PALYNOLOGICAL CONGRESS (7th), Brisbane, Australia. (Dr. John Rigby, Conventions Department, P.O. Box 489, G.P.O., Sydney, NSW 2001, Australia).

August 28 - September 2, 1988

CLAY (AIPEA 9th International Conference), Strasbourg, France. (Dr. Helene Paquet, 9th International Clay Conference, Institut de Geologie, 1 rue Blessig, F-67084 Strasbourg Cedex, France).

August 29 - September 2, 1988

GEOCHEMISTRY AND COSMOCHEMISTRY (European Association of Geochemistry International Congress), Paris, France. (Pr. C.J. Allegre, Laboratoire de Geochimie et Cosmochimie, 4 place Jussieu, Tous 14-15, 3 eme etage, 75252 Paris Cedex, France).

September 5-9, 1988

PETROLOGY AND GEOCHEMISTRY OF GRANULITES AND RELATED ROCKS (International Workshop), Clermont-Ferrand, France. (Drs. D. Vielzeuf and Ph. Vidal, Departement de Geologie, 5 rue Kessler, 63038 Clermont-Ferrand, France).

September 5-9, 1988

FISSION TRACK DATING (6th International Congress), Besancon, France. (Laboratoire de Microanalyses nucleaires, UER Sciences et Techniques, La Bouloie, Route de Gray, 25030 Besancon Cedex, France).

September 5-9, 1988

GEOSTATISTICS (3rd International Congress), Avignon, France. Languages: English and French. (Geostat Congress 1988, Centre de Geostatistique, 35 rue Saint-Honore, 77305 Fontainebleau, France).

September 5-10, 1988

FAN DELTAS (International Workshop), Calabria, Italy. Sponsored by IAS. (Dr. Albina Colella, Dipartimento di Scienze della Terra, Universita della Calabria, 87030 Castiglione Cosentino SC. (CS), Italy).

September 6-10, 1988

GEOCHEMISTRY AND MINERALIZATION OF PROTEROZOIC MOBILE BELTS (International Symposium), Beijing, P.R. China. Partly co-sponsored by IGCP-217 and IGCP National Committee of China. Languages: English and Chinese. (Prof. Sun Dazhong, Tianjin Institute of Geology and Mineral Resources, CAGS, No. 4, 8th Road, Dazhigu, Tianjin 300170, P.R. China).

September 7-10, 1988

ASIAN MARINE GEOLOGY (International Conference), Shanghai, P.R. China. Co-sponsored by IUGS Commission for Marine Geology. (Prof. Wang Pinxian, Department of Marine Geology, Tongji University, Shanghai 200092, P.R. China).

September 19-23, 1988

ENGINEERING GEOLOGY AS RELATED TO THE STUDY, PRESERVATION OF ANCIENT WORKS, MONUMENTS AND HISTORICAL SITES (IAEG International Symposium), Athens, Greece. Languages: English, French, and Greek. (Greek Committee of Engineering Geology, 1988 Symposium Secretariat, P.O. Box 19140, GR-117 10 Athens, Greece).

September 20-22, 1988

BARITE (Symposium), Kutna Hora, Czechoslovakia. (Geological Survey /OUG/Symposium Barite, Malostranske nam. 19, 118 21 Praha 1, Czechoslovakia).

September 20-23, 1988

METAMORPHISM AND CRUSTAL EVOLUTION (International Symposium), Changchun, P.R. China. Languages: English and Chinese. (Yan Hongquan, Changchun College of Geology, Changchun, Jilin, P.R. China).

September 25-28, 1988

MEDITERRANEAN BASINS (AAPG European Geological Conference & Exhibition), Nice, France. (AAPG Convention Department, Box 979, Tulsa, Ok 74101, USA).

September 26-29, 1988

THE APPLICATION OF GEOLOGY IN THE DEVELOPING COUNTRIES (International Conference), Nottingham, U.K. Co-sponsored by AGID. (Conference Secretariat, Dept. of Geology, University of Nottingham, Nottingham, NG7 2RD, U.K.).

October 1988

COAL RESEARCH (International Conference), Tokyo, Japan. (Dr. W.G. Jensen, International Committee for Coal Research, Bte 11, B-1150 Brussels, Belgium).

October 1-3, 1988

NEOTECTONICS (INQUA Colloquium), Orleans, France. (J. Fourniguet, BRGM/SGN, B.P. 6009, 45060 Orleans Cedex 2, France).

October 11-17, 1988

GEOLOGY '88, CHINA (International Exhibition), Beijing, P.R. China. (M.C. Morley-Hall, SHK International Services Ltd., 3/F Prince Rupert House, 64 Queen Street, London EC4R 1AD, England, UK).

October 12, 1988

HYDROTHERMAL PROCESSES IN VOLCANIC TERRANES (Joint Meetings: Geological Society of London and Mineralogical Society of Great Britain), Cardiff, Wales, U.K. (Dr. R.E. Bevins, Department of Geology, National Museum of Wales, Cardiff CF1 3NP, UK).

October 23-28, 1988

MINE WATER (3rd International Congress), Melbourne, Australia. (Australasian Institute of Mining and Metallurgy, P.O. Box 122, Parkville, Victoria 3052, Australia).

October 30 - November 3, 1988

SOCIETY OF EXPLORATION GEOPHYSICISTS (Annual Meeting), Anaheim, California, USA. (Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, Ok. 74101, USA).

October 31 - November 3, 1988

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), Denver, Colorado, USA. (Meetings Department, GSA, P.O. Box 9140, Boulder, Co. 80301, USA).

November 1988

GLOBAL GEOSCIENCE TRANSECTS (ICL Symposium and Workshops), Belem, Brazil. (J. Monger, Geological Survey, 100 W. Pender Street, Vancouver, B.C., Canada V6B 1R8).

November 10-14, 1988

EXPLORATION AND DEVELOPMENT OF GEOTHERMAL RESOURCES (Meeting), Kumamoto and Beppu, Japan. (Geothermal Research Society, c/o Geological Survey of Japan, 1-1-3 Higashi, Yatabe, Tsukuba, Ibaraki 305, Japan).

November 21-24, 1988

SILVER-EXPLORATION, MINING AND TREATMENT (Conference), Mexico City. (IMM Conference Office, 44 Portland Place, London W1N 4BP, U.K.).

1989

January 1989

SOIL MECHANICS AND FOUNDATION ENGINEERING (12th International Conference), Rio de Janeiro, Brazil. (XII ICSMFE, Caixa Postal 1559, 20000 Rio de Janeiro, PJ, Brazil).

January 15-27, 1989

OMAN OPHIOLITE-STRUCTURE-PETROLOGY-STRATIGRAPHY (International Symposium), Muscat, Sultanate of Oman. (Secretary, Hilal Azry, Ministry of Petroleum and Minerals, P.O. Box 551, Muscat, Oman).

February 8-11, 1989

MODEL OPTIMIZATION IN EXPLORATION GEOPHYSICS (7th International Seminar), Berlin. (Institut für Geophysikalische Wissenschaften, Mathematische Geophysik, Freie Universität Berlin, Podbielskiallee 60, D-1000 Berlin 33, Federal Republic of Germany).

February 28-March 3, 1989

APPLICATION OF COMPUTERS AND OPERATIONS RESEARCH IN THE MINERAL INDUSTRY (21st International Symposium), Las Vegas, Nev., USA. (Society of Mining Engineers, Caller No. D, Littleton, Co. 80162-5002, USA).

March 28 - April 9, 1989

SILURIAN SYSTEM (International 'Murchison' Symposium), Keele, Staffs., U.K. Co-sponsored by the IUGS Subcommittee on Silurian Stratigraphy. (Dr. M.G. Bassett, National Museum of Wales, Cathays Park, Cardiff CF1 3NP, Wales, UK).

May 17-18, 1989

GOLD IN EUROPE (International Conference), Toulouse, France. (R.P. Foster, Department of Geology, University of Southampton, Hants, SO9 5NH, U.K.).

June 26-29, 1989

ENGINEERING GEOLOGY IN TROPICAL TERRAINS (International Conference), Selangor Darul Ehsan, Malaysia. Co-sponsored by IAEG. (Secretariat, International Conference, Dept. of Geology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor Darul Ehsan, Malaysia).

July 9-19, 1989

INTERNATIONAL GEOLOGICAL CONGRESS (28th), Washington, D.C., USA. (International Geological Congress, P.O. Box 1001, Herndon, Va. 22070, USA).

July 27-August 1, 1989

WATER-ROCK INTERACTION (6th International Symposium), Bath, U.K. (Dr. W.M. Edmunds, Hydrogeology Group, BGS, Maclean Building, Crowmarsh Gifford, Wallingford, Oxfordshire, OX10 8BB, U.K.).

August 14-15, 1989

PRECAMBRIAN GRANITOIDS: PETROGENESIS, GEOCHEMISTRY AND METALLOGENY (IGCP 217 and 247 Symposium), Helsinki, Finland. (Precambrian Granitoids Symposium, Department of Geology, University of Helsinki, P.O. Box 115, SF-00171 Helsinki, Finland).

September 3-9, 1989

GEOMORPHOLOGY (2nd International Conference), Frankfurt/Main, F.R.G. (Prof. Dr. Arno Semmel, Institut für Physische Geographie, Universität Frankfurt, Senckenberganlage 36, Postfach 11 19 37, D-6000 Frankfurt/Main, F.R. Germany).

September 4-8, 1989

NON-METALLIC MINERALS (2nd World Congress), Beijing, P.R. China. (Prof. Xu Changyou, Wuhan University of Technology, Wuhan, Hubei Province, P.R. China).

September 14-19, 1989

EDITING IN THE 90'S (Joint CBE, EASE, AESE Meeting), Ottawa, Ontario, Canada. (Barbara Drew, Research Journals, National Research Council of Canada, Ottawa, Ontario, Canada K1A 0R6).

September 17-24, 1989

ENERGY (14th World Congress), Montreal, Quebec, Canada. (World Energy Conf., 34th St. James's Street, London SW1A 1HD, UK).

October 2-4, 1989

GEOCHEMICAL EXPLORATION (13th International Symposium), Rio de Janeiro, Brazil. Co-sponsored by AEG. (Organizing Committee, 13th IGES, P.O. Box 2432, 20010 Rio de Janeiro, Brazil).

October 2-4, 1989

FLUVIAL SEDIMENTOLOGY (4th International Conference), Barcelona, Spain. (C. Puigdefabregas, Servei Geològic de Catalunya, carrer Diputació 92, 08015 Barcelona, Spain).

October 29 - November 2, 1989

SOCIETY OF EXPLORATION GEOPHYSICISTS (Annual Meeting), Dallas, Texas, USA. (Convention Assistant, SEG, P.O. Box 3098, Tulsa, Ok. 74101, USA).

November 9-12, 1989

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), St. Louis, Missouri, USA. (Meetings Department, GSA, P.O. Box 9140, Boulder, Co. 80301, USA).

1990

August 1990

INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS (8th Symposium), Ottawa, Canada. (Dr. R.W. Boyle, Geological Survey of Canada, 601 Booth Street, Ottawa, Canada K1A 0E8).

August 12-18, 1990

INTERNATIONAL MINERALOGICAL ASSOCIATION (15th Meeting), Beijing, China. (Prof. Huang Yunhui, Institute of Mineral Deposits, Chinese Academy of Geological Sciences, Baiwanzhuang Rd. 26, Fuchengmenwai, Beijing, China).

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

General Information

The Society publishes the *Buletin Persatuan Geologi Malaysia* (Bulletin Geological Society of Malaysia) and the *Warta Geologi* (Newsletter of the Geological Society of Malaysia) which is issued bimonthly.

Papers of general interest or on the geology of the Southeast Asian region (South China, Burma, Thailand, Indochina, Malaysia, Singapore, Indonesia, Brunei and the Philippines) and also marine areas within the region are welcome for publication in the *Bulletin*. Short notes, progress reports and general items of information are best submitted to the *Warta Geologi*.

Papers should be as concise as possible. However, there is no fixed limit as to the length and number of illustrations. Therefore, papers of monograph length are also welcome. Normally, the whole paper should not exceed 30 printed pages and it is advisable that authors of papers longer than 30 printed pages should obtain the consent of the Editor before submission of the papers.

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Figure captions must be typed on a separate sheet of paper. The captions must not be drafted on the figures.

Original maps and illustrations or as glossy prints should ideally be submitted with sufficiently bold and large lettering to permit reduction to 15 × 22 cm; fold-outs and large maps will be considered only under special circumstances.

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Reference cited in the text should be listed at the end of the paper and arranged in alphabetical order and typed double-spaced. The references should be quoted in the following manner:

Suntharalingam, T., 1968. 'Upper Palaeozoic stratigraphy of the area west of Kampar, Perak. *Geol. Soc. Malaysia Bull.*, 1, 1-15.

Hosking, K.F.G., 1973. Primary mineral deposits. In Gobbett, D.J. and Hutchison, C.S. (Eds), "*Geology of the Malay Peninsula (West Malaysia and Singapore)*". Wiley-Interscience, New York, 335-390.

The name of the book or publication must be underlined and will be later printed in italics.

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