

## PERSATUAN GEOLOGI MALAYSIA

## WARTA GEOLOGI

## NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

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DIKELUARKAN DWIBULANAN  
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# CATATAN GEOLOGI

## (GEOLOGICAL NOTES)

### A FURTHER NOTE TO THE WING SANG CHEONG TIN MINE, IPOH, PERAK - OBSERVATIONS OF TIN MINERALIZATION ALONG A NEW ROAD CUTTING

P.C. AW, Geological Survey of Malaysia, P.O. Box 1015, Ipoh, Perak.

#### Abstract

*Excavation for road construction has uncovered tin mineralization which is dated to be late Triassic in age. There are a number of N-S striking quartz veins with diffuse borders in altered granite. Some of them are rich in cassiterite which has been recovered by tin-fossickers. Field observations indicate that the cassiterite veins were formed by fracture-filling with accompanying wall rock alteration probably in a high temperature hydrothermal environment. Soil geochemistry may be an effective technique in detecting any sub-outcropping mineralized veins in the nearby residual soil.*

#### Introduction

In an earlier note on the Wing Sang Cheong Tin Mine (Aw, 1983) it was stated that the Government had re-possessed part of the leased area for the construction of a new north-south highway. Construction of the highway began in October 1983. A new road cutting about 250 m to the south of the mine has exposed a number of mineralized cassiterite veins which have been exploited by 'tin fossickers'.

The 'tin fossickers' became aware of this 'hidden treasure' towards the end of 1983. There were about a dozen of them who began by panning the residual soil and later followed by chipping and chiseling the mineralized veins uncovered by blasting of rocks (Plates 1 to 4). According to some fossickers, more than (> 5,000 kgs) M\$100,000/- worth of tin-ore has been recovered by them. In fact, one of them stated that his best recovery, in association with another co-worker, was about 1 pikul (60.5 kg) of tin-ore per day.

The purpose of this note is to describe some of the author's field observations on the tin mineralization, which is an extension of the mineralized veins from Wing Sang Cheong Mine. The efficient role of the tin fossickers in the recovery of cassiterite from sub-economic/small-but-rich deposits in granite is also discussed.

#### Location and Access

The road cutting can be reached either via the mine or by the new Ipoh - Changkat Jering highway, at the 5 km-stone Ipoh - Kuala Kangsar road (Figure 1).



Plate 1: Eastern half of the roadcutting. Foreground shows a number of tin-fossickers at work. Note about 30 m thick of residual soil has been removed (background).



Plate 2: Close-up tin-fossickers at work on a N-S mineralized vein.

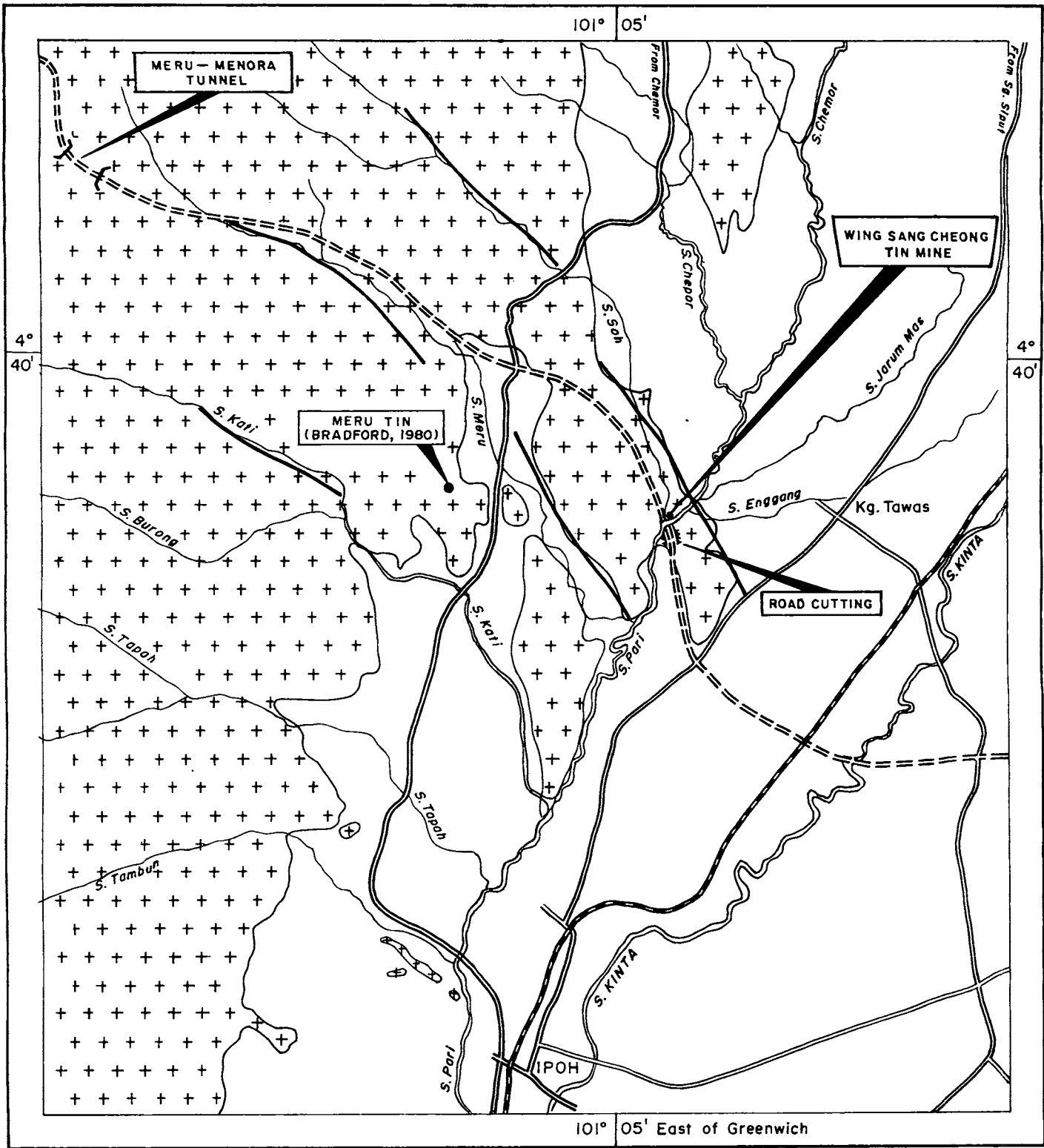




Plate 3: Detached cassiterite-bearing rock is pulverized with a hammer to liberate the cassiterite from the gangue.



Plate 4: Panning to separate the cassiterite from the gangue.



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Figure 1: General geology and location of road cutting south of Wing Sang Cheong Tin Mine, Ipoh.

## Geology

The rock at the roadcut is granite which is part of a linear 4 km long stock, an off-shoot of the Keladang granite batholith. The stock intrudes into marble and other metasediments (Ingham & Bradford, 1960). Marble is exposed in an old mine hole about 450 m to the north.

The fresh granite is similar to that exposed in Wing Sang Cheong Tin Mine. It is a medium- to coarse-grained, slightly porphyritic biotite granite. The rock is jointed, with the major joint striking  $330^{\circ}$  and dipping at  $75^{\circ}$  -  $85^{\circ}$  to the northeast. Some of the major joints are lined with black tourmaline veins.

The granite consists mainly of quartz, microcline-perthite, plagioclase and biotite. Perthite displays a variable degree of cloudiness. The clay minerals from the inner part of the feldspar megacrysts are found (by XRD) to be mainly montmorillonite and kaolin (Gan A.S. & Leong K.H., Geological Survey Malaysia, personal communication). Biotite is invariably chloritized, with some altered to muscovite. Plagioclase commonly shows spot alteration to sericite. The common secondary minerals are chlorite, sericite, muscovite, quartz and tourmaline. Pyrite and arsenopyrite occur erratically. Fluorite is rare.

Minerals commonly associated with cassiterite are quartz, tourmaline, sericite/muscovite, chlorite, pyrite and arsenopyrite.

## Tin Mineralization

There are a number of parallel greisen-bordered veins within a minimum exposed zone of about 40 m wide. The veins strike N-S and dip steeply at  $70^{\circ}$  to  $85^{\circ}$  to the east. The longest vein which could be measured is about 40 m, with a probable extension for another 40 m to the south. Other exposed veins are about 2 to 3 m in length. The width of individual veins ranges from about 2 cm to 30 cm (Figure 2).

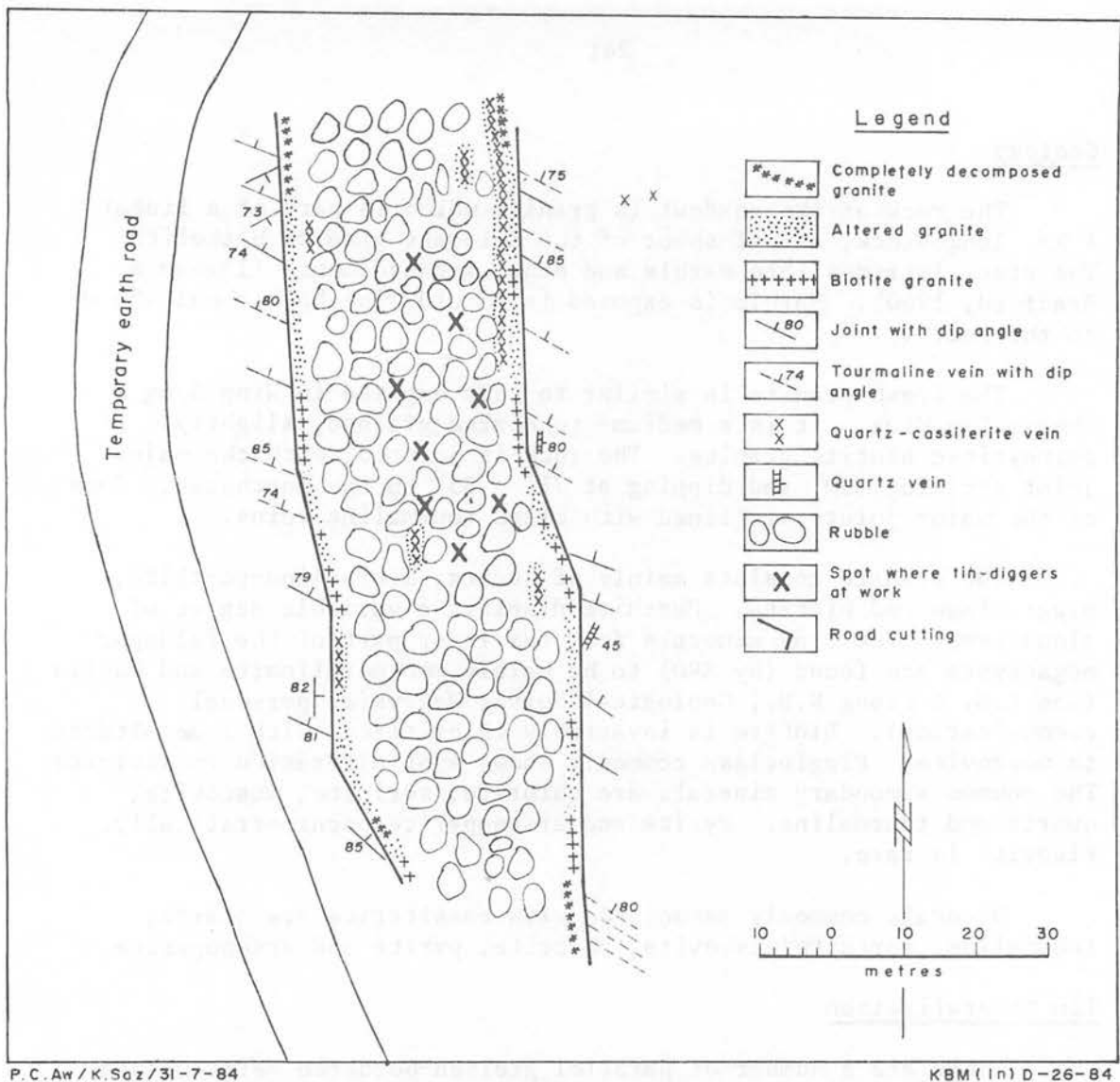
The *modus operandi* of the 'tin fossickers' is most revealing in relation to tin mineralization. They looked for 'white rock' but searched for tin-ore in the 'dark rock'. This simple truth is borne out by the author's observations.

Cassiterite is found associated with quartz (white rock), but it is not commonly found within it (Plate 5). It occurs commonly in the altered granite in proximity to the vein quartz.

Most of the cassiterite-bearing quartz veins have diffuse (or imperceptible) borders with the altered granite. Quartz veins with well-defined borders, on the other hand, are generally barren of cassiterite.

It was also observed that most of the cassiterite is on the 'footwall' of the quartz vein. The 'hanging wall' has little or no cassiterite (Figure 3).

The texture of the altered granite in close proximity to the cassiterite is variable and mostly totally destroyed. Cassiterite is normally in contact with quartz on one side, and patches of



P. C. Aw / K. Sez / 31-7-84

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Figure 2: Primary tin mineralization exposed along road cutting south of Wing Sang Cheong Tin Mine, Ipoh.



Plate 5: Easterly dipping quartz vein in altered granite. The cassiterite is concentrated on the 'footwall' on the left. Foreground shows the water-filled pit where cassiterite has been removed by tin-fossickers.



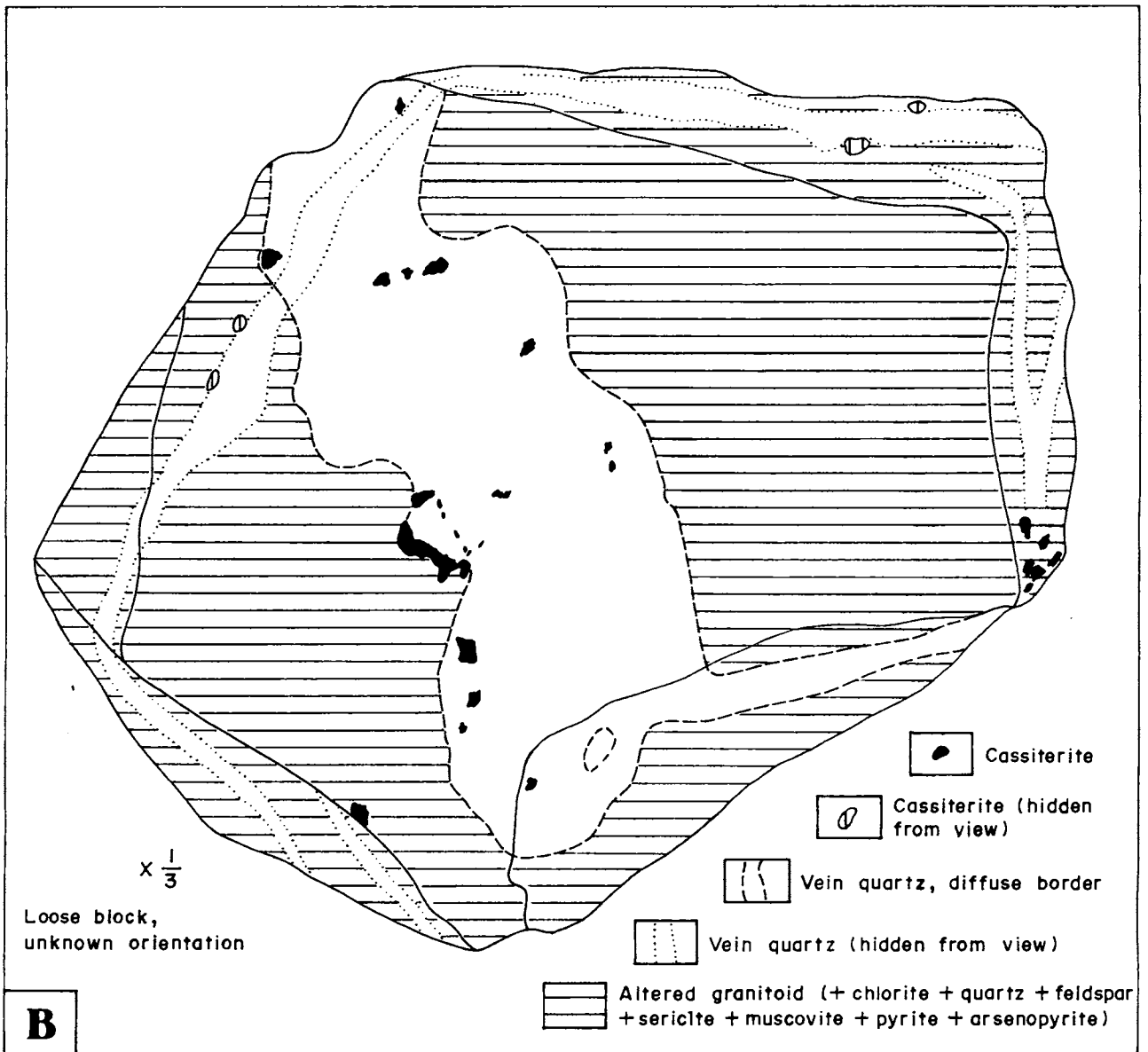
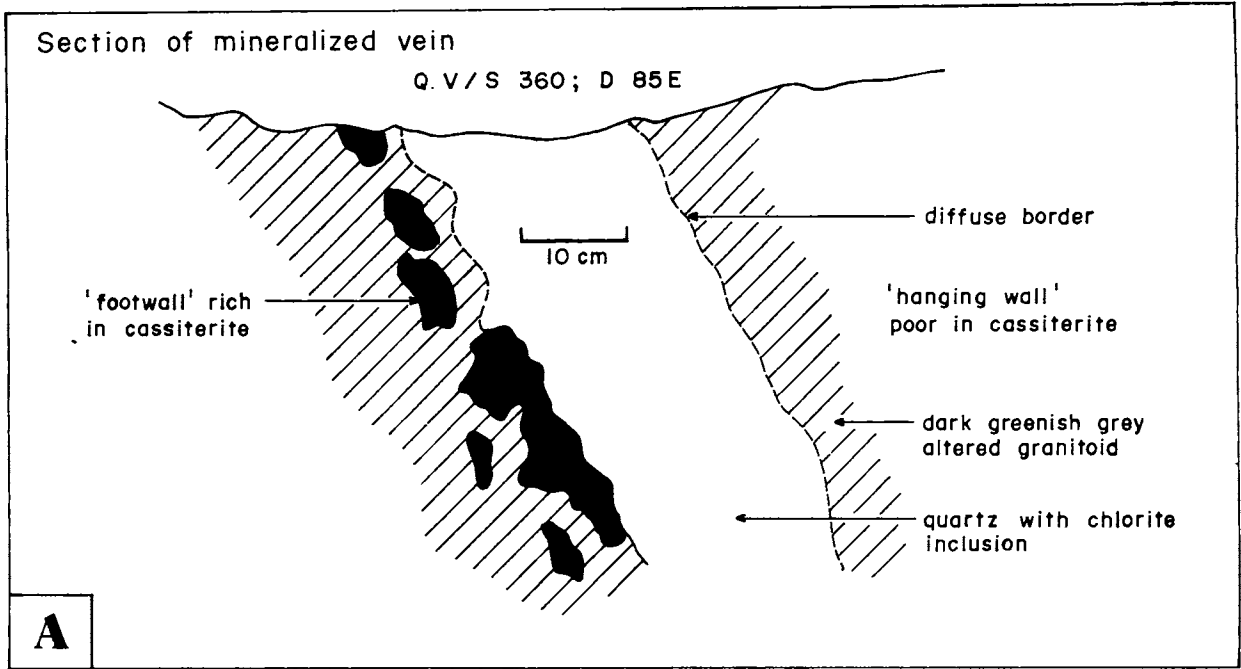


Figure 3: Spatial relationship between cassiterite, vein quartz and altered granitoid.

chlorite, tourmaline-chlorite-sericite or chlorite-muscovite on the other side. Sulphides if present, occur in the fractures of the other minerals including cassiterite.

The age of mineralization is probably late Triassic. K/Ar age determination on muscovite associated with cassiterite gave a figure of  $200 \pm 2$  m.y. (Yap & Kwan, 1984).

## Discussion

### Role of tin fossickers

The discovery of this tin deposit was accidental. It was found indirectly as a result of rock excavation for road construction. If it has not been for the watchful eyes of the fossickers, the exposed mineralized veins would not have been discovered and the tin ore would have formed part of road building material. This note also would have seen the light of print!

Although the fossickers recovered most of the ore they could find, they must necessarily be selective. They normally chip out rocks containing coarse-grained cassiterite, leaving behind cassiterite of less than 1 cm diameter. Cassiterite-bearing rocks such as shown in Figure 3B were ignored by the fossickers.

Although no estimate can be made, the author believes substantial amount of tin-ore still remains under the road cutting. According to one of the fossickers, rock blasting at the road cutting caused a cave-in below the surface. This could be due to the collapse of the underground adit of the old French mine referred to in the author's earlier note (Aw, 1983). If this is so, the mineralized veins exposed by the road cut are the upper extensions of the same vein system which was mined. As the former underground mine ceased operation prematurely due to an accident, it is likely some tin-ore may still be present. However, with the construction of the highway over it, it is very unlikely that the remaining tin-ore will ever be exploited.

The discovery of primary tin mineralization by rock excavation substantiates the author's earlier proposition that quarrying of granite in the Kinta Valley may lead to the uncovering of primary tin deposits (Aw, 1983). Such deposits are likely to be sub-economic by normal mining practices. However, tin fossickers can be effectively employed to recover the cassiterite from such deposits.

### Type of tin deposit

The tin deposit under discussion may be classified as quartz-cassiterite type (after Smirnov, from Taylor, 1979) or greisen-bordered veins (Hosking, 1974).

Field observations show that the cassiterite mineralized veins were probably formed under high temperature hydrothermal environment. The spatial relation of the cassiterite with the diffuse bordered quartz veins and the altered granite indicate the mineralization is by fracture in-fillings with accompanying wall rock alterations.

The observation of rich concentration of cassiterite along the

'footwall' of diffuse bordered quartz veins shows that there is a time lag in the formation of cassiterite and quartz. The vein quartz seems to have already been in place before the formation of cassiterite below it.

On the other hand, the distinct bordered quartz veins which are relatively poor in cassiterite are inferred to form at a lower temperature when it is less reactive and when most of the cassiterite has been deposited.

### Search for tin deposit

The mineralized veins from the Wing Sang Cheong Tin Mine and from the road cutting appear to be along the same N-S alignment. Air photograph interpretation shows that they may be located along a lineament (Lai K.H., Geological Survey Malaysia, personal communication).

Another primary tin deposit in granite, which occurs about 2½ km to the west of the road cut at Meru, was mined in 1957 (Bradford, 1980).

There are in addition a few other granitic stocks in the surrounding area. Some of them are also bordered by lineaments (Figure 1).

These granitic stocks form linear hillocks. The residual soil cover of some of them is still relatively undisturbed. Structural analysis followed by geochemical soil sampling may help to locate any sub-outcropping mineralized veins (Figure 4).

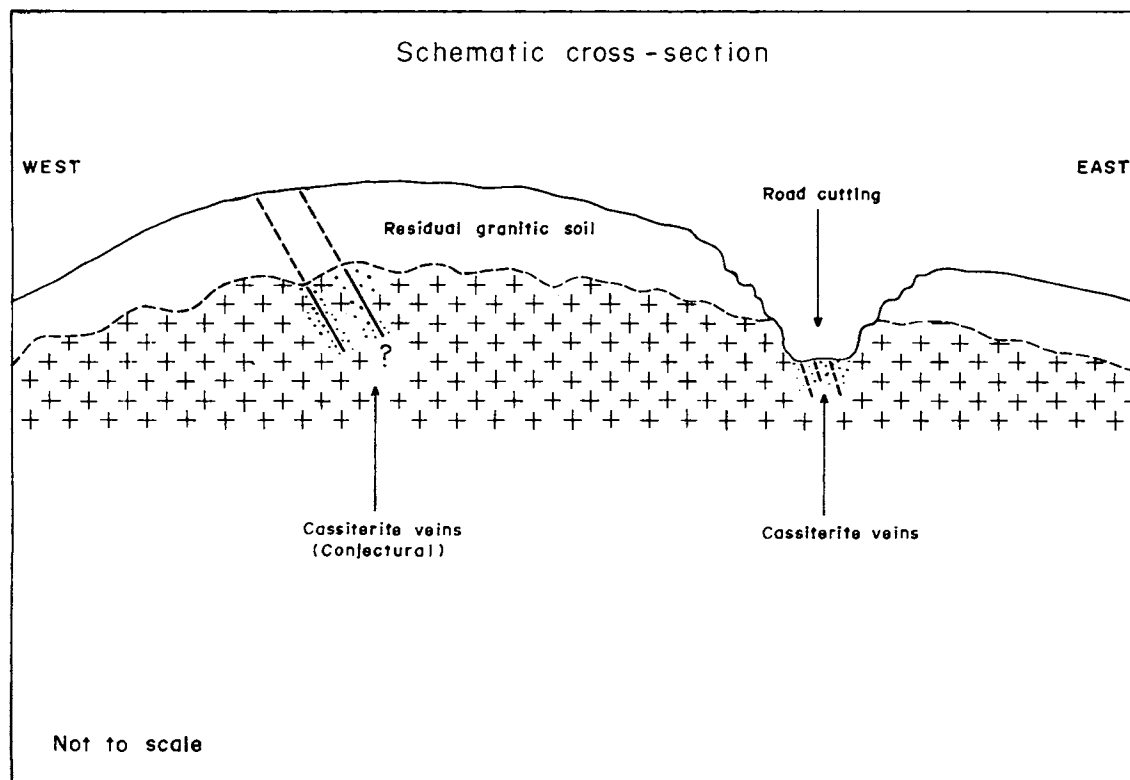


Figure 4: Schematic cross-section of the granite stock across the road cutting.

## Conclusion

Rock excavation for road construction has uncovered some rich cassiterite veins which have been efficiently recovered by tin fossickers. The N-S striking veins in altered granite seem to form part of the same mineralized vein system as that of Wing Sang Cheong Mine. Textural features observed indicate that the cassiterite veins were probably formed in high temperature hydrothermal environment. The K/Ar age determination shows that the mineralization is late Triassic.

## Acknowledgements

I thank my colleagues, Messrs F. Chand, S.S. Rajah and L.H. Chu for their critical comments on the paper and Messrs Mohd. Sani Adnan and Eh Noi for their field assistance.

## References

- Aw, P.C., 1983. Wing Sang Cheong Tin Mine, Ipoh, Perak - a case study of mining and quarrying on the same site. Warta Geologi, 9, 141-151, Geol. Soc. Malaysia.
- Bradford, E.F., 1980. Geology and mineralization of the Meru Section, Meru Tin Limited, Jelapang, Perak. Geological Survey Malaysia, Geological Papers. Volume 3, 38-44.
- Hosking, K.F.G., 1974. The search for deposits from which tin can be profitably recovered now and in the foreseeable future. Fourth World Conference on Tin. Volume I, 21-84. The International Tin Council.
- Ingham, F.T. & Bradford, E.P., 1960. The geology and mineral resources of the Kinta Valley, Perak. Geological Survey Malaysia, Memoir 9.
- Taylor, R.G., 1979. Geology of tin deposits. Elsevier Scientific Publishing Co.
- Yap, F.L. & Kwan, T.S., 1984. Age of cassiterite mineralization near Wing Sang Cheong Tin Mine, Ipoh. Warta Geologi, Vol. 10, No. 6, p. 247-248.

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Permission to publish this paper is given by the Director-General, Geological Survey of Malaysia.

## AGE OF CASSITERITE MINERALIZATION NEAR WING SANG CHEONG TIN MINE, IPOH.

F.L. YAP and T.S. KWAN, Geological Survey of Malaysia, P.O. Box 1015, Ipoh, Perak, Malaysia.

Cassiterite mineralization exposed at a roadcutting (map reference qY 441144 Sht. 54) in the Gunung Kledang pluton south of Wing Sang Cheong Tin Mine has been described by Aw (1984). Greisen bordering two cassiterite mineralized veins at the roadcut were sampled and the muscovite separated out using the usual methods of grinding under alcohol followed by shaking table and magnetic separation. Argon was extracted in a system essentially similar to that described by Flisch (1982) and isotopic abundances measured in a Micromass 1200 mass spectrometer operated in the static mode. Potassium was determined by flame photometry with an Instrumentation Laboratory Model II. 443 Flame Photometer using Li as an internal standard.

K-Ar analysis on the two samples gave the following results:

Table 1: K-Ar age of muscovite from greisen

Sample No.	% K *	$^{40}\text{Ar}$ rad $\times 10^{-6}$ Cm <sup>3</sup> STP/g	% rad	Age ** (m.y.)
1	8.57	71.21	98.1	202 $\pm$ 6
2	8.80	71.43	96.0	198 $\pm$ 6

Mean age of muscovite: 200  $\pm$  2 m.y.

The two muscovites gave ages of 202  $\pm$  6 and 198  $\pm$  6 m.y. with a mean age of 200  $\pm$  2 m.y. The K-Ar blocking temperature for muscovite has been estimated at 350°C (Purdy and Jaeger, 1976). Fluid inclusions studies and other geothermometry studies show that the deposition temperature of cassiterite is in the range of 510°C to 410°C (Sawkins, 1966; Kelly & Turneaure, 1970). This leads to the conclusion that the mean K-Ar age of 200  $\pm$  2 m.y. for the muscovite dates the cassiterite mineralization. If the cassiterite mineralization was younger than the muscovite, the K-Ar clock would have been reset at the time of cassiterite deposition anyway.

\* Potassium analysis by S.K. Lum

\*\* Decay constants as recommended by Steiger and Jaeger (1977)



The age of the Gunung Kledang Pluton itself has not been established to any degree of reliability. Bignell and Snelling (1977) state that the pluton was probably emplaced between 235-205 m.y. ago. However, they report a K-Ar biotite age of  $207 \pm 6$  m.y. from the Papan Quarry to the south. As this is indistinguishable from the age of the greisen, it is likely that the tin mineralization is genetically related to the granite and is a late stage event in the emplacement of the Gunung Kledang pluton.

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#### Rereferences

- Aw, P.C., 1984. A further note to Wing Sang Cheong Tin Mines, Ipoh, Perak - Observation of tin mineralization along new road cutting. Warta Geologi, Geol. Soc. Malaysia, vol. 10, no. 6, 237-246.
- Bignell, J.D. and N.J. Snelling, 1977. Geochronology of Malayan granites. Overseas Geol. and Miner Resour. No. 47.
- Kelly, W.C. and F.S. Turneure, 1970. Mineralogy paragenesis and geothermometry of tin and tungsten of the eastern Andes, Bolivia. Econ. Geol. 65, 609-680.
- Flisch, M., 1982. Potassium - argon analysis. In G.S. Odin (Ed.) Numerical Dating in Stratigraphy. J. Wiley, 151-158.
- Purdy, J.W. and E. Jaeger, 1976. K-Ar ages on rock-forming minerals from the Central Alps. Mem. Inst. Geol. Min. Univ. Padova Vol. XXX.
- Sawkins, F.J., 1966. Preliminary fluid inclusion studies of the mineralization associated with the Hercynian granites of S.W. England. Trans. I.M.M. 75 B., 109-112.
- Steiger, R.H., & E. Jaeger, 1977. Subcommittee on Geochronology: convention on the use of decay constants in geochronology and cosmochronology. Earth Planet. Sci. Lett. V. 36, 359-362.

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## NOTES ON THE NATURE OF 'GARAM BUKIT' - A MALAY FOLK MEDICINE

T.T. KHOO, Jabatan Geologi, Universiti Malaya, Kuala Lumpur.

### Introduction

One of the more interesting features of the Malaysian market scene or any potentially crowded place is the varied and often exotic business activities which go on by the road side or five-foot ways of shophouses. As many Malaysians are health conscious, invariably those businesses which attract sizeable crowds are those setting medicine ranging from the patented to the home-brewed or from animal to herbal. From one of these in the Chow Kit Market, Kuala Lumpur, Encik Sharif Taha a student from University of Malaya bought a mineral-like medicine called 'garam bukit' (hill salt in Bahasa Malaysia) and presented some to the author for identification. The current market value is about a ringgit per gram.

The purpose of this note is to report on the nature of the 'garam bukit'. Its possible occurrence in Malaysia will be discussed and its supposed medical efficacy will be commented.

### Physical and Optical Properties

The specimen is reddish brown with a specific gravity of 2.14 and hardness of  $2\frac{1}{2}$ . It is soluble in water with evolution of hydrogen sulphide gas. The specimen, in fact, has a faint but distinctly unwelcomed smell of rotten egg. Fragments of the specimen in immersion oil are pale pink with fine dusty dots and larger opaque areas occupied by inclusions. The fragments show perfect cubic cleavages and are isotropic under cross-polars. The refractive index is  $\approx 1.545$ .

The mentioned properties identify the 'garam bukit' to be halite. The  $H_2S$  gas is probably occluded in the halite as gaseous occlusions are not uncommon in natural halite.

### Chemistry

XRF scan indicates the predominant presence of NaCl and atomic absorption analysis found that in addition to Na and halite solution contains 0.14% K, 0.03% Ca and 0.01% Fe. A solution of the halite responded positively to the chloride test.

### X-ray Studies

X-ray diffraction data of the halite is shown in Table 1. Also shown is the data of salt recrystallized from an aqueous solution of a sample of the halite which is a mixture of white and pale brownish crystals. These results show that the halite has a unit cell of  $a = 5.64 \text{ \AA}$  and a calculated density of 2.16.

The calculated density is close to but slightly higher than the determined value. This may not have any easy explanation or significance although one may be tempted to relate this to the presence of occluded gases.

### Medical Efficacy

The 'garam bukit' is purportedly efficacious in the healing of wounds and for the treatment of 'lelah' which is used generally for ailments such as asthma and other related breathing problems e.g. bronchitis. The use of saline solutions to wash wounds is well-known and therefore the use of 'garam bukit' for this purpose does not appear to be a misapplication. In the medication of chronic bronchitis, a mixture with sodium chloride in hot water is used for loosening glutinous sputum in patients and again the use of 'garam bukit' here may have the required effects. The claims of the efficacy of a 'pinch' of this salt in some treatments may not be so hollow after all.

### Occurrence

The specimen studied is derived from a large chunk which the vendor chipped off and packed into small plastic bags for sale. According to Encik Sharif, the vendor said that the large chunk was obtained from a place called 'Gua Gurun' in Kedah and that mousedears and porcupines used to lick the 'garam bukit' at that place. Encik Sharif also found out from another man who is well-versed in traditional Malay folk medicine that 'garam bukit' can be found in a certain Bukit Kelima in the Gunung Tahan area.

The occurrences of the 'garam bukit' mentioned above are worth remarking. The author does not know of any place called Gua Gurun in Kedah. If the location is near Gurun, then it is possible that the 'garam bukit' originated from Gunung Jerai. Interestingly, the deltaic-shallow nearshore Jerai Quartzite and the fluvial-deltaic-lacustrine Tembeling Group in the Gunung Tahan area have environments of deposition favouring the occurrences of evaporite deposits.

The above discussion will be futile if the 'garam bukit' is from a foreign source. However, if so, the author believes that the vendor would have emphasized that the salt has been imported and so improving the sale prospects given the general bias for things imported. The utterances of the vendor did not in anyway improve the sale prospects. Coupled with the rather widespread use of 'garam bukit' for medicinal purposes locally, the author tends to believe that 'garam bukit' is of local occurrence.

### Acknowledgements

The author would like to thank Encik-Encik M.C. Lee, B.L. Chong and T.C. Koh for laboratory assistance. Encik Sharif Taha is thanked for the various contributions mentioned in the note.

Table 1: X-ray diffraction data of natural and recrystallized halite from Gua Gurun. Spacings of halite from JCPDS file included for comparison. (Quartz internal standard used,  $\text{CuK}_\alpha$  radiation).

hkl	Intensity (max. 100)	JCPDA $d$ (Å)	Gua Gurun Halite (natural) $d$ (Å)	Gua Gurun Halite (recrystallized) $d$ (Å)
111	13	3.258	3.259	3.254
200	100	2.821	2.822	2.818
220	55	1.994	1.986	1.994
222	15	1.628	1.630	1.627
400	6	1.410	1.412	1.410

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# PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

## TECHNICAL TALKS

G. Stoops: Microscopic aspects of mineral alteration.

Prof. G. Stoops from the Geologisch Instituut, State University of Gent, Belgium gave a talk on the microscopic aspects of mineral alteration on December 14. 15 members attended this talk.

Prof. Stoops discussed the guidelines for the description of mineral alteration as seen in the microscope. The word 'alteration' here includes changes due to weathering. Many slides showing the various alteration patterns of olivine, biotite, feldspar and garnet were discussed. These minerals show specific alteration patterns and also different degrees of alteration. These patterns and degrees of alteration are now being tabled in a paper contributed by the Subgroup on Weathering Phenomena & Neoformations of the Working Group on Soil Micromorphology of the I.S.S.S.

SITI ZAUYAH

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## PETROLEUM GEOLOGY SEMINAR '84 - REPORT

The Geological Society of Malaysia Petroleum Geology Seminar 1984 was held on 3rd and 4th December 1984 at Hotel Merlin, Kuala Lumpur and attended by more than 170 participants.

The Seminar was declared open by Yang Mulia Raja Tan Sri Mohar bin Raja Badiozaman, Chairman of PETRONAS. In his welcoming address, the Society's President, Mr. Leong Khee Meng, stressed that it is about time we pursue the formation of the proposed Malaysian Institute of Professional Geologists and would appreciate the support of the Government and other organizations which employed geologists. In his opening address, Yang Mulia Raja Tan Sri Mohar highlighted the following points:

- One of the priority tasks of PETRONAS is to search for more oil and gas reserves.
- Petroleum is vital to the economic life of a country and as it is a depleting resource, it must therefore be carefully managed.
- Further exploration efforts in Malaysia will still be worthwhile with the existence of numerous geological structures and meaningful offshore sedimentary basins.
- Malaysia planned to develop its gas reserves both for revenue and for local consumption to reduce over-dependence on oil significantly.



- PETRONAS is currently reviewing the terms of the Production-Sharing Contracts and will recommend to Government modifications to the terms as appropriate.
- He praised the various organizations and individuals for their contributions in terms of financial and technical support to the successful organization of the Seminar.
- He also stressed that as a professional breed, the geologists are very little known and heard and their efforts in discovering the hidden riches are not appreciated by the public and the need to educate the public on the various factors involved in the exploration of petroleum resources.

For the details, please see the Opening Address by Yang Mulia Raja Tan Sri Mohar.

The 2-day Seminar this year saw the presentation of fourteen (14) papers (see Programme). The Seminar would not have achieved its present status without the financial and technical support from various organizations and individuals. Generous financial support has been received from the following companies:

- BP Petroleum Development Ltd. (Malaysian Branch)
- Delcom Services Sdn. Bhd.
- ECL Australia
- Elf Aquitaine Malaysia
- Esso Production Malaysia Inc. (EPMI)
- Geophysical Company of Norway A.S. (GECO)
- Geophysical Services (M) Sdn. Bhd.
- Japan Petroleum Exploration Co. (JAPEX)
- Occidental (Singapore) Inc.
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- Teikoku Oil Co. Ltd.

N. RAMLI

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## WELCOMING ADDRESS BY MR. LEONG KHEE MENG, PRESIDENT, GSM.

On this occasion of the 8th Petroleum Geology Seminar, I extend to all of you a very warm welcome.

The response to the call for papers for this year's Seminar has been overwhelming. Financial support has also been very encouraging. To all of you and to your organisations, the GSM is indeed very grateful.

Although 1984 marks the 8th year of Petroleum Geology Seminar, Petroleum Geology in Malaysia is at least 75 years old. It started in 1909 when Shell commenced exploration for oil in Sarawak with a geological field trip around the Miri area. The 1st well Miri No: 1 was drilled the following year - 1910, resulting in the discovery of the Miri oil field. The rest is history.

The next oil field came onstream only 58 years later in 1968 i.e. the 1st offshore oil field - The West Lutong Field.

From 1968 onwards, there was no looking back as offshore discoveries, both oil and gas (some giants) were made year after year.

As the fortunes of oil companies (Shell and Esso) grow, the GSM, founded a year earlier in 1967 with an initial membership of 97, has also grown over the last 17 years to over 650 members, residing in Malaysia and worldwide.

It has progressively grown with the increasing activities and fortunes of the oil companies.

The GSM would like to thank our staunch supporters, Shell and Esso, later to be joined by Petronas and Schlumberger.

We would also like to wish the newcomers - Elf Aquitaine Malaysia, Opic and Future Oil Companies exploring in Malaysia successes as have been tasted by Shell, Esso and Petronas Carigali.

We know geologists in Malaysia are contributing substantially to society and enhancing the economy of the country as they are actively and conscientiously involved in mineral exploration and development, oil and gas exploration and development, in the search for ground water and structural materials, industrial minerals and in geo-technical and engineering geological works.

In Malaysia, several groups of scientists and engineers are represented by professional bodies e.g. The Institute of Chemists, The Institute of Civil and Mechanical Engineers and so on. Even accountants and lawyers are represented by their respective professional bodies. However, in spite of the contributions of the Malaysian Geologists to nation-building, I would like to point out the pressing concern the Geologists in Malaysia are facing:-

- The status of the Malaysian Geologists in professional terms are not clearly defined or understood.

Both the private and public in Malaysia appears to realise that there is a group of people called geologists in existence in Malaysia whenever a highway fails e.g. the K.L.-Seremban highway. They remembered that geologists should have been consulted professionally on subsurface geological conditions before the highway was aligned. There are also other examples.

The GSM is and will remain a scientific organisation although its main objective is to promote advancement of geological sciences particularly in Malaysia, it realised the predicament of its members and was strived to have the status of geologists in professional term to be more clearly defined about 10 years ago.

However, at that time, it appeared that to be recognised as a professional geologist, one has to masquerade as a professional engineer first and thus we erroneously went along with mining engineers under the umbrella of the proposed Mineral Engineers Act. After almost 10 years of futile effort, a growing number of geologists felt that it was no less honourable for geologists to be known as geologists and not engineers, and, thus, the breakaway from the proposed Mineral Engineer Act was effected about a year ago. We are now on our own.

The GSM is presently pursuing the formation of the proposed Malaysian Institute of Professional Geologists and is in the process of drafting the proposed Professional Geologists Act. We intend to have it legally incorporated as soon as possible and we shall pursue it full steam next year.

The Malaysian Institute of Professional Geologists as a professional body once legally incorporated would both establish the Malaysian Geologists as a practitioner of the profession and provide him or her with the opportunity to participate in the expression of corporate opinion and decision making.

The Malaysian Institute of Professional Geologists would advance the profession and practice of geology and allied disciplines e.g. geophysics and geochemistry and to maintain proper professional standards and ethics.

In this endeavour, the GSM would appreciate the support of the Government and other organisations e.g.

- Ministry of Primary Industries
- Geological Survey of Malaysia
- Petronas
- MMC

In closing, I would like to wish all participants a fruitful 2-day seminar and to thank Yang Mulia Raja Tan Sri Mohar bin Raja Radiozaman for kindly consenting to spend some of his very busy time to inaugurate the 1984 Petroleum Geology Seminar.

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## OPENING ADDRESS BY RAJA TAN SRI MOHAR BIN RAJA BADIOZAMAN, CHAIRMAN, PETROLEUM NASIONAL BERHAD (PETRONAS)

Mr. Chairman, Ladies and Gentlemen,

I am greatly honoured to be invited to address this distinguished gathering this morning and to declare open the Petroleum Geology Seminar 1984 organized by the Geological Society of Malaysia.

As I understand it, the main objective of this seminar is to bring together local as well as foreign geoscientists, and to

encourage professionals, academicians, government officials and researchers engaged in petroleum geology in general to exchange information and share their experience and knowledge.

This Seminar is of particular interest and relevance to Petronas which is entrusted with the finding and development of the Nation's petroleum resources. One of the priority tasks of Petronas is to search for more oil and gas reserves. The chances of successful exploration and discovery of further petroleum resources will increase only with better understanding of petroleum geology and better technology and exploration methods. This is because exploration and drilling activities have to be done at greater depth and under more difficult conditions. In the areas where the exploration efforts are already matured, easily assessible economic quantities of recoverable reserves which flow readily under natural pressure is becoming increasingly scarce to find.

Petroleum is vital to the economic life of a country and as it is a depleting resource it must therefore be carefully managed. As for Malaysia, with domestic energy consumption continuing to rise and not an over abundant reserves of petroleum resources it is the more necessary to find and manage what ever resources that we have properly. In view of this, we have to obtain more and accurate information as to the size of the reserves that we have. This could only be achieved through continuous exploration work.

In Malaysia, petroleum resources were extracted as early as 1910 and today's production is consequential to exploration efforts made more than ten years ago. For Malaysia, exploration success ratio has so far been very favourable. A ratio of 1 to 6 compared to the world average of 1 to 10. The numerous geological structures and the existence of meaningful offshore sedimentary basins indicate that further exploration efforts in Malaysia will still be worthwhile.

Exploration results in Malaysia so far have led to the conclusion that Malaysia has remaining oil reserves estimated at 2.9 billion barrels and natural gas reserves estimated at 39 trillion cubic feet which is equivalent to about 6.6 billion barrles of oil.

Current consumption of petroleum products in Malaysia is around 200,000 barrels a day or about 90% of the energy consumed in the country. As Malaysia has more natural gas than oil, the development of its gas reserves both for revenue and for local consumption is expected to reduce this over-dependence on oil significantly.

This is also to be in line with international trends to diversify away from oil as a primary energy source.

Let me highlight a bit as to what have we done with our gas. For the revenue purpose, a liquified natural gas (LNG) plant has been constructed in Bintulu, Sarawak. Exports of LNG from the central Luconia gas fields through this plant is already on stream for nearly two years. At present, two of the gas fields are producing at a rate of about 500 million standard cubic feet per day. When all the five fields dedicated to the LNG project begin producing by 1986, they will provide the LNG plant with a maximum of 1.25 billion standard cubic feet of gas per day for 20 years.

For the domestic utilisation, Petronas and its contractors are at present actively involved in harnessing natural gas from the oil and gas fields offshore Peninsular Malaysia and Sabah. A major area of application is in power generation and heavy industry.

The National Electricity Board, The Heavy Industries Corporation of Malaysia (HICOM) and the Sabah Gas Industries are among the first corporations in the country to identify and utilise this clean and more efficient resource for energy generation.

The National Electricity Board has taken the first step in the switch from oil to gas with the construction of a 900-megawatt combined cycle power station at Paka, Trengganu to utilise natural gas for electricity generation.

The heavy industries corporation of Malaysia is using gas for its integrated steel mill also in Trengganu state.

Sabah Gas Industries utilises associated gas from Sabah's offshore oil fields to feed a methanol plant, a hot briquetted iron plant and a power plant.

Plans are now being studied for phase two of the Peninsular Gas Utilisation Project (PGUP) which includes the construction of a network of gas pipelines from Trengganu to the west coast of Peninsular Malaysia and the export of gas to Singapore.

Ladies and Gentlemen,

As it is necessary to have continuous exploration work to update information on the reserves of oil and gas that are available in our country and as our resources to conduct exploration on our own are limited, foreign companies would be welcomed to participate in exploration work in Malaysia. As an encouragement Petronas is currently reviewing the terms of the production sharing contracts and will recommend to government modifications to the terms as appropriate.

Exploration work in Malaysia at present is being undertaken by 6 companies - Petronas Carigali Sdn. Bhd. and Esso Production Malaysia Inc. in offshore Peninsular Malaysia; Sarawak Shell Bhd. and Elf Aquitaine Malaysia in offshore Sarawak, Sabah Shell Petroleum Company, Esso Production Malaysia Inc. and Overseas Petroleum and Investment Corp. (OPIC), a wholly owned subsidiary of the Chinese Petroleum Company (CPC) in offshore Sabah.

Coming back to the Seminar this morning, I am happy to note the ready response from various organisations and individuals to present papers at this Seminar and these papers contain information vital to petroleum exploration. I am also glad to know that some of the corporations have presented technical papers on little known aspects of petroleum geology in this region and on the latest methods and techniques of petroleum exploration and development. Their willingness to share their knowledge, expertise and experience is indeed welcomed. The continued support and cooperation from the participating corporations, organizations and individuals in term of financial and technical support have contributed to the success organization of this important Seminar.

The Geological Society of Malaysia is to be commended for its continuous efforts in promoting the exchange of information of petroleum geology and exploration among local and foreign experts through this annual seminar. I understand that the papers to be presented today and tomorrow have been prepared by experts and professionals who are working or have worked in the Southeast Asia and Asian Regions. I have no doubt that these papers will provide the stimulus for fruitful discussions amongst the participants of this Seminar.



As a professional breed the geologists are very little known and heard and what they do and achieve in discovering the hidden riches are not appreciated by the public. The common public impression of geologists are people who search for old rocks and fossils and whenever discoveries of valuable minerals, oil or gas are made the public in their excitement tend to forget the geologists whose professional skills contributed to the discoveries. I therefore sincerely hope that this Seminar while providing a forum for professional and technical discussions will also provide better understanding of geology in general and petroleum geology in particular. There is a need to educate the public in regard to the economic, social, strategic and political significance of our petroleum and gas resources, how they are searched and found and the skill and technology involved in the exploration of petroleum resources.

In conclusion I wish the participants very fruitful discussions during the Seminar and an enjoyable stay in our country.

It is now my very great pleasure in declaring the Petroleum Geology Seminar 1984 opened.

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## ABSTRACTS OF PAPERS

### A Heat Flow Study in The Malay Basin

Wan Ismail Wan Yusoff, PETRONAS.

*A heat flow study in the Malay Basin has been carried out using data from 57 exploratory wells. Thermal conductivity of 686 cores were measured using the Quick Thermal Conductivity Meter (QTM) with temperature gradients of wells being calculated from well log data.*

*An average heat flow of up to 2.60 HFU has been determined in areas near the southern flank of the south and central parts of the basin. In the southeastern quadrant of the basin, heat flow decreases towards the northern flank. The entire northeastern flank of the basin has a lower heat flow of 1.60 HFU.*

*The Malay Basin has been subjected to extensional and compressional forces during its development, resulting in faults, grabens and half-grabens being formed. It has also been affected by massive uplift in the southeastern portion. The Tertiary magmatic activities took place in the vicinity of the southern parts of the basin. The magnitude and distribution pattern of heat flow in the basin are believed to be related to the above tectonic activities.*

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## Cyclicities in the Miocene Nyalau Formation and Their Implications

Dr. Azhar Hj. Hussin and Dr. Nuraiteng Tee Abdullah, Department of Geology, University of Malaya.

Detailed sedimentological observations in the Miocene Nyalau Formation exposed at the 22nd miles Bintulu-Miri Road Quarry allowed the recognition of two major sequences present there. The exposed part of the lower sequence measures 13 m of its stratigraphic thickness and is overlain by a more than 60 m thick upper sequence. The upper sequence rests on a major truncation surface above the lower sequence.

Sediments of the lower sequence can be grouped into seven lithofacies; Facies I comprising of lenticular and flaser bedded fine-sandstones, Facies II of 20-30 cm thick broadly channelised medium sandstone, Facies III rippled fine-sand facies, Facies IV amalgamated, bioturbated, carbonaceous sandstone facies, Facies V of amalgamated small-channelled sandstone facies, Facies VI of cross-laminated medium sandstone and Facies VII of massive fine-sandstone facies. Abundant ophiolite are found in Facies V and VI. Rare lignite horizons are found in the lower sequence usually associated with Facies IV.

Minor (less than  $\frac{1}{2}$  m) fining upwards cycles are found in the amalgamated small-channel sandstone facies and the lenticular-flaser sandstone facies (Facies I and V). Paleocurrent directions are bimodal, indicating movement to both east and west. The environmental interpretation of the lower sequence is a peritidal complex which received occasional small influx of fine-grained sediment.

In the upper sequence, seven main lithofacies can be observed; Facies VIII comprised of black shale sequence with subordinate dark grey fine-sandstone, Facies IX of thin-bedded, bioturbated, rippled carbonaceous fine-sandstone. Isolated 2 m thick channel sandstone with abundant ophiolite constitute Facies X. Facies XI of rippled medium sandstone onwards Facies X. Facies XII comprised of 30 cm - 1 m thick coarse sandstone with abundant rooflets and rare thin vertical burrows. Thick massive clean sandstone constitute Facies XIII. The uppermost part of the upper sequence is a channelised facies, composed of 2-3 m thick coarse sandstone channels. The upper sequence is interpreted as a deposition of shoreline with a fluvial channel complex which received abundant influx of coarser sediments.

The overall interpretation of this part of the Nyalau Formation is that this part records a regressing shoreline, marked by an increase input of sediments into the basin.

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Slumping At The Late Miocene Shelf-Edge, Offshore West Sabah:  
A View of A Turbidite Basin Margin

B.K. Levell and Awang Kasumajaya \*, Sabah Shell Petroleum Company Limited.

*A coalescing series of elongate spoon or scoop-shaped unconformities can be mapped along almost the entire 300 km length of the Late Miocene shelf-edge offshore West Sabah.*

*The unconformities have an erosional relief of up to 500 m and typical widths of 1-3 kms. Maximum slope angles (without allowing for decompaction) are up to 25 deg. In many cases, the unconformities both truncate and are overlain by marine sediments and are interpreted as due to retrogressive submarine slumping. They may subsequently have been deepened by erosional turbidity currents but retain a smooth slump scar morphology.*

*The slump scars or channels occur in two geological settings:*

- (1) *On the flanks of growing structures at tectonic shelf margins where parallel bedded shelf seismic facies pass abruptly into a chaotic slope facies composed of alternating offlap and onlap packages: a destructive slope setting.*
- (2) *Within units of seismic foresets representing progradation of a muddy slope system into water depths of up to 750 m: a constructive slope setting.*

*In both settings the slump scars and channels occur along major fault lines and it is likely that faults caused the slumps due to both seismic triggering and slope oversteepening. Typical sediment volumes of 1-5 km<sup>3</sup> were removed during slumping and subsequent erosion.*

*Although slump scars are known in the area from the Early and Middle Miocene as well as the Late Miocene, approximately 90% of all the known slump scars and submarine channels occur within the Late Miocene. This was a period of rapid outbuilding of a clastic wedge offshore West Sabah. It is probable that both the outbuilding and slump activity are in part due to a Late Miocene global sea level fall. In one exploration well, shallow marine deposits onlap a slump scar unconformity. A rare example of 'downward-shift in coastal onlap', but this was probably caused by exceptionally rapid uplift of a particular tectonic block rather than sea level fall alone.*

*Four exploration wells have penetrated the slump scar unconformities and their fills. In all cases except the abovementioned, the fill consists of a monotonous claystone succession deposited in deep water. On seismic sections the fill is normally poorly reflective and shows weak seismic foresetting indicative of subsequent slope progradation.*

*The slump scars/channels have a two-fold significance for hydrocarbon exploration.*

*Firstly, the relief created between neighbouring slump scars, overlain by slope clays provided potential for stratigraphic trapping.*

\* Presented by B.K. Levell.

*Secondly, the unconformities allow identification of the stratigraphic units which have been eroded and re-deposited basinward. Hence, the sand-proneness of a turbidite basin can be indirectly assessed. In the case of offshore West Sabah, there is a clear relationship between the destructive slope setting discussed above and a major sand-bearing turbidite basin in the northern part of the area.*

*The widespread occurrence of slump scars in offshore West Sabah is thought to be due to a combination of factors, namely active linear basement fault zones acting as basin-margins, rapid sedimentation of clastic sediments without sufficient time for dewatering, and probably, sea level fall.*

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### Aspects To The Resolving Power of 3D Seismic Surveys

Wolfgang Houba, Prakla-Seismos GMBH

*Meanwhile hydrocarbon exploration using 3-Dimensional seismic techniques can look back onto a series of experienced enterprises of encouraging work. Successful results of 3D surveys offshore and onshore have proved to be based on careful interactions of data acquisition, data processing as well as data interpretation already acquired during the planning stage.*

*Sophisticated techniques in each of these domains have been developed in the past few years for enhancing the resolution of the resulting data volumes to enable higher reliability in interpretation work. Important aspects such as spatial sampling, careful positioning, effective binning and powerful imaging will be discussed with respect to practicable applications.*

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### The Role of Geophysics in Oil and Gas Field Development

Khee Kok Kean and Mohd Izham Ismail \*, Esso Production Malaysia Inc.

*For years the role of geophysics has been associated with only the exploration phase of the oil business. With the development and refinement of geophysical techniques, this role now extends throughout the upstream activities, especially in gas and oil field development and production.*

*One such technique involves the construction of depth structure maps. A 3-D structural model can be built from these maps, therefore giving the size and shape of the reservoir. Special data processing of both 3-D and 2-D seismic data may help determine reservoir variations, lithologic changes, presence of hydrocarbons, fluid contacts and extent of an aquifer. The input of all these data into the 3-D structural model helps engineers compute the volume and extent*

\* Presented by Mohd Izham Ismail.

of hydrocarbons, the number of wells needed to economically develop the field and the placement of drilling platforms and/or wells.

Site surveys, which involve a wide range of geophysical tools, are used in the selection of safe platform locations. The data from a properly carried out site survey, will provide water depth, seafloor conditions and geohazards in the sub-seafloor strata. These data are also used in designing development drilling programs.

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#### Direct Detection of Hydrocarbon by Electraflex Method

Abdul Halim Quazi, Universiti Sains Malaysia

This method bears no relations to other electrical prospecting methods such as resistivity, spontaneous, potential, induction, electro-magnetic, induced polarization, telluric, magneto-telluric and electro-magnetotelluric, etc.

The transmitter is a dipole 800 m long, grounded at both extremities. The receiver is a 160 m dipole, also grounded at both extremities. The Electraflex signal is stored by the hydrocarbons as in a capacitor. After switch off the input signal, the capacitor discharges and this discharge is picked up by the instruments. This information is used to plot the areal extent of pools in the sub-surface and may provide a semi-quantitative estimate of their magnitude.

Magnetic, gravity and seismic survey find out the structure of the rocks in the sub-surface and not the hydrocarbons. Electrical transients serve as direct hydrocarbon indicators supplementing seismic and gravity. It ideally suited to deal with stratigraphic traps.

Each geophysical approach provides evidence about the sub-surface from its own perspective. Clearly a combination of the geophysical approaches should compound benefits from each.

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#### Seismic Prediction of Hydrocarbon Reservoirs - A (Critical) Review on the Determination of Lithological Parameters from Seismic Data

Burkhard Buttkus, Federal Institute of Geosciences and Resources (BGR), Hannover.

The approach in seismic reservoir prediction is a combination of the extraction of physical parameters from seismic measurements, seismogram inversion including the calibration at available well locations and modelling. The key to most present-day reservoir interpretation is understanding the reflection wave shape as a function of structural and petrophysical parameters.

Much success in the recognition of stratigraphical traps, prediction of pore filler changes and the extent of hydrocarbon reservoirs from seismic sections during the last decade is based on



*improvements in seismic data acquisition plus processing and a better understanding of the relations between seismic surface data and petrophysical/lithological situations in the subsurface.*

*After a brief review on new developments and trends in Exploration Seismics the concepts of data extraction and modelling, the condition required for their application and limitation are discussed.*

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### Depositional Environments of the J Sandstone, Southeastern Part of the Malay Basin, Offshore West Malaysia.

Nik Ramli Nik Hassan \*, PETRONAS Carigali Sdn. Bhd.

*The J Sandstone is an important hydrocarbon bearing reservoir in the Malay Basin. The Lower and Upper Member of the J consist of a variety of shoreface and offshore sediments. Shoreface facies comprise upper, middle and lower shoreface whilst offshore facies are made up of offshore shales/siltstones, offshore bars and offshore sheet sands. Shoreface progradation and vertical stacking of associated offshore bars occurred during deposition of the Lower and Upper J. Evidence indicate that storm processes may have been responsible for the deposition of these stacked offshore bars.*

*Progradation terminated in the Upper J as a result of rapid submergence of the shorezone by the Miocene transgression. Storm events occurring within this transgression resulted in the formation of offshore sheet sandstones.*

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### History and Geology of Tiong Field

Mohd Redzuan Mohd Said, Esso Production Malaysia Inc.

*Tiong field is the fourth field offshore Peninsular Malaysia, to be developed by Esso Production Malaysia Inc. The structure is a domal anticline intersected by several north-south trending normal faults. Five exploration wells were drilled in the field between October 1977 and August 1979 and 41 development wells were drilled from two platforms from August 1982 to June 1984. The field produces oil from Early Miocene Group J sandstone reservoirs and gas from Late Oligocene Group K and Group L sandstone reservoirs.*

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\* Currently at University of Oxford, U.K.

Marine Geoscientific Studies of The Federal Institute for Geosciences and Natural Resources (BGR) in Asian Offshore Areas

BGR Continental Margin Study Group \*, Federal Institute of Geosciences and Resources (BGR), Hannover.

*In the frame of the SEATAR (Studies in East Asian Tectonics and Resources) - Project sponsored by CCOP (Committee for Coordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas) and IOC (Intergovernmental Oceanographic Commission) the Federal Institute of Geosciences and Natural Resources (BGR) has carried out marine geoscientific investigations in cooperation with CCOP member countries on different Southeast Asian continental margins.*

*This paper gives a general view of the scientific results of the R/V VALDIVIA and R/V SONNE Southeast Asian cruises carried out since 1977 in the Coral Sea, Makassar Strait, Arafura Sea, Sulu Sea and South China Sea. Structural styles are discussed under the aspect of hydrocarbon potential.*

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LITHO, A Computerised Approach to Lithofacies Identification

A.R. Somturk, Schlumberger.

*The fact that logs respond to the geological parameters such as mineralogy, texture and sedimentary features as well as to the petrophysical parameters of a formation is well demonstrated.*

*In recent years few modern logging tools have been designed and now run frequently measuring new physical parameters which add valuable information to describe the lithology of the formations.*

*The increase of measurements produced by modern logging techniques has necessitated the use of high-speed digital computers and analytical programs.*

*LITHO is a program which combines these modern wireline logging measurements with a lithofacies database to produce an automatic lithological description of the formation crossed by the well.*

*The database which is defined from petrographical knowledge and calibrated against intervals whose lithology is well known, currently uses density, neutron, sonic transit time, gamma ray, photoelectric cross section and thorium, potassium and uranium concentration log recordings. External knowledge can be taken into account using Artificial Intelligence methods.*

*The procedure has been tested in two wells in Malay Basin and are used as example in this paper.*

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\* Presented by Dr. Burkhard Buttkus.

Exploration History of Malong Discovery

H.T. Ong and T.S. Ng \*, PETRONAS Carigali Sdn. Bhd.

*The Malong structure in the Tenggol Arch geological province, offshore Terengganu, East Peninsular Malaysia, was first recognised by CONOCO and others in 1975. Probably because of its relatively small feature, it did not generate sufficient exploration interest.*

*PETRONAS Carigali through its 1981 seismic campaign established a fairly significant structural closure over Malong and in 1983 drilled a rank wildcat well followed by an appraisal well in 1984. Oil and gas were encountered in sandstone of probably Early Miocene age.*

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Modern Laboratory Techniques for The Handling of Measurement On Unconsolidated Cores

Lars Lydersen, Geophysical Company of Norway A.S.

*Hydrocarbons have quite commonly been found in poorly or completely unconsolidated sand. This has led to a number of problems within drilling, well completions and production technology and a number of techniques to overcome these problems have been developed and are generally available today.*

*The handling of unconsolidated sand in the laboratory, however, has been lacking. This paper presents practical techniques for handling, sampling and measurement of unconsolidated core, both for routine and special core analysis. Possible measurement problems are discussed.*

*The increased value of the cores as material for geological evaluations are also demonstrated.*

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The Mechanics of Progressive Deformation in Crustal Plates - A Working Model for Southeast Asia

B.G.M. Wood, Marathon Petroleum Exploration Ltd., Singapore.

*A model explaining the mechanics of Tertiary deformation of the Southeast Asian crustal plates is presented which links Wrench Tectonics and Plate Tectonics. The model realigns the roles of subduction, rifting and shearing in crustal deformation integrating them to form a dynamic and progressive system driven by a single continuous force.*

\* Presented by T.S. Ng.

The Southeast Asian crustal complex overlies the Pacific Plate at the intersection of the Pacific, Eurasian and Austral/Indian Crustal Plates. Relative plate movements at this intersection have resulted in a high angle of convergence between the Pacific and Eurasian Plates and a low angle of convergence between the Pacific and Austral/Indian Plates.

The Eurasian Plate in acting as buttress has resisted westward movement of the Southeast Asian and Pacific Plates. Subsequent shortening against this boundary has been accommodated largely by subduction of the oceanic Pacific Plate.

Deformation of the Southeast Asian Plate along the Pacific Plate's southern boundary presents a more complex structural situation. Deformation has occurred in progressive stages, each successive stage over-printing the former. Decoupling has occurred between each stage. The overall results have been:

- (a) east-west crustal shortening by compressional folding, thrusting, strike-slip faulting and buckling of the Southeast Asian Plates in response to a west directed horizontal principal stress.
- (b) vertical crustal thickening by basin development and mountain building, and
- (c) north-south crustal expansion by Island Arc formation.

Initially, east-west shortening and fragmentation of the Early Tertiary Southeast Asian crustal plate was accommodated progressively by folding, thrusting and strike-slip faulting. This resulted in the plate being broken by a series of west trending sub-parallel Shear Systems. Continued shortening and endloading of the plate from the east successively buckled the elongate, decoupled, inter-shear fragments away as Island Arcs from adjacent fragments to override the impinging Pacific Plate. Behind these arcs expansion and rotation (primary rotation) was accommodated by rifting and short offset transform faults. The formation of multiple arc complexes by repetitive buckling of crustal fragments not only increased the width of the region of deformation but further rotated (secondary rotation) the older complexes.

The crustal deformation of Southeast Asia, in terms of this new working model, is displayed in a Tectonic Map of the region.

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# PETROLEUM GEOLOGY SEMINAR 1984



# PETROLEUM GEOLOGY SEMINAR 1984



Captions to the photos of Petroleum Geology Seminar 1984

<u>Photo Nos</u>	<u>Subject</u>
1	At the Registration Desk.
2	En. Nordin Ramly, Chairman of the Petroleum Geology Seminar 1984.
3	Opening address by YM Raja Tan Sri Mohar Raja Badiozaman, Chairman, Petronas.
4	Mr. Leong Khee Meng, GSM President, presenting a memento to YM Raja Tan Sri Mohar Raja Badiozaman.
5 and 6	A section of the audience.
7 to 19	The speakers presenting their papers.
20 to 22	Some of the Session Chairman.
23 to 29	Time for Questions and Discussion.
30 to 35	Coffee break.
36 to 41	Donation Time.
42 to 43	Lunch Time.

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

CHANGES IN GSM COUNCIL 1984/85

A number of changes have taken place in the present GSM Council due to the resignations of the Hon. Secretary and a Council Member.

Encik Mohd Ali Hassan who has been the Hon. Secretary of the GSM since 1983 tendered his resignation on the 1st November and this was accepted by the Council on the 9th November 1984. Encik Ali has left on study leave and is currently doing post graduate work at the Department of Environmental Sciences, Hydrogeology Section, University of Lancaster, Lancaster LA1 4YQ, United Kingdom. We take this opportunity to thank him for all the time he has contributed to the GSM and wish him all the best for the future. The GSM Council has requested that Dr. S. Paramanathan act as Hon. Secretary for the rest of the Council's term.

Dr. Abdul Hamid Mohamad, Council Member also tendered his resignation on 17th October 1984. This was also accepted by the Council on the 9th November 1984. We also take this opportunity to thank Dr. Hamid for his support of the GSM. The Council has with consent appointed Dr. Idris Mohamad as Council Member from 9th November, 1984 for the rest of its term.

Mr. Dennis Tan, who has been acting as the GSM's representative in Kuching, Sarawak has also asked to be relieved of this due with his move to Shell at Miri. Mr. Victor Hon of the Geological Survey has been appointed to replace Dennis. We take this opportunity to thank Mr. Dennis Tan and welcome Mr. Victor Hon.

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## PENERBITAN PERSATUAN (PUBLICATIONS OF THE SOCIETY)

### Warta Geologi

With the publication of this Warta Geologi the delays of the Warta, it is hoped, will now be a past affair. Every effort will be made from now on to release the Warta more regularly and on time. This of course depends very much on many factors. Members can assist greatly by sending in regularly articles/notes etc. for publication. Unless these come in regularly the Editor will have a difficult time trying to fill up the Warta. While every attempt will be made to publish articles received quickly we will also have to maintain the high standards. Therefore a review of the articles is necessary and this may sometimes take time so please bear with us. So please keep your articles coming in.

### Bulletins

As mentioned in the last Warta (vol. 10, no. 5, Sept-Oct 1984) Bulletin 17 (Dec 1984) is with the printers. Two additional papers have been reviewed and accepted for publication. This makes the number of papers in this Bulletin 17 to be 18-voluminous. These additional papers are as follows:-

1. Tan, B.K.: The tectonic framework and evolution of the Central Belt and its margins, Peninsular Malaysia.
2. Chakraborty, K.R. and Metcalfe, I.: Analysis of mesoscopic structures at Mersing and Tanjung Kempit, Johore, Peninsular Malaysia.

This Bulletin is currently in the galley proof stage and we hope that this Bulletin will be available for distribution by February 1985. As members are aware Bulletins 18 and 19 will consist of papers presented at the GEOSEA V.

### GEOSEA V

Review of papers received to date has already commenced and is progressing satisfactorily. It is hoped that the review of the papers can be completed by May 1985. Authors who have yet to submit their papers are requested to do so not later than 31 January 1985 if their papers are to be included in the publication.

### Stratigraphic Correlation of Thailand and Malaysia

This Workshop was held in Haad Yai, Thailand from 8-10 September 1983. Volume 1 (Technical Papers) of the Proceedings were published by the Geological Society of Thailand. The GSM committed to publish the Late Papers and Discussions as Volume II. The editing of these late papers and discussions are in an advanced stage and it is hoped that this Volume II can be published by April 1985.

The papers and discussions of this Workshop review and summarise the latest information and ideas on the Geology and Stratigraphy of Peninsular Thailand and Peninsular Malaysia and every geologist in this region should have a copy. Have you got your copy of Volume I - Technical Papers yet? If not they are still available from:

Hon. Asst. Secretary  
Geological Society of Malaysia,  
c/o Dept. of Geology,  
University of Malaya,  
Kuala Lumpur 22-11, MALAYSIA.

Price: M\$25/= (US\$12.40) - surface mail.



Special Bulletin on Petroleum Geology

The GSM Council is considering publishing a special Bulletin on Petroleum Geology. This would primarily be a collection of papers present at the Petroleum Geology Seminars held annually by the GSM - in particular those papers that have yet to be published. Other papers not presented at these seminars would also be accepted. All papers of course will be subject to the normal editorial review. Letters to authors of papers presented at the Petroleum Geology Seminar 1984 have already been sent out and we are hopeful that the response would be good. So get cracking and send your papers in preferably before 31 January 1985. Your speedy response will assist the Council in its decision to publish this Special Bulletin.

S. PARAMANANTHAN

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## KEAHLIAN (MEMBERSHIP)

The following applications for membership were approved by the Council:

Full Members

Stephen M. Lane, GCA, P.O. Box 82, S'pore Changi Airport, Singapore 9181.

Joseph E. Friend, IIAPCO, P.O. Box 2759, Jakarta, Indonesia.

Chow Weng Sum, Geological Survey Malaysia, Kuala Lumpur.

Ali Riza Somturk, Schlumberger, 3rd Floor, Wisma Bunga Raya, 152, Jln. Ampang, Kuala Lumpur.

James Ahmad, Gaffney, Cliné & Associates, P.O. Box 82, Singapore Changi Airport, S'pore 9182.

Student Member

Mahidah Ab. Wahab, Jabatan Geologi, Universiti Malaya, Kuala Lumpur.

Associate Member

Stansbury S. Dur, 1819 Augusta no. 226, Houston, Texas 77057, U.S.A.

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## PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

The following members have informed the Society of their new addresses:

Peter T.F. Chia, XGP/22, Sarawak Shell Berhad, Lutong, Sarawak, Malaysia.

Choy Kam Wai, 100, Harley Street, Bendigo, Victoria 3550, Australia.

Burton, C.K., 06-410 E Eugenia Court, Pandan Valley, Singapore 2159.

Jamain Bojei, ITA/6, Sarawak Shell Bhd., Lutong, Miri, Sarawak, Malaysia.

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## PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The following publications were added to the Library:

1. Seatrad Library, Acquisition list, July-Sept, 1984.
2. AAPG Explorer, Sept & Oct, 1984.
3. IMM Bulletin no. 936, 1984.
4. American Museum Novitates, no. 2784, 1984.
5. American Museum of Natural History, Bulletin, v. 178, article 3, 1984.
6. RMRDC, Newsletter no. 8, 1984.
7. Committee for co-ordination of joint Prospecting for mineral resources in South Pacific offshore areas.(CCOP/SOPAC), Proceedings of the Twelfth Session Nuku'alofa, Tonga. 11-20 Oct 1983.
8. Episodes, vol. 7, no. 3, 1984.
9. Tin and its uses, no. 141, 1984.
10. Asian oil and gas, Oct and Sept 1984.
11. Seatrad Bull. vol. V, no. 3, 1984.
12. IMM Section A: vol. 93, July 1984.
13. Petroleum News, vol. 15, no. 7 and 9, 1984.
14. Journal of Science of the Hiroshima U. Series C, vol. 81, no. 3, 1984.
15. Geological Report of the Hiroshima U. no. 24, 1984.
16. National Science Museum, Bull. vol. 10, no. 3, 1984.
17. Geosurvey Newsletter, vol. 16, nos. 7-16, 1984.
18. National Library S'pore, adult reference collections accessionslist, Aug. & Sept., 1984.
19. Commonwealth Science Council, NL Sept/Oct 1984.
20. Books about S'pore, 1984.
21. Diesel and gas turbine worldwide, Oct. 1984.
22. Scripta geologica, 76, 1984.

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## SALE OF GEOSEA V SOUVENIRS

Bag - \$18.00  
Key chain holder - \$1.00

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## B E R I T A - B E R I T A L A I N

### ( O T H E R N E W S )

## 4TH HEIDELBERG SYMPOSIUM ON ORE GENESIS

Mineralogisch-Petrographisches Institut, Der Universitat Heidelberg,  
Germany.

Date: 14-15 February, 1985.

Main Topic: Crystal growth dating in ore genesis: Experimental and "natural" approaches.

Program

- Prof. Dr. G. Alfaro, Concepción Galletué and San José: The two southern porphyry copper prospects in Los Andes of Chile.
- Dr. L. Fontboté, Chr. Mayer, S. Schmidt, Heidelberg: Genetic criteria for the formation of the Ag-deposits of Caracoles and Chañarcillo, Chile.
- L. Diaz, M.-E. Cisternas: Concepción stratabond deposits in the Neocomian Basin around Copiapó, Chile.
- Prof. Dr. A. Wauschkuhn, Heidelberg: Andean orogeny and ore genesis in Central Peru.
- Dr. K.A. Gunnesch, M. Gunnesch, Heidelberg: Observations on criteria for ore genesis, petrology and geothermometry in the ore deposits of Milpo and Atacocha, Peru.
- W. Zimmernink, Heidelberg: The role of metasomatic processes and the formation of garnets in the skarn zone of the deposit Santandér, Peru.
- X. Song, Peking: Genetic criteria in the Pb-Zn-deposits of Fankou, PRC.
- Prof. Dr. S.J. Kim, Seoul: Manganese deposits of South Korea: A genetic overview.
- U. Goerg, B. Sarbas, W. Engel, Heidelberg: Geochemistry and petrology of the Precambrian graphite-garnet-gneisses of the Tsavo-Area, Kenya.
- Prof. Dr. T. Schadlun, Moscow: On the role of ore microscopy in the solution of ore genetic problems.
- Prof. Dr. G. Frenzel, Prof. Dr. P. Stoffers, Heidelberg: Mn-Micronodules of the Aitutaki-Passage, New Zealand.
- Prof. Dr. S. Janković, Belgrad Ore genetic studies on brittle metals in ore deposits.
- Prof. Dr. A. El Goresy, Heidelberg: The chalcophile behaviour of alkali-metals in meteorites.
- Prof. Dr. E.F. Stumpfl, Leoben: Graphite, platinum-metals and the C-O-H-S-system.
- Prof. Dr. G. Kullerud, Lafayette: The significance of oxygen for the stability of monoclinic pyrrhotite.
- Dr. L. Miller, Denver: Mineral exploration in volcanic island arcs.
- Prof. Dr. P. Omenetto, Padua: Scheelite metallogeny in Italy.
- Prof. Dr. J. Guilbert, Tucson: Petrology and geochemistry in New England granitoid metallogeny.
- Prof. Dr. G. Moh, Heidelberg: Genesis and paragenesis of complex sulfosalts: Franckeite and cylindrite.
- Dr. R. Sobott, Alsenzelle, R. Klaes, Heidelberg: Genetic and paragenetic criteria of Tl-sulfosalts.
- Prof. Dr. G.C. Amstutz, Heidelberg: Conclusions; The role of crystal growth dating in ore genesis.

Please contact the following for further information:

Sekretariat,  
Mineralogisch-Petrographisches Institut,  
der Universität Heidelberg,  
Postfach 104040,  
D-6900 Heidelberg,  
GERMANY.

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## 13TH CONGRESS - THE COUNCIL OF MINING AND METALLURGICAL INSTITUTIONS

Venue: Canberra, Australia.

Date: 11-16 May 1986

### Theme

"The Twenty-First Century - Mining for Mankind"

### Aim

To bring together members of the kindred institutions, and other interested persons, for the presentation of information and discussion on the trends in technology and science in the minerals industry of the 21st century.

### General Programme

Delegates will assemble in Canberra on Saturday 10 and Sunday 11 May, 1986. Some will have participated in Pre-Congress tours in the preceding week. The Congress will be opened with a plenary session on Monday 12 May and technical sessions will be held throughout the ensuing week. These sessions will be divided into four streams, Exploration and Geology, Mining, Metallurgy, and Miscellaneous and will be conducted concurrently. It is expected that about 135 papers will be published.

On Wednesday 14 May, local tours of technical and general interest will be conducted.

A Congress banquet will be held on Tuesday 13 May. Other social functions will be held during the Congress.

The final plenary session will be on Friday 16 May. Delegates will depart thereafter for Post-Congress tours.

### Call for Papers

A number of plenary session addresses on the main theme of the Congress will be invited.

The technical sessions of the Congress will include Exploration and Geology, Mining, Metallurgy, and Miscellaneous topics within the scope of the theme, and applying to all minerals including oil and gas. Authors are invited to submit papers in English in fields including but not confined to the following:

Exploration and Geology

- Structural geology
- Plate tectonics
- Ore-genesis
- Mine geology
- Sedimentology
- Geochemistry
- Geophysics
- Geobotany
- Landsat imagery
- Geostatistics/computer applications
- Reserves

Mining

- Deep rock mining
- Coal mining
- Undersea mining
- Oil and gas extraction
- Shaft sinking
- Rock cutting
- Hoisting
- Arctic environment
- Filling and support
- Ventilation
- New stoping methods
- Transportation
- Rock mechanics
- Materials and equipment development
- Robotics

Metallurgy

- Comminution
- Sorting
- Gravity concentration
- Flotation
- Product disposal
- Direct reduction
- Biological metallurgy
- Petroleum processing
- Smelter feed preparation
- Smelting
- Steelmaking
- Chemical metallurgy
- Automation
- Materials and equipment development

Miscellaneous

- Economics/risk analysis
- Markets
- Geo-politics
- Education
- Computer modelling
- Computerisation
- Ceramics
- Metal substitution
- Occupational health
- Safety
- Refractories
- Sampling
- Environment

Papers will be of a two-column A4 format and should be of the order of 5000 words in length.

Intending authors are invited to submit the titles of proposed papers together with a brief synopsis (not more than 250 words) outlining the aims, content and conclusions of their papers. Synopses must be received by 1 February 1985 and authors should advise whether they intend to be present at the Congress. Authors will be notified of the provisional acceptance of their papers by 1 May 1985. They will then be asked to submit the full text of papers by 1 October 1985 for final consideration. Accepted papers will be reprinted by the photo-offset process direct from the authors' typescripts.

Intending authors should note the following deadline dates:

Receipt of synopses	1 February 1985
Notification of provisional acceptance of papers	1 May 1985
Receipt of full texts for final review	1 October 1985

Tours

Pre-Congress and Post-Congress tours of approximately one week's duration are offered. Because of the wide variety of mining and metallurgical activities available to visit in Australia and New

Zealand, and the long distances to be travelled, it has been decided to offer initially a large number of tours of limited areas and interests. Intending participants are asked to assign priorities to their requests on the attached reply form. From the responses to this invitation, final decisions regarding each Pre-Congress and Post-Congress tour will be made.

At this time it is not possible to give precise details of local airline schedules which would be effective in 1986, but the organisers are confident that it will be feasible to visit the major locations of interest within each tour area within one week.

Where possible every effort will be made by the local tour organising committee to arrange details of the tours to suit the particular interests of participants - for example, geology, mining, metallurgy etc.

Participants who have special interests which are not covered by the range of tours listed below, should write directly to the Congress Secretary outlining their desires, to see what can be arranged. Pre-Congress tours will be arranged so that participants will arrive in Canberra on Saturday 10 May, 1986 in time for the proposed reception in the evening. Post-Congress tours will be arranged with participants leaving Canberra on Friday afternoon 16 May, 1986 for their tour destinations.

#### Registration and Programme

The registration fee for delegates who are members of constituent bodies is expected to be in the order of \$A500 which includes the cost of running the Congress, six volumes, morning and afternoon teas and lunches during the Congress sessions and all evening functions. It excludes the costs of tours and local excursions. For delegates who are non members of constituent bodies there will be a surcharge of \$A100 on the registration fee. The accompanying persons registration fee is expected to be \$A300.

It is expected that the Final Programme and Registration Form will be issued on 1 September 1985.

#### Enquiries

All correspondence relating to the Congress and proposals for papers should be addressed to:

The Honorary Secretary,  
13th Congress of the Council of Mining  
and Metallurgical Institutions,  
C/- The Australasian Institute of Mining and Metallurgy,  
P.O. Box 310,  
CARLTON SOUTH, Victoria,  
Australia 3053.



**13TH CONGRESS  
THE COUNCIL OF MINING AND METALLURGICAL INSTITUTIONS  
CANBERRA, AUSTRALIA, 11-16 MAY 1986  
REPLY FORM TO SECOND CIRCULAR**

Persons interested in attending the 13th CMMI Congress and/or participating in tours are asked to complete this form and return as soon as possible to:

The Honorary Secretary  
13th Congress of the Council of Mining and Metallurgical Institutions  
C/- The Australasian Institute of Mining and Metallurgy  
PO Box 310  
CARLTON SOUTH, Victoria  
Australia 3053.

SURNAME ..... GIVEN NAMES .....  
DESIGNATION (Professor/Dr/Mr/Mrs/Miss/Ms)

POSTAL ADDRESS .....

POSITION OR TITLE AND COMPANY/ORGANISATION .....

I am a member of (constituent body of CMMI) .....

Please indicate that you propose registering for the Congress by placing a tick in this box.

**TOURS**

Please complete the following details in respect of tours, and mark your priorities alongside those tours:

**PRE-CONGRESS TOURS**

- | Tour No.   | Mark priority<br>1, 2, 3 etc. |
|--|-------------------------------|
| <b>WESTERN AUSTRALIA</b>   |                               |
| 1. Gold and nickel mining and processing centres in Kalgoorlie district, ranging from as far north as Meekatharra, to Norseman in the south. | <input type="checkbox"/>      |
| 2. The coal, bauxite and mineral sands operations north and south of Perth.  | <input type="checkbox"/>      |
| 3. The alumina and nickel refining plants in the vicinity of Perth, and the nickel smelter at Kalgoorlie.                                    | <input type="checkbox"/>      |
| 4. The Pilbara district iron ore and natural gas operations, the Telfer gold mine and the Argyle diamond operation.                          | <input type="checkbox"/>      |

**NORTHERN TERRITORY**

- |  |                          |
|--|--------------------------|
| 5. Commencing from Darwin this tour will include the uranium mines in the East Alligator River area, the bauxite/alumina complex at Gove, and the manganese operation at Groote Eylandt. | <input type="checkbox"/> |
|--|--------------------------|

**NEW ZEALAND**

- |   |                          |
|---|--------------------------|
| 6. Commencing from Auckland this tour will include the coal, gold, iron sand, steel and petroleum operations in the North Island, and aluminium smelting in the South Island. | <input type="checkbox"/> |
|---|--------------------------|

**POST-CONGRESS TOURS**

**NORTH QUEENSLAND**

- |  |                          |
|--|--------------------------|
| 7. Commencing from Brisbane this tour will include the copper/silver/lead/zinc operations in the Mount Isa district, bauxite mining at Welpa, and nickel and copper refining facilities at Townsville. | <input type="checkbox"/> |
|--|--------------------------|

**CENTRAL QUEENSLAND**

- 8. Commencing from Brisbane this tour will include the extensive surface and underground coal mining operations in Central Queensland, the coal loading ports near Mackay and Gladstone, and the alumina/aluminium plants at Gladstone.

**NEW SOUTH WALES AND SOUTH AUSTRALIA**

- 9. Commencing from Sydney the coal mining operations, both surface and underground, in the Singleton, Newcastle and Port Kembla areas will be visited, together with coal loading ports at Newcastle and Port Kembla.
- 10. Commencing from Sydney the metal mining and processing facilities at Cobar, Elura, Broken Hill, Port Pirie, Whyalla and Olympic Dam (Roxby Downs), will be visited, including the research facilities at Australian Mineral Development Laboratories in Adelaide.

**VICTORIA AND TASMANIA**

- 11. Commencing from Melbourne this tour will include brown coal operations in eastern Victoria, scheelite mining at King Island, and tin, copper and silver/lead/zinc production in western Tasmania.
- 12. Commencing from Melbourne this tour will include smelters for aluminium, ferro-alloys and zinc in Victoria and Tasmania.

**PETROLEUM**

- 13. Commencing from Melbourne this tour will include the Bass Strait production and processing facilities, the Moomba and other Cooper Basin activities, and Port Bonython in South Australia.

**NEW ZEALAND**

- 14. Commencing from Auckland this tour will include the coal, gold, iron sand, steel and petroleum operations in the North Island, and aluminium smelting in the South Island.

**SHORT TWO-DAY TOURS**

In order to cater for those attending the Congress who may wish to have a shorter tour close to Canberra, you are asked to indicate your interest in the following tours, which can be arranged before and after the Congress. Please indicate your interest by a tick in the appropriate square.

Tour No.	Pre Congress	Post Congress
15. Cobar and Elura copper and lead/zinc mines and concentrators, Central New South Wales. (Pre and Post Congress ex Canberra)	<input type="checkbox"/>	<input type="checkbox"/>
16. Singleton, Hunter Valley, open cut and underground coal mines. (Pre Congress ex Sydney, Post Congress ex Canberra)	<input type="checkbox"/>	<input type="checkbox"/>
17. Newcastle underground coal mines and port facilities. (Pre Congress ex Sydney, Post Congress ex Canberra)	<input type="checkbox"/>	<input type="checkbox"/>
18. Newcastle steel, aluminium, lead/zinc and related industries. (Pre Congress ex Sydney, Post Congress ex Canberra)	<input type="checkbox"/>	<input type="checkbox"/>
19. Port Kembla underground coal mines and port facilities. (Pre Congress ex Sydney, Post Congress ex Canberra)	<input type="checkbox"/>	<input type="checkbox"/>
20. Port Kembla steel, copper and related industries. (Pre Congress ex Sydney, Post Congress ex Canberra)	<input type="checkbox"/>	<input type="checkbox"/>
21. Canberra district geological tour.	<input type="checkbox"/>	<input type="checkbox"/>

I will be accompanied by: .....

Special Interest, e.g. geology, mining, metallurgy, etc:



## VI LATIN AMERICAN GEOLOGICAL CONGRESS

Venue: Bogota, D.E., Colombia.  
 Dates: 9-12 October, 1985.

### Introduction

The VI Latin-American Geological Congress is an event of a multi-disciplinary character promoted by the "Consejo Consultivo de Directores de Servicios Geológicos de Latinoamérica". Its organization was granted to the Instituto Nacional de Investigaciones Geológico-Mineras, INGEOMINAS, during the realization of the V Latin-American Congress celebrated in October, 1982 in Buenos Aires, Argentina.

### Objectives

The main objective is the contribution for a better knowledge and study of the geologic problems of Latin American, and to promote the statement and dissertation of the investigations related to Geology, Mineral Resources and other general topics related with developing of Earth Sciences.

### General Topics

- Regional Geology
- Structural Geology
- Geochronology
- Hidrogeology
- Mineralogy
- Paleontology
- Economic Geology
- Stratigraphy

### Participants

The Congress is open to professionals of the Geology and other areas connected with Earth Sciences.

### Languages

Official languages for the Congress are: Spanish, English, French and Portuguese.

### Instructions to authors of technical papers

- Paper must be typewritten single space, letter paper size (21.5 x 28 cm)
- Title and presentation as in the attached model.
- Deadline for submission of papers: March 31st, 1985. Proceedings of the Congress will be forwarded during realization of the event.
- Only originals will be accepted.
- Printing of the Proceedings will be obtained directly from originals forwarded by the authors. Omissions or mistakes are not responsibility of the Executive Committee.

Registration Form

VI CONGRESO LATINOAMERICANO DE GEOLOGIA  
 INGEOMINAS-AGID  
 Bogotá, D.E., Colombia - 9al 12 de  
 octubre de 1985

VI LATIN-AMERICAN GEOLOGICAL CONGRESS  
 INGEOMINAS-AGID  
 Bogotá, D.E. - Colombia - October  
 9th-12th, 1985

Nombres y Apellidos \_\_\_\_\_

Name \_\_\_\_\_

Profesión \_\_\_\_\_

Profession \_\_\_\_\_

Entidad \_\_\_\_\_

Company of Organization \_\_\_\_\_

Dirección \_\_\_\_\_ Teléfono \_\_\_\_\_

Address \_\_\_\_\_ Phono \_\_\_\_\_

Ciudad \_\_\_\_\_ Pais \_\_\_\_\_

City \_\_\_\_\_ Country \_\_\_\_\_

Estoy interesado en presentar trabajo en el Congreso Si  No

I wish to present a paper in the Congress Yes  No

Valor de la Inscripción: U.S.\$150 Registration Fee: U.S.\$150

-oOo-

Address

Comité Ejecutivo  
 VI Congreso Latinoamericano de Geologia  
 INGEOMINAS - AGID  
 Diagonal 53 No. 34-53  
 Apartado Aéreo: 4865  
 Cables: INGEOMINAS  
 Bogotá, D.E. - Colombia

Executive Committee  
 VI Latin American Geological Congress  
 INGEOMINAS - AGID  
 Diagonal 53 No. 34-53  
 P.O. Box: 4865  
 Cable: INGEOMINAS  
 Bogotá, D.E. - Colombia

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CONFERENCE ON INSPECTION, REPAIR & MAINTENANCE FOR THE OFFSHORE  
 AND MARINE INDUSTRIES

Venue: Hyatt Regency Hotel, Singapore  
 Dates: February 26-28, 1985

Introduction

This Conference will bring you up-to-date on the current thinking and newest advances against corrosion, highlight innovations in non-destructive testing and inspection processes, analyse new construction and maintenance systems and proven repair techniques and explore current trends, options and alternatives.

Objectives

The object of this Conference is to offer technical insights into these vital areas crucial to all construction projects. The 1985 Asian Conference on Inspection, Repair & Maintenance includes 6 technical sessions with top experts on each of these subjects.

Technical Sessions

1. Materials of Construction and Design
2. Protective Coatings and Linings
3. Cathodic Protection
4. Corrosion Monitoring
5. Rig and Underwater Inspection
6. Repair and Maintenance Technology

Registration Fee

S\$1395/US\$665 per person (Special rates also available for groups).

Further Information/Registration

Phone: The Administrator Singapore: 3383521

Telex: RS 34834 IIR (Include company name and address)

Write to: Conference Administrator,  
IIR Exhibitions Pte. Ltd.,  
Suite 08-03, Golden Wall Centre,  
89 Short Street,  
Singapore 0718.

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## OIL AND GAS ACCOUNTING SEMINARS

Singapore: May 13-17, 1985

London: June 3-7, 1985

**BASIC INTERNATIONAL OIL AND GAS ACCOUNTING**

This five day introductory course provides all of the basic elements on oil and gas accounting.

**Who Should Attend?**

Any person who prepares or uses financial information for oil and gas producing companies will find the **BASIC SEMINAR** useful. Participants include:

- \* Staff accountants and financial personnel of oil and gas producing companies, including national oil companies
- \* Non-financial managers
- \* Staff of accounting firms
- \* Government officials who interact with oil and gas producing companies
- \* Attorneys, engineers and other professionals who use financial information of oil and gas producing companies

### **Prerequisite**

Participants may have little or no accounting or oil and gas background. A special short segment on the morning of the second day is designed for participants with limited accounting experience. The primary prerequisite is that the participant have a need to better understand oil and gas accounting.

### **Purpose**

This seminar introduces the participant to oil and gas accounting with emphasis on preparation and interpretation of internal accounting and financial information. The purpose of the seminar is to learn the accounting characteristics, forms, and procedures that are unique to the oil and gas industry.

### **Basic Seminar Curriculum:**

**Day 1:** Basic industry characteristics and accounting terms. This session concentrates on the geology and engineering concepts necessary for understanding accounting. Primary economic relationships, such as long term supply contracts and production sharing contracts are discussed in detail.

**Day 2:** Basic accounting concepts. The first part of this session is designed for participants who have limited accounting backgrounds. Revenue accounting and systems will be discussed during the remainder of the day. The session will concentrate on documents such as authorizations for expenditure, run tickets, invoices, billings, and others.

**Day 3:** Gas accounting; the budgeting process. Initially, this session will concentrate on gas accounting with emphasis on gas processing plant accounting and allocation problems. The remainder of the day will be spent on preparation, revision, and approval of the operating and capital expenditure budgets. The session will cover analysis of results and interpretation of variances from the budget.

**Day 4:** Capital asset accounting. A detailed study of successful efforts and full cost accounting with careful attention to specific rules in accounting for acquisition, exploration, and development costs. Special problems with amortization will be discussed. Included is a major case on fixed asset accounting.

**Day 5:** Taxation and auditing procedures. A general look at the tax structures in various oil producing countries and the accounting procedures for taxation. A careful study of the different types of auditing; internal, governmental, joint interest, and independent, is followed by an examination of audit procedures and techniques.

Singapore: May 20-22, 1985

London: June 10-12, 1985

### **ADVANCED INTERNATIONAL OIL AND GAS ACCOUNTING**

This three day advanced course concentrates on the current relevant topics in financial reporting and disclosures by oil and gas producing companies.

#### **Who Should Attend?**

The **ADVANCED SEMINAR** is useful for individuals involved with the preparation, auditing, or use of external financial statements including:

- \* Financial staff of oil and gas producing companies,
- \* Financial and managerial personnel of national oil companies,
- \* All levels of personnel of accounting firms,
- \* Attorneys, engineers and other professionals who use financial information of oil and gas producing companies,
- \* Investors and financial consultants and advisors.

## Prerequisite

Participants are expected to have some experience in oil and gas accounting or should have completed the ACE Basic Oil and Gas Accounting Seminar. Any participant who has completed the Basic Seminar will be able to effectively join the advanced seminar.

## Purpose

The Advanced Seminar concentrates on contemporary technical issues in financial accounting and reporting by oil and gas producing companies. The discussion will center on implementation problems with the various oil and gas accounting pronouncements and with interpretation of published financial statement information.

## Curriculum

The curriculum will be kept flexible until just prior to the seminar so that the most current developments can be discussed. The seminar will include detailed discussions on the following topics plus any new developments prior to the seminar date:

- \* Foreign Currency Translations
- \* Current Value Accounting for oil and gas producing companies, including the Standardized Measure of Oil and Gas Producing Activities
- \* Accounting for Plant Removal and Site Restoration Costs
- \* Reporting Problems with Contemporary Production Sharing Contracts
- \* Oil and Gas Industry Audit Guide (AICPA)
- \* Deferred Income Taxes
- \* Detailed Reporting Requirements of the Financial Accounting Standards Board and The Securities and Exchange Commission.

The level of discussion and topic emphasis will be adjusted to the participants' particular needs.

## SPECIAL NOTE

Most seminars in oil and gas accounting are taught as if the participants were associated with oil and gas producing companies in the United States. While U.S. practices are influential in world-wide oil and gas accounting, the emphasis in both the basic and the advanced seminars is on general concepts and techniques that can be applied in any country.

The examples, exercises, and case studies are not patterned after any single company or country but will have general application for all participants. In developing the materials, the instructor draws on his wide range of experience in teaching and oil and gas consultation. All topics are newly developed *specifically* for these sessions.

## Seminar Fees

The Registration Fees for these seminars are:

Basic Oil & Gas Accounting	US\$875
Advanced Oil & Gas Accounting	US\$575

## Registration

For each registration, send NAME OF PARTICIPANT, EMPLOYER, PARTICIPANT'S TITLE OR POSITION, CITY OF SEMINAR DESIRED AND SPECIFY BASIC, ADVANCED, OR BOTH SEMINARS.

Registration may be made by:

- Telex - Number: 744409, Answerback: ACE LBK,
- Mail - 3104 76th. St., Lubbock Texas USA, 79423, or
- Phone - (806) 745-6476

## Information

For information on any aspect of these seminars, contact:

Robert J. Koester  
 Accounting Continuing Education, International  
 3104 76th St.  
 Lubbock Texas, USA 79423  
 Telex: 744409, Answerback: ACE LBK  
 Telephone: (806) 745-6476

## AAPG'S SINGLE SPEAKER PROGRAM

### About the Program

The Education Department of AAPG offers the Single Speaker Program as an opportunity for geological societies and companies to engage noted authorities in earth science as speakers for their meetings and continuing education programs.

The subjects and speakers listed in this catalog are available for 3, 6, 9 or 12-hour presentations. You may phone or write to request a presentation. We will contact the speaker and confirm mutually convenient dates for the appearance as quickly as possible.

AAPG Education Department,	Phone: (918) 584-2555
P.O. Box 979,	Telex: 49-9432
Tulsa, OK 74101.	Cable: AAPG TUL

### Responsibilities of Sponsoring Organization, AAPG and Speaker

The sponsoring organization is responsible for advance and on-site logistics for the presentation. This includes advertising, budgeting, securing the meeting place and necessary equipment, arranging for refreshments and reproduction of course notes, and taking care of hotel accommodations, transportation, and hospitality for the speaker.

Many speakers arrange their lectures and course notes to meet the special needs of the sponsoring organizations. Personal contact between the speaker and a designated person from the host organization is vital in this regard. Well in advance of the appearance, advise the speaker of the particular emphasis, especially with regard to examples and case histories, that will best suit your organization.

The AAPG Education Department coordinates communication and paperwork. When a course is confirmed, we will send both the speaker and the sponsoring organization a Course Data Sheet which will be exchanged between the two parties when completed.

The speaker fills out one side of the sheet - giving information such as audiovisual requirements, size of course notes, arrival and departure times, etc. The sponsor completes the other side with information such as the location and time of the appearance, size of the audience, and special interests which should be addressed.

Sponsoring organizations will also be sent evaluation forms and samples of certificates which may be ordered for individuals who attend the presentations. Biographical information on the speaker and abstracts of the material to be presented will be provided upon request.

### Fee

The sponsoring organization pays the speaker's honorarium and expenses and the AAPG fee.

AAPG will give the speaker an expense statement form before the appearance, and, if requested, provide an expense advance. After the presentation, we will pay the speaker directly and invoice the sponsor for the honorarium, expenses, and AAPG fee.

The fee schedule, effective January 1, 1984, is as follows:

<u>AAPG Fees for U.S. Presentations</u>	<u>Open to Public</u>	<u>Inhouse Training</u>
3-hour presentation .....	\$150	\$350
6-hour presentation .....	\$300	\$650
9-hour presentation .....	\$450	\$950
12-hour presentation .....	\$600	\$1,250
Speaker honorarium rate .....	\$200 per lecture-hour	

Due to additional time and paperwork required to coordinate overseas presentation, \$350 will be added to the AAPG fee rates for appearances outside the United States. All overseas course fees are invoiced and due in advance.

### Topic Headings

#### Basin Assessment

- Marine Evaporites: Facies Development and Relation to Hydrocarbons and Mineral Genesis ..... B. Charlotte Schreiber
- Groundwater Flow in Drainage Basins and Its Relevance to Hydrocarbon Exploration ..... József Tóth

#### Carbonates and Evaporites

- Austin Chalk Stratigraphic and Diagenetic Controls of Oil Entrapment ..... John F. Harris
- Practical Subsurface and Stratigraphic Methods of Exploration for Carbonate Reservoirs ..... John F. Harris
- Exploration for Carbonate Stratigraphic Reservoirs ..... Gerald M. Friedman
- Carbonate Porosity Prediction ..... Raymond C. Murray
- Understanding Evaporites for Exploration ..... Raymond C. Murray
- Marine Evaporites: Facies Development and Relation to Hydrocarbons and Mineral Genesis ..... B. Charlotte Schreiber
- Stratigraphy and Petrography of Carbonate Reservoirs ..... James Lee Wilson

#### Clastic Diagenesis

- Diagenesis of Volcanic Sandstones ..... James R. Boles
- Principles of Chemical Diagenesis with Applications to Sandstone Cementation ..... James R. Boles
- Sandstone Diagenesis in Clay-Rich Sequences with an Example from the Gulf Coast Tertiary ..... James R. Boles
- Diagenesis of Sandstone with Emphasis on Primary and Secondary Porosity Distribution in Relation to Exploration and Production of Hydrocarbons ..... Earle F. McBride
- Secondary Reservoir Porosity in the Course of Sandstone Diagenesis ..... Volkmar Schmidt

#### Clastic Sediments and Facies

- Exploration for Sandstone Stratigraphic Traps ..... Robert R. Berg
- Terrigenous Depositional Systems - A Genetic Approach to Facies Analysis in Petroleum Mineral Exploration .... L.F. Brown, Jr.

- Depositional Systems in the Exploration for Sandstone Stratigraphic Traps ..... William E. Galloway
- Analysis of Sandstone Depositional Environments .. Richard J. Moiola
- Modern and Ancient Deep-Sea Fan Sedimentation ..... Tor H. Nilsen
- Turbidite Sedimentation in California ..... Tor H. Nilsen
- Sedimentation in Rapidly Subsiding Alluvial Basins ..... Ron Steel
- Exploration for Turbidites and other Deep-Water Sandstones .....  
..... Roger G. Walker
- Computer, Mathematical and Statistical Applications
- Modern Methods of Age Dating and Stratigraphic Correlation .....  
..... William W. Hay
- Computer Applications by Petroleum Geologists ..... C.F. Iglehart
- Application of the Computer in Petroleum Exploration .....  
..... Philip H. Stark
- Fluvial, Deltaic and Nearshore Applications
- Exploration for Sandstone Stratigraphic Traps ..... Robert R. Berg
- Analysis of Sandstone Depositional Environments .. Richard J. Moiola
- Geophysics for Geologists
- An Integrated Approach to Seismic Stratigraphic Exploration .....  
..... Norman S. Neidel
- Seismic Data Processing for Stratigraphic Objectives .....  
..... Norman S. Neidel
- Stratigraphic Modeling and Interpretation - Geophysical Principles  
and Techniques ..... Norman S. Neidel
- Stratigraphic Interpretation of Seismic Data .... Robert E. Sheriff
- Structural Interpretation of Seismic Data ..... Robert E. Sheriff
- Aeromagnetic Applications in Hydrocarbon Exploration Isidore Zietz
- Geopressure in Exploration
- Pore Pressure: Its Ramifications and Its Relationship to Structural  
Geology ..... Peter E. Gretener
- Global Tectonics and Oil Exploration
- Stratigraphy and Sedimentary Tectonics of the Appalachians .....  
..... John M. Dennison
- Plate Tectonics, Sea-Floor Spreading, and Continental Drift .....  
..... Robert S. Dietz
- Continental Drift and Global Mass Balance ..... William W. Hay
- Petroleum Exploration in Thrust Belts and Their Adjacent Forelands ..  
..... James D. Lowell
- Structural Styles, Their Plate Tectonic Habitats and Hydrocarbon Traps  
in Petroleum Provinces ..... James D. Lowell
- Sedimentation, Tectonics and Basin Development - Examples of Rift  
and Strike-Slip Basins from Scotland, Norway, and Svalbard ...  
..... Ron Steel
- Tectonic Guidelines to Oil and Gas Exploration .. Thomas L. Thompson



Log Analysis

Well Log Formation Evaluation ..... Richard H. Merkel

Organic Geochemistry in Petroleum Exploration

Geothermics: Using Temperature in Hydrocarbon Exploration .....  
 ..... Peter E. Greten

Photogeology and Remote Sensing

Radar for Geological Exploration ..... Louis F. Dwellwig  
 Remote Sensing Applied to Oil Exploration ..... Louis F. Dwellwig

Regional Geology

Geology and Petroleum Potential of Northwestern Montana .....  
 ..... W.W. Boberg

Geology of Western North America ..... B. Clark Burchfiel

Working with California Tectonic Problems ..... John C. Crowell

Tectonic Evolution of Western North America ..... Gregory A. Davis

Stratigraphy and Sedimentary Tectonics of the Appalachian Basin ....  
 ..... John M. Dennison

Geologic Evolution and Hydrocarbon Potential of the Louisiana Slope  
 ..... Allen Lowrie

Eocene Tectonics, Sedimentation, and Stratigraphy of the San Joaquin  
 Valley Area ..... Tor H. Nilsen

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 and Strike-Slip Basins from Scotland, Norway, and Svalbard ...  
 ..... Ron Steel

Stratigraphic and Tectonic Evolution of the Indian Ocean .....  
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Geological Applications of Reservoir Engineering Tools .....  
 ..... John R. Farina

Drillstem Testing ..... W. John Lee

Fundamentals of Petroleum Reservoir Behavior ..... W. John Lee

Oil and Gas Reserve Estimation ..... W. John Lee

Well Testing ..... W. John Lee

Seismic Stratigraphy

Facies Analysis and Its Role in Seismic Stratigraphic Interpretation  
 ..... L.F. Brown, Jr.

Seismic Stratigraphic Analysis of Rift and Post-Rift Continental  
 Margins - Role of Tectonic Evolution on Basin Style, Depositional  
 Systems, and Reservoir Potential Trends ..... L.F. Brown, Jr.

Seismic Stratigraphic Exploration for Deep-Water (Turbidite) Reservoirs  
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An Integrated Approach to Seismic Stratigraphic Exploration .....  
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- Exploration for Sandstone Stratigraphic Traps ..... Robert R. Berg
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- Exploration for Turbidites and Other Deep-Water Sandstones ..... Roger G. Walker
- Stratigraphy and Petrography of Carbonate Reservoirs ..... James Lee Wilson
- Structural Geology/Tectonics
- Tectonics, Structure, and Sedimentation along Strike-Slip and Oblique-Slip Mobile Belt ..... John C. Crowell
- Working with California Tectonic Problems ..... John C. Crowell
- Experimental Rock Deformation Studies - Their role in Solution of Structural Problems in Exploration and Production ..... Mel Friedman
- Structural Interpretation of Microstructures - A Review of Useful Fabrics and Textures ..... Mel Friedman
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- Exploration in Turbidites and Other Deep-Water Sandstones ..... Earle F. McBride
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Uranium and Other Minerals

Stratigraphic Framework Related to Uranium Possibilities in the  
 Appalachians ..... John M. Dennison  
 Depositional and Ground-Water Flow Systems in Exploration for  
 Uranium ..... William Galloway

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## EMPLOYMENT CORNER

Fellow geologist, Fred Claire Hankinson from the United States is seeking employment in the oil and gas exploration field. His professional resume is with the Hon. Secretary (contact Anna) and can be forwarded to any prospective employer who is interested. A brief resume of Fred is as follows:-

Name: Fred Claire Hankinson

Age: 46

Address: 2018 Alabama Avenue,  
 Savannah GA 31404,  
 912/233/3599,  
 U.S.A.

Qualifications: B.Sc (Hons) - Geology 1963  
 M.Sc - Mineral Engineering 1965

## Recent Working Experience:

- Fifteen years experience - oil and gas exploration.
- Senior Geologist, Pacific Tin Consolidated Corp. Oil & Gas Div.
- Vantage Production Co.
- Dow Chemical, U.S.A. - Oil & Gas Div.
- Occidental Petroleum Inc. Alaska.
- Union Oil Co, California.

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## KURSUS-KURSUS LATIHAN DAN BENGKEL-BENGKEL (TRAINING COURSES AND WORKSHOPS)

December 1984 - January 1985

METHODS AND TECHNIQUES IN EXPLORATION GEOPHYSICS (Hyderabad, India). Diploma course organized annually by the National Geophysical Research Institute of the Council of Scientific and Industrial Research, Hyderabad, India, and sponsored by Unesco. Language: English. For information: The Director, International Training Course on methods and techniques in geophysical exploration, National Geophysical Research Institute, Hyderabad, 500 007 (A.P.) India.

January 1985 - March 1985

REMOTE SENSING APPLICATION AND DIGITAL IMAGE PROCESSING (Enschede, The Netherlands). Certificate courses on techniques for national resources surveys, organized annually by the International Institute of Aerial Surveys and Earth Sciences (ITC). Sponsored by Unesco. English. For information: ITC Student Affairs Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

1st Half 1985

WORKSHOP ON THE ECONOMIC GEOLOGY, EXPLORATION, MINING AND MARKETING OF POTASH AND OTHER FERTILIZER MINERALS (Bangkok, Thailand).

February 1985

METALLOGENY (Quito, Ecuador). Annual training course for Latin Americans organized by Central University of Quito, the Autonomous University of Madrid (Spain), and Unesco. Spanish. For information: Ing. Antonio Salgado, Director, Curso Internacional de Metaloginia, Escuela de Ingenieria en Geologia, Minas y Petroleos, Division de Post-grado, Universidad Central, Quito, Ecuador.

February 1985 - March 1985

GEOCHEMICAL PROSPECTING TECHNIQUES (Tervuren, Belgium). Annual course sponsored by the Royal Museum of Central Africa and UNDP. French. For information: Musee royal de l'Afrique centrale, Steenveg op Leuven, 13, B-1980 Tervuren, Belgium.

25 February - 9 March 1985

UNITED NATIONS INTERREGIONAL SEMINAR AND STUDY TOUR ON GOLD EXPLORATION AND DEVELOPMENT (Bangalore, India). For information: Mr. Geoffrey Robson, Chief, Minerals Branch, Natural Resources and Energy Division, DTCD - United Nations, Room DC-848, New York, N.Y. 10017, U.S.A.

February 1985 - June 1985

MINERAL EXPLORATION (Leoben, Austria). Diploma course organized annually by the University of Mining and Metallurgy in Leoben and sponsored by Unesco. English. For information: University for Mining and Metallurgy, Postgraduate course on mineral exploration, Montanuniversitat, Leoben, A-8700, Austria.

February 1985 - November 1985

PHOTOINTERPRETATION APPLIED TO GEOLOGY AND GEOTECHNICS (Bogota, Colombia). Course organized by the Interamerican Centre of Photo-interpretation (CIAF) in cooperation with ITC and Unesco. Spanish. For information: Academic Secretariat of the CIAF, Apartado Aereo 53754, Bogota 2, Colombia.

February 1985 - December 1985

GEOHERMICS (Pisa, Italy). Certificate course organized annually by the Istituto Internazionale per le Ricerche Geotermiche and sponsored by Unesco, UNDP and Italy. English. For information: Dr. Mario Fanelli, Istituto Internazionale per le Ricerche Geotermiche, Via Buongusto 1, 56100 Pisa, Italy.

March 1985 - April 1985

MINERAL EXPLORATION (Paris, France). Short course based on a simulation method organized annually by the Ecole Nationale Superieure des Mines and sponsored by Unesco. French. For information: Prof. H. Pelissonnier, Ecole des Mines, 60 Bd Saint Michel, 75272 Paris, Cedex 06, France.

Mid 1985

WORKSHOP ON GOLD GEOLOGY OF MELANESIA (Papua New-Guinea).

June 1985 - August 1985

PRINCIPLES AND METHODS OF ENGINEERING GEOLOGY (Budapest, Hungary). Certificate course organized by the Hungarian Geological Institute and sponsored by Unesco. Language: English. For information: Hungarian Geological Institute, Nepstadion ut 14, P.O. Box 106, H 1142 Budapest, Hungary.

June 1985 - August 1985

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

June 1985 - November 1985

GENERAL HYDROLOGY with emphasis on groundwater (Argentina). Post-graduate course. Language: Spanish. For information: IHP National Committee of Argentina, Comite Nacional para el Programa Hidrologico Internacional de la Republica Argentina, Av 9 de Julio 1925 - 15<sup>o</sup> piso, 1332 Buenos Aires, Argentina.

July 1985 - August 1985

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.

August 1985 - October 1985

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: GEOCHIMCSSR Unesco, Geological Survey, Malostranske nam. 19, 11821 Prague, Czechoslovakia.

September 1985

SEMINAR ON DRILLING, SAMPLING AND BOREHOLE LOGGING (Wuxi, Jiangsu Province, China)

September 1985 - October 1985

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, A-8010 Graz, Austria.

September 1985 - November 1985

MINING 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: ITC (ME), 3, Kanaalweg, 2628 Delft, The Netherlands.

September 1985 - November 1985

GEOHERMAL ENERGY (Kyushu, Japan). Annual short course organized by the Government of Japan and sponsored by Unesco. Language: English. For information: Japan International Cooperation Agency (2nd Training Division, Training Affairs Department), P.O. Box 216, Shinjuku Mitsui Building, 2 - 1, Nishi-shinkuku-ku, Tokyo 160, Japan.

October 1985 - November 1985

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 1550 Postdam, German Democratic Republic.

October 1985 - September 1986

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. Languages: English and French. For information: Prof. Dr. R. Paepe, Director of IFAQ, Kwartairgeologie, Vrije Universiteit Brussel, Pleinlaan 2, B-1050, Brussels, Belgium.

October 1985 - September 1986

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.

November 1985 - December 1985

REMOTE SENSING APPLICATIONS COURSE FOR EARTH SCIENCES (Enschede, The Netherlands). Annual course organized by the International Institute for Aerial Survey and Earth Sciences and sponsored by Unesco. Language: English. For information: ITC Student Registration Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

## KALENDAR (CALENDAR)

A bracketed date (Mar-Apr 1984) denotes entry in that issue carried additional information.

1985

- January : ACID-SULPHATE SOILS (Meeting), Dakar, Senagal.  
(Dr. W.G. Sombroek, ISSS, International Soil Museum,  
9 Duivendaal, POB 353, 6700 A.J. Wageningen, The  
Netherlands)
- Jan 7 - 10 : HYDROGEOLOGY OF ROCKS OF LOW PERMEABILITY (17th  
International Congress of IAH), Tucson, Arizona,  
U.S.A. (Eugene S. Simpson, Department of Hydrology  
and Water Resources, College of Earth Sciences,  
The University of Arizona, Tucson, AZ 85721, U.A.A.)
- February : INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION ASSEMBLY  
(13th Session), Paris, France. (Unesco, 7, place  
de Fontenoy, 75700 Paris, France)
- Feb 11 - 14 : GEOMECHANICS IN TROPICAL LATERITE AND SAPROLITIC  
SOILS (1st International Conference), Sao Paulo,  
Brazil. (Dr. W.C. Hachich, Secretary ISTS-BMS, C.P.  
7141, 01000 Sao Paulo, SP, Brazil)
- Feb 11 - 14 : ASIAN MINING '85 (2nd Conference), Manila Philippines.  
(Meeting Secretary, The Institution of Mining and  
Metallurgy, 44 Portland Place, London W1N 4BR, U.K.)
- Feb 27 - : GEOLOGY OF THE OCEANS (75th Annual Meeting of the  
Mar 2 : Geologische Vereinigung), Kiel, West Germany.  
Languages: English and German. (M. Sarnthein,  
Geologisch-Palaeontologisches Institut, Universitaet,  
Olshausenstrasse, D-2300 Kiel, F.R.G.)
- Mar 11 - 15 : SE ASIAN GEOTECHNICAL CONFERENCE (8th), Kuala Lumpur,  
Malaysia. Language: English. (The Hon. Secretary,  
8th SEAGC, The Institution of Engineers, Malaysia,  
P.O. Box 223, Petaling Jaya, Selangor, Malaysia).
- Mar 11 - 15 : TUNNELLING 85 (4th International Symposium),  
Brighton, England. (Tunnelling 85, The Secretary,  
Institution of Mining and Metallurgy, 44 Portland  
Place, London W1N 4BR, U.K.)
- Apr 1 - 4 : EUROPEAN UNION OF GEOSCIENCES (Biennial Conference),  
Strasbourg, France. (Organizing Committee,  
Department of Earth Sciences, University of Cambridge,  
Downing Street, Cambridge CB2 3EQ, U.K.)
- Apr 1 - 5 : NUMERICAL METHODS IN GEOMECHANICS (5th International  
Conference), Nagoya, Japan. (Prof. T. Kawamoto,  
Department of Civil & Geotechnical Engineering,  
Nagoya University, Chikusa, Nagoya 464, Japan)
- Apr 9 - 12 : EVOLUTION OF THE EUROPEAN LITHOSPHERE (MEGS 4:  
Meeting of European Geological Societies), Edinburgh,  
U.K. (Dr. S.K. Monro, Institute of Geological  
Sciences, Murchison House, West Mains Road,  
Edinburgh EH9 3LA, Scotland, U.K.)

- Apr 14 - 17 : PROSPECTING IN AREAS OF DESERT TERRAIN (Conference), Rabat, Morocco. (Conference Office, IMM, 44 Portland Place, London W1N 4BR, U.K.)
- Apr 28 - : GEOCHEMICAL EXPLORATION (11th International AEG  
May 1 Symposium), Toronto, Canada. (Dr. W.B. Coker, Kidd Creek Mines Ltd., 357 Bay St., Ste. 300, Toronto, Ontario, Canada M5H 1T7)
- May 6 - 17 : NEOGENE PHOSPHORITES OF THE SE UNITED STATES (International field workshop and seminar, IGCP 156), Greenville, N.C., to Tallahassee, Florida. (W.C. Burnett, Dept. of Oceanography, Florida State University, Tallahassee, FL 32306, U.S.A.)
- May 7 - 10 : PETROCHEM MALAYSIA '85, Kuala Lumpur, Malaysia. (Conference and Exhibition Services Sdn. Bhd., 9A, Jalan SS24/8, Tamkan Megah, Petaling Jaya, Malaysia. Tel: 749257).
- May 13 - 17 : TUNGSTEN (3rd International Symposium), Madrid. (Mr. M.R.P. Maby, Secretary, Primary Tungsten Association, 280 Earls Court Road, London SW5 9AS, U.K.)
- May 15 - 17 : TURBIDITE-HOSTED GOLD DEPOSITS (International Symposium), Fredericton, New Brunswick, Canada. Symposium held with Geological Association of Canada Annual Meeting. (Simon J. Haynes, NOVA Scotia Department of Mines and Energy, P.O. Box 1087, 1690 Hollis Street, Halifax, Nova Scotia, Canada B3J 2X1)
- May 27 - 31 : AMERICAN GEOPHYSICAL UNION (Spring Meeting), Baltimore, Md. (Meetings, AGU, 2000 Florida Avenue, NW, Washington, DC 20009, U.S.A.)
- May 27 - : CORAL REEF CONGRESS: Reef and Man (5th International,  
June 1 Papeete, Tahiti. (Antenne Museum Ephe, Congres Recifs Coral Lines 1985, B.P. 562, Papeete, Tahiti, French Polynesia)
- June 2 - 9 : INTERNATIONAL MINERAL PROCESSING CONGRESS (15th), Cannes, France. Languages French and English. (International Mineral Processing Congress Secretary, BRGM SGN/Mineralurgie, B.P. 6009-45060 Oriens Cedex, France)
- June 9 - 15 : WATER RESOURCES (5th World Congress), Brussels, Belgium. (Dr. L.W. Debacker, c/o Brussels International Conference Centre, Parc des Expositions, Place de Belgique, B-1020 Brussels, Belgium)
- Oct 7 - 11 : FIRST ASIAN WATER TECHNOLOGY EXHIBITION & CONFERENCE, Putra World Trade Centre, Kuala Lumpur, Malaysia. (International Conferences & Exhibitions Ltd, 6 Porter Street, Baker Street, London W1M 1HZ, United Kingdom, Tel: 01-487 2622 Tlx: 21591 CONFEX G.

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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)—hardcover.
- Bulletin 3** (1970), 146 p. Papers in Gemorphology and Stratigraphy (with Bibliography supplement), edited by P.H. Stauffer. Price: M\$10.00 (US\$5.00).
- Bulletin 4** (1971), 100p. 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), 334p. Proceedings, Regional Conference on the Geology of Southeast Asia, Kuala Lumpur, March 1972. Edited by B.K. Tan. Price: M\$22.00 (US\$11.00)—hardcover only.
- Bulletin 7** (1974), 138 p. Edited by B.K. Tan. Price: M\$12.00 (US\$6.00).
- Bulletin 8** (1977), 158 p. 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\$12.50).
- Bulletin 10** (1978), 95 p. A collection of papers on the geology of the Asean region. 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\$25.00).
- Bulletin 12** (1980), 86p. Papers on Petroleum Geology, Engineering Geology, Structure, Palaeomagnetism & Petrology, edited by G.H. Teh. Price: M\$20.00 (US\$10.00).
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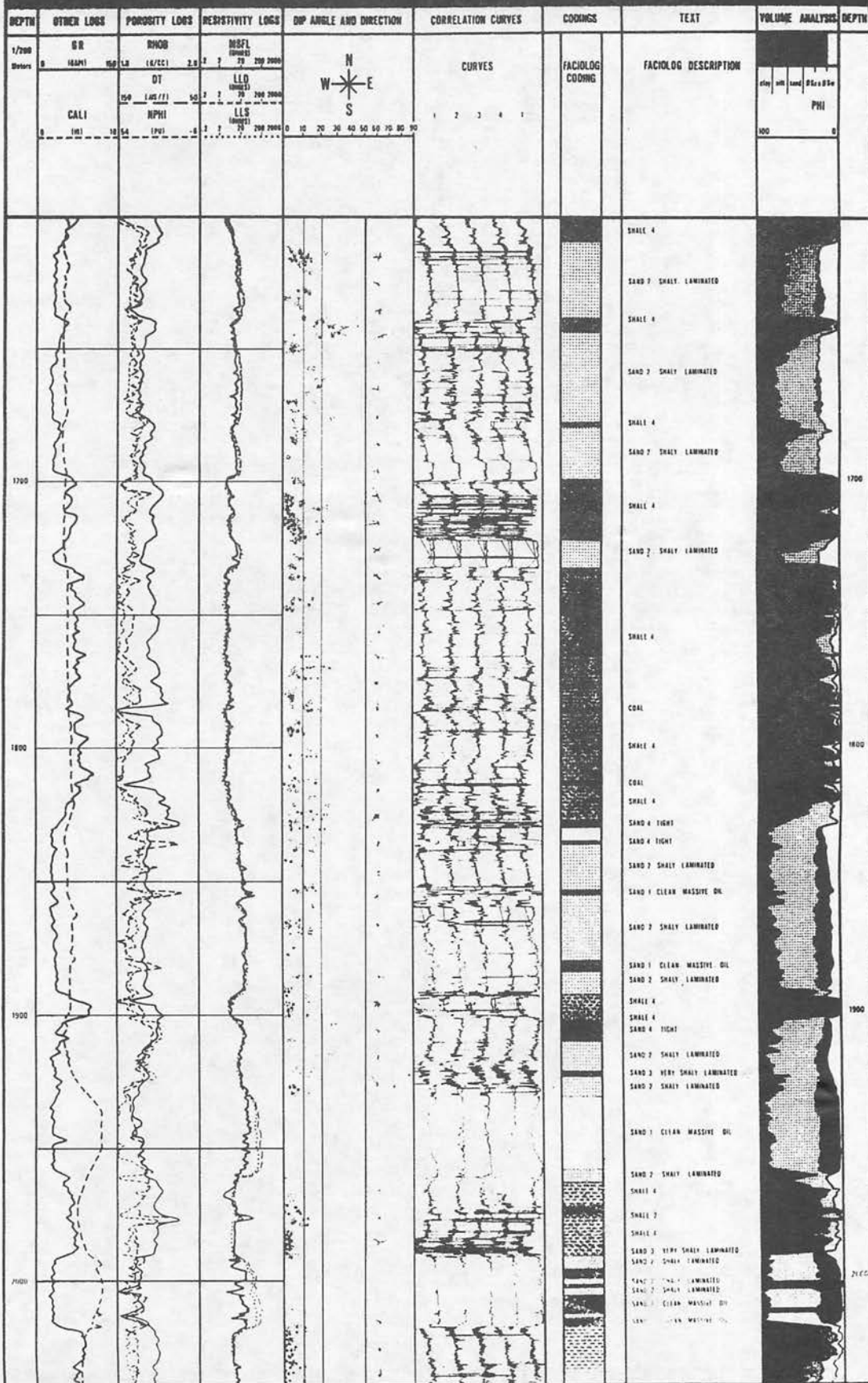
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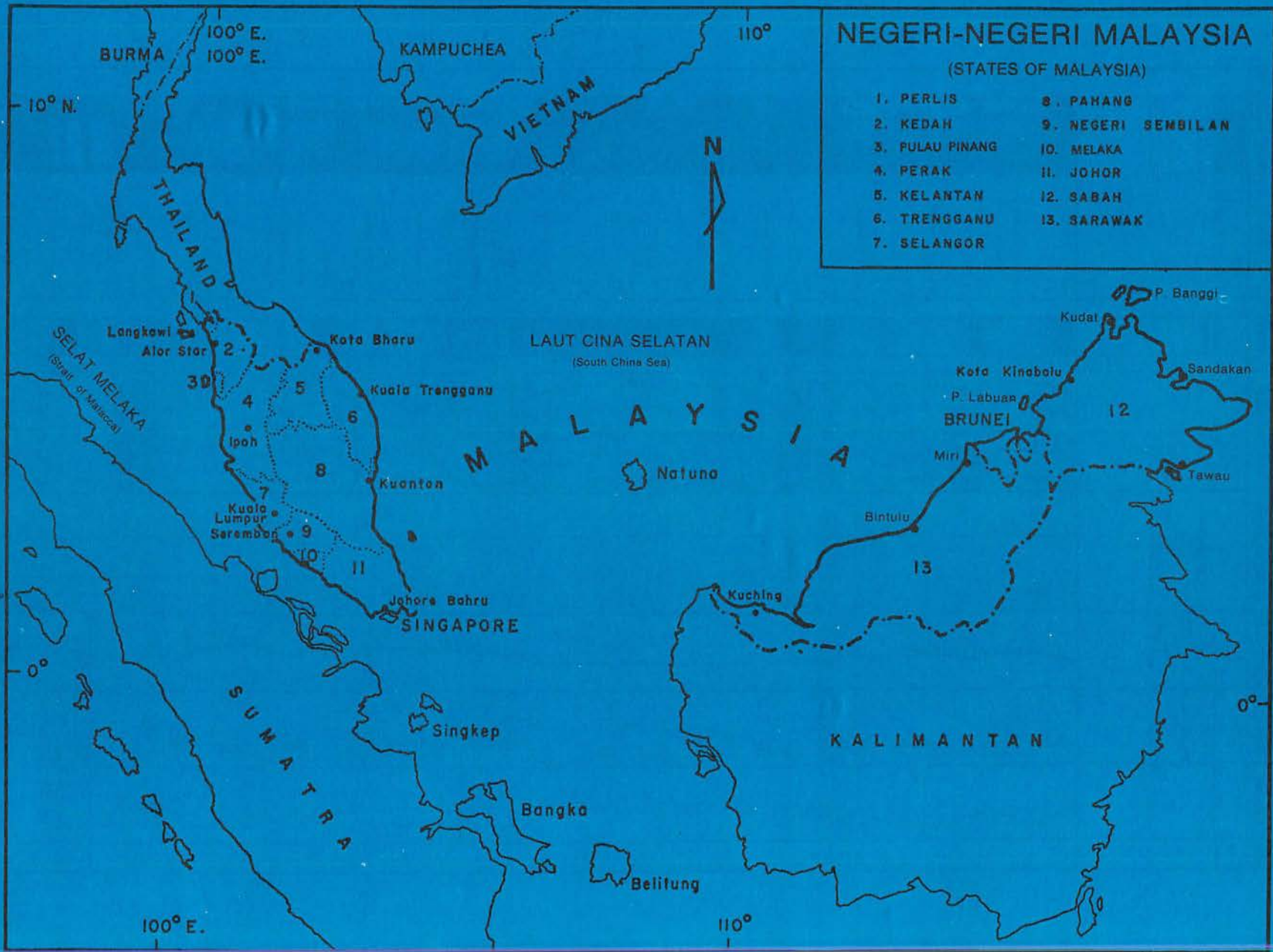
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# FACIOLOG



Wireline logging data is finding wider applications in sedimentology. This began with the study of log curve shapes to identify different depositional sequences. Recent developments have led to the use of logs to identify "electrofacies"—that is, a set of log responses that characterizes a sediment and distinguish it from others. The objective is to associate a certain type of lithofacies defined by core data with a set of log responses so that such a lithofacies can be identified in other wells without core data. This can also be used to guide the choice of interpretation model and in well to well correlations.



# NEGERI-NEGERI MALAYSIA

(STATES OF MALAYSIA)

- |                 |                    |
|-----------------|--------------------|
| 1. PERLIS       | 8. PAHANG          |
| 2. KEDAH        | 9. NEGERI SEMBILAN |
| 3. PULAU PINANG | 10. MELAKA         |
| 4. PERAK        | 11. JOHOR          |
| 5. KELANTAN     | 12. SABAH          |
| 6. TRENGGANU    | 13. SARAWAK        |
| 7. SELANGOR     |                    |