

PERSATUAN GEOLOGI MALAYSIA

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KANDUNGAN (CONTENTS)

CATATAN GEOLOGI (GEOLOGICAL NOTES)

K.R. Chakraborty: Occurrence of tholeiite in the Late Cenozoic basaltic lavas in Kuantan, Pahang, Peninsular Malaysia	269
S.K. Lam: Tektite found in Sarawak	273
Ibrahim bin Abdullah: Jalur Batu Kapur: Formasi Macincang atau Batu Kapur Setul?	276

PERHUBUNGAN LAIN (OTHER COMMUNICATIONS)

Tan Boon Kong: Excerpts from the writings of Karl Terzaghi	280
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PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

Petroleum Geologi Seminar '83—Report	283
Petroleum Geologi Seminar '83—Abstracts of Papers	289
K. Robinson: Tertiary development and petroleum geology of Offshore Sabah, Sarawak and Brunei	297
V. Schenk: Geotechnical investigation for tunnels and open cuts	297
Dialogue session—Professional Geologists and GSM Council	299
Open-house discussion—Professional Members and GSM Members	301
EGM on Proposed Professional Geologists Act	302

BERITA PERSATUAN (NEWS OF THE SOCIETY)

GEOSEA V—Progress Report (Nov. '83)	303
Letter to the Editor	306
GSM Council Nomination 1984/85	307
Keahlian (Membership)	308
Pertukaran Alamat (Change of Address)	308
Pertambahan Baru Perpustakaan (New Library Additions)	309

BERITA-BERITA LAIN (OTHER NEWS)

SEATRAD Centre—International Seminar on Mining Techniques for Alluvial Tin Deposits	309
SEATRAD Centre—new building	310
Quaternary Geology of Malaysia—Short Course	314
Gastech 84	315
AMF Exploration for Carbonate Reservoirs Workshop	317
AMF Electrical Methods in Mineral Exploration Workshop	318
ITC short courses in Remote Sensing	320
Kursus-kursus Latihan (Training Courses)	322
Kalendar (Calendar)	324



DIKELUARKAN DWIBULANAN
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CATATAN GEOLOGI
(GEOLOGICAL NOTES)

OCCURRENCE OF THOLEIITE IN THE LATE CENOZOIC BASALTIC
LAVAS IN KUANTAN, PAHANG, PENINSULAR MALAYSIA

CHAKRABORTY, K.R., Department of Geology, University of Malaya,
Kuala Lumpur, Malaysia.

The extrusion of basaltic lavas in and around Kuantan, Pahang, the only known occurrence of Late Cenozoic volcanism in Peninsular Malaysia. Recent palaeomagnetic and geochronologic (K-Ar) studies suggest that the lavas have been extruded during the Matuyama reversed magnetic epoch at about 1.7 ± 0.2 Ma (Haile *et al.*, in press). The Kuantan lavas have been previously described by several workers and three distinct compositional types have hitherto been recognised, namely, alkali olivine basalt (including hawaiite), basanite and olivine nephelinite (Chakraborty, 1980; Chakraborty *et al.*, 1980). However, in a recent study of a new batch of samples, it has been found that a few are tholeiitic in composition indicating that the basaltic lavas of Kuantan, though predominantly alkaline, also comprise minor flows of tholeiite.

The specimens of tholeiite come from the loose boulders in Sg. Patong and one of its tributaries. No in situ outcrop of tholeiite has yet been located. Petrographically the tholeiites resemble the rocks of alkali olivine basalt group in having olivine microphenocrysts and intergranular texture, but they are chemically distinct. The chemical compositions and CIPW norms of two analysed tholeiite samples are given in Table 1. Compositionally they lie close to but astride the plane of silica saturation in the normative basalt tetrahedron.

The tholeiites under consideration should not be construed as equivalent to or consanguineous with the hypersthene-normative rocks of the alkali olivine basalt (AOB) group previously reported and discussed by Chakraborty (1980). Significant chemical disparity exists between the analysed tholeiites and members of the AOB group which precludes any immediate genetic link between them. Compared to the hypersthene-normative rocks of the AOB group, the tholeiites have much higher contents of normative hypersthene as well as higher Mg-values (and hence less evolved), and while the former are alkaline in terms of alkali-silica relationship, the tholeiites are subalkaline (Fig. 1). Other important chemical differences between them are graphically depicted in Fig. 2; the tholeiites are relatively poorer in TiO_2 and CaO but richer in SiO_2 . It should also be noted that the tholeiites do not share the chemical variation trends displayed by the AOB group.

Since the tholeiite specimens come from stream boulders and since no radiometric dating has been done on these specimens, it may

Table 1

Chemical analyses and CIPW norms of two tholeiites from Kuantan

	<u>1</u>	<u>2</u>		<u>1</u>	<u>2</u>
SiO ₂	49.98	52.04	Qz	-	2.07
Al ₂ O ₃	14.33	14.11	Or	7.20	8.35
TiO ₂	1.70	1.77	Ab	25.37	25.46
FeO*	10.74	9.81	An	22.96	21.73
MnO	0.21	0.15	Di	9.65	9.41
MgO	8.21	7.58	Hy	22.95	25.37
CaO	7.61	7.22	Ol	3.94	-
Na ₂ O	2.93	2.94	Mt	3.25	2.97
K ₂ O	1.19	1.38	Il	3.30	3.44
L.I	1.67	1.78	Ap	1.38	1.21
Total:	99.14	99.28			

FeO* = Total Fe as FeO. L.I. = Loss on ignition.

Fe₂O₃/FeO ratio of 0.25 is used for norm calculation.

be argued that they may not be the products of Late Cenozoic volcanism but are related to the much older tholeiitic dolerite dykes (104 ± 10 Ma; Haile *et al.*, in press) that are common in the Kuantan area. This possibility, however, can be discounted on chemical grounds. Moreover, the tholeiites, like the other lava samples, are quite fresh whereas the dykes are invariably and often extensively, altered. In Oxide vs. FeO*/(FeO* + MgO) diagrams (not shown) the tholeiites do not plot on the regular variation curves of the dykes. The dykes with FeO*/(FeO* + MgO) ratios similar to those of the tholeiites have significantly lower SiO₂ and Na₂O, and higher CaO and MgO contents.

The tholeiitic lavas do not appear to be significant volumetrically, nevertheless their occurrence has important implications, concerning the genesis and evolution of magmas in this region, particularly in view of the fact that a small volcanic centre (a single volcano?) has erupted such a variety of contrasting lava types apparently within a short period of time.

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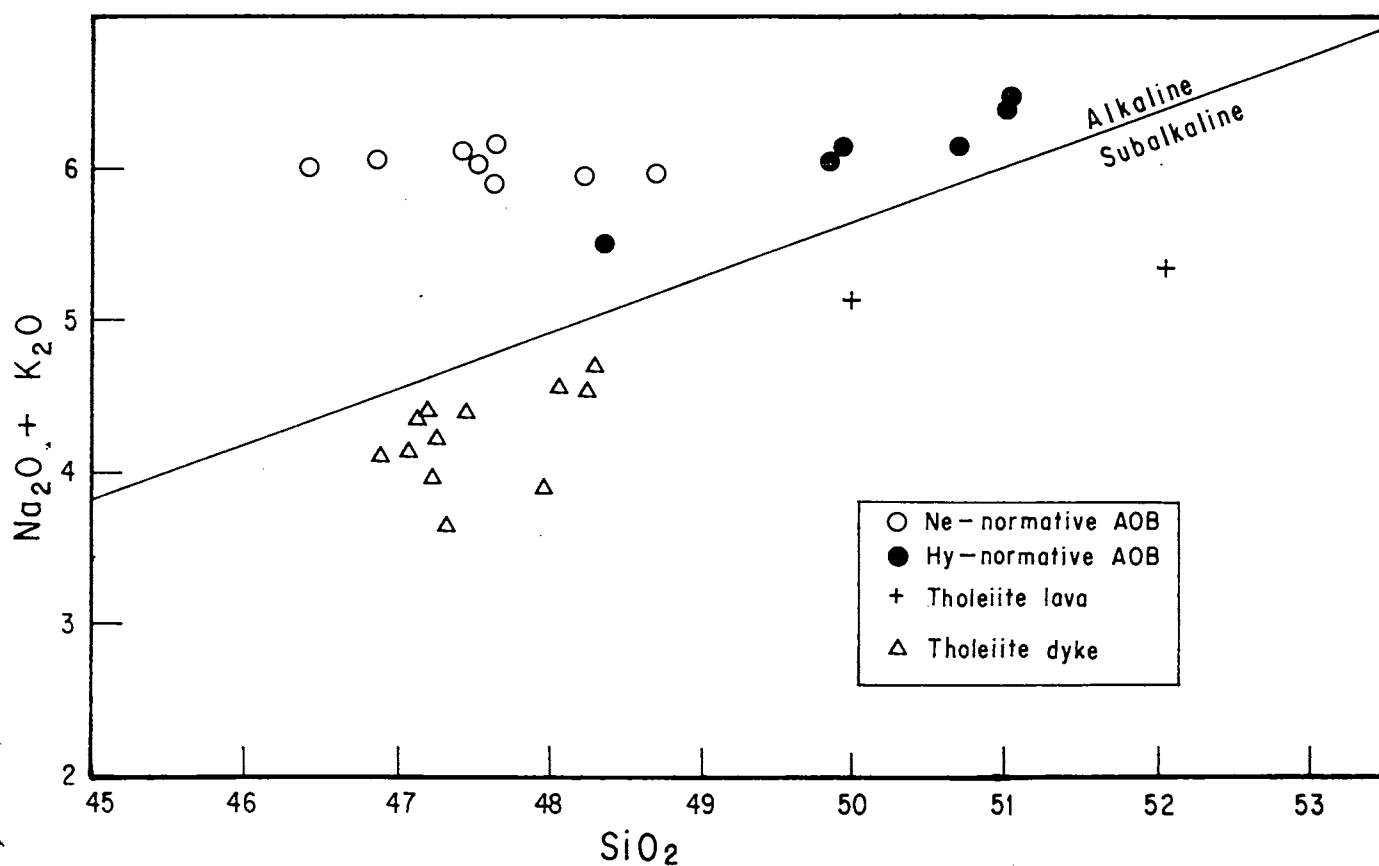


Figure 1. Total alkali vs. silica plots of the tholeiite and alkali olivine basalt group lavas. Plots of tholeiite dykes are also shown for comparison. Alkaline-subalkaline dividing line is after Irvine and Baragar (1971).

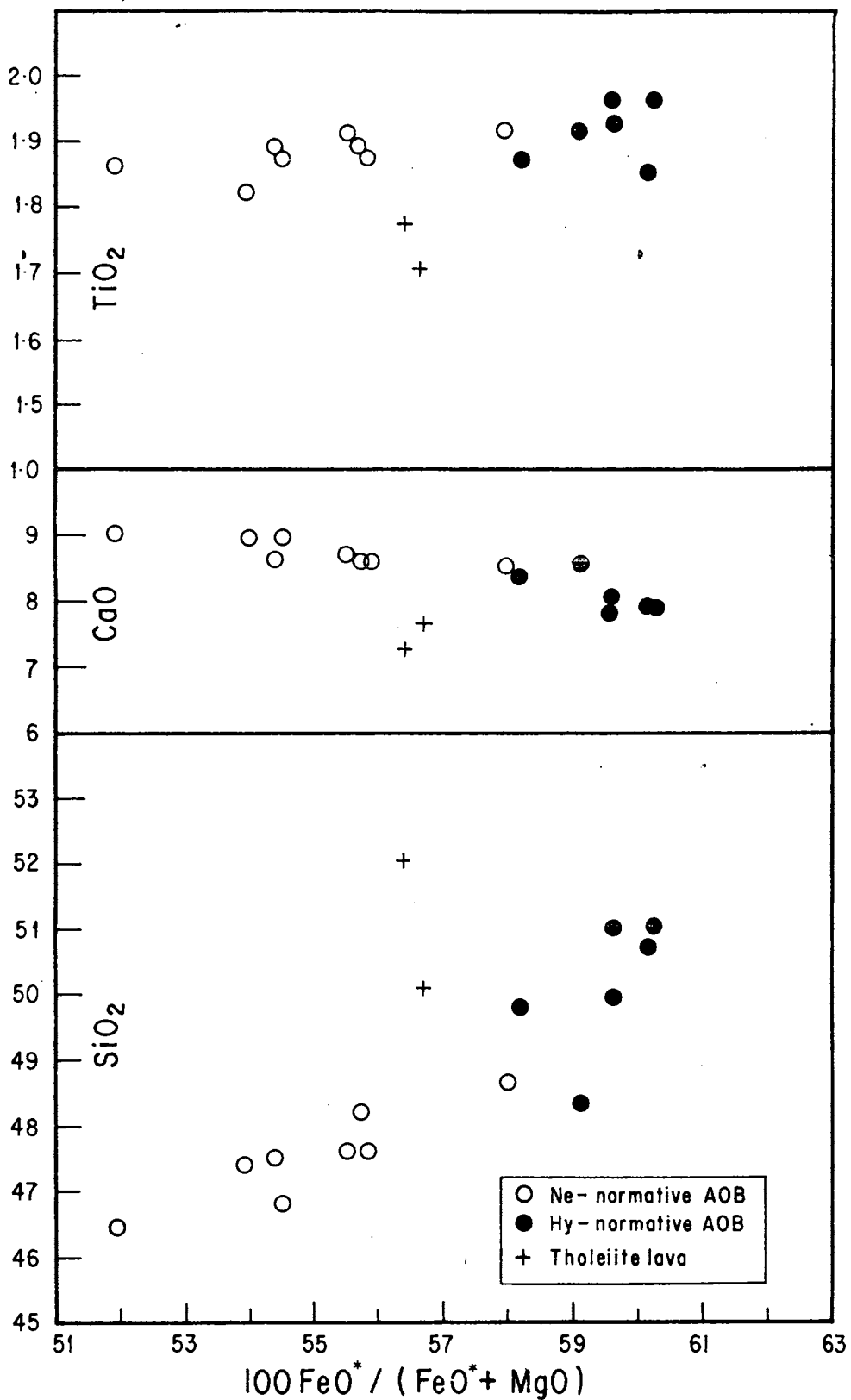


Figure 2. Oxide vs. $\text{FeO}^*/(\text{FeO}^* + \text{MgO})$ plots of the tholeiite and alkali olivine basalt group lavas.

TEKTITE FOUND IN SARAWAK

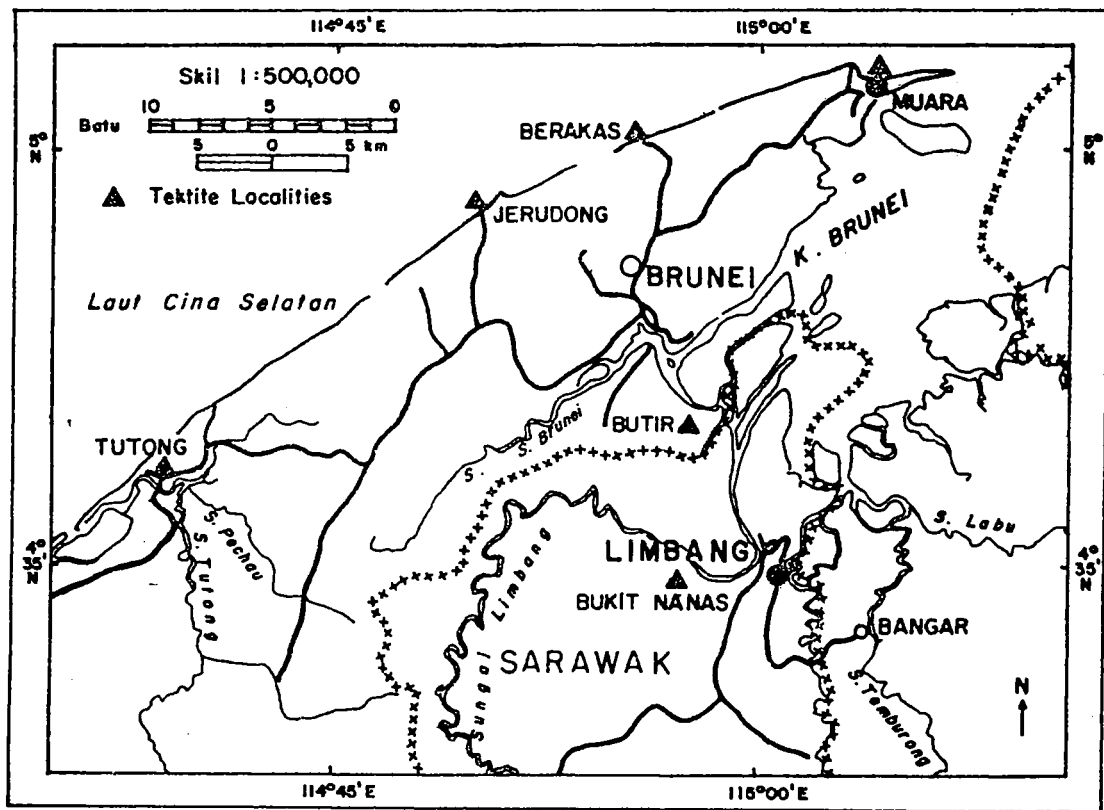
S.K. LAM, Jabatan Penyiataan Kajibumi Malaysia, Sarawak.

Tektites have not previously been reported in Sarawak, whereas in Brunei, a number of tektite localities had been reported (Mueller, 1915; Wilford, 1960; Tate, 1970). This short note records the first tektite locality known in Sarawak.

In March, 1982, the writer found one specimen of tektite in one of the test pits, TA22, dug at the Bukit Nanas gravel deposit which is located just south of Sungai Selangan between Sungai Berawan and Sungai Tubai 3 km southeast of Limbang town (Fig. 1), in north Sarawak. The location is at approximately latitude $4^{\circ}45'N$ and longitude $114^{\circ}57'E$.

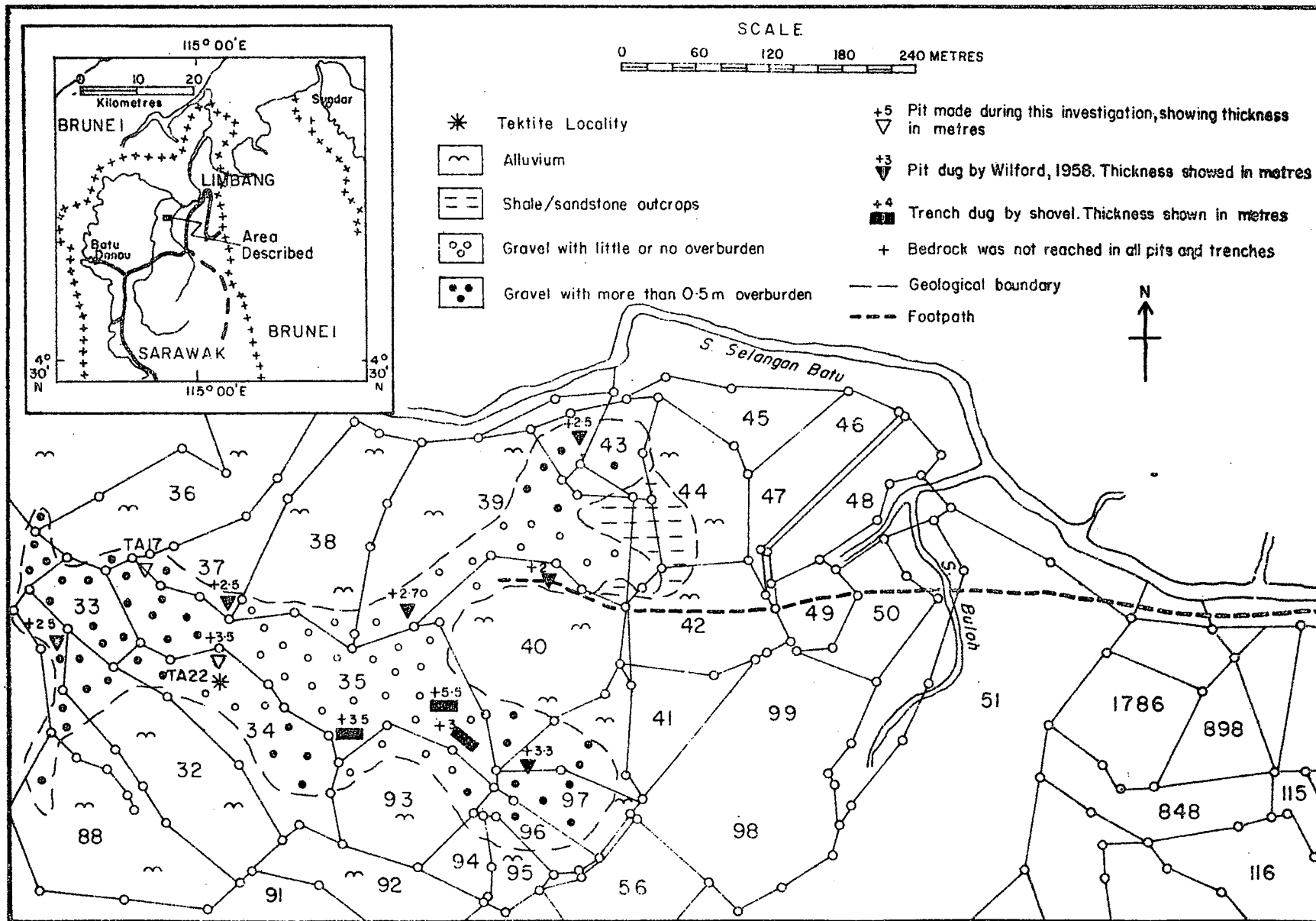
The tektite was found at a depth of about 1.5 m, amongst vein quartz and sandstone pebbles of the Bukit Nanas gravel deposit, which is a terrace deposit about 40 to 50 m a.s.l., forming a horse-shaped hill (Lam, 1982) (Fig. 2).

The tektite found is nearly spherical in shape, with a diameter of about 25 mm. The specimen has a brilliant black lustre and the surface is completely scoured with small marks which resemble hemispherical pits with a few deep, elongated pittings or grooves



SM 1221/1/83

Fig. 1. Tektite Localities in Sarawak and Brunei



SP2546/1/83

Fig. 2. Tektite locality at Bukit Nanas gravel deposit, Sungai Selangan, Limbang.

(see plate 1). No sign of abrasion from transport is observed on the specimen. The specimen weighs 35 g. The size of the tektite is within the size range of the smaller fraction of the gravel i.e. from 10 mm to 30 mm.

The occurrence of the Limbang tektite can be correlated to the Brunei tektites as it is quite close, geographically, to the latter (Fig. 1), and is found to occur in similar environment, i.e. associated with raised alluvial terrace deposits of Quaternary age. It also has corresponding physical properties to the Brunei tektites. Therefore, they may have come from the same origin.

Acknowledgement

The writer wishes to thank Mr. Denis Tan and Professor P.H. Stauffer for their comments on the draft of this note.

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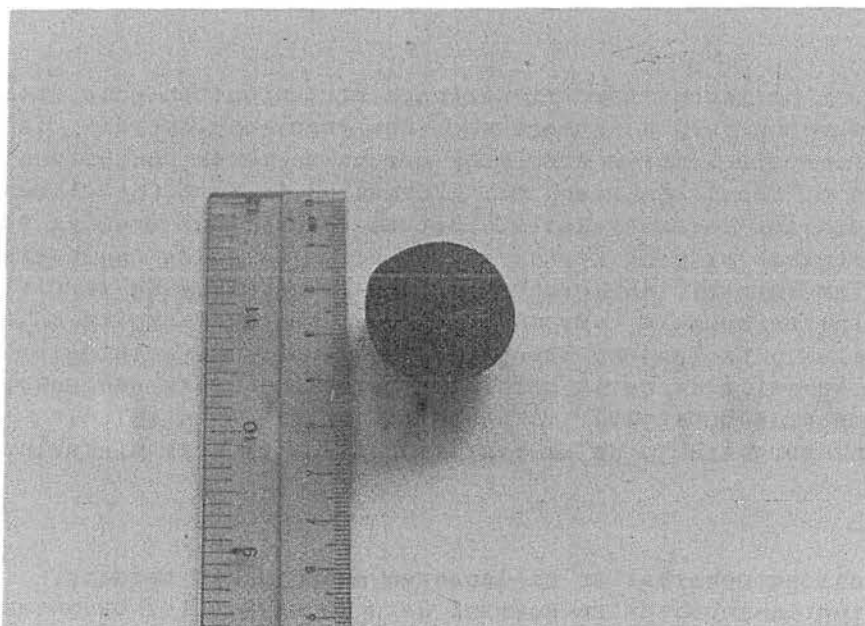


Plate 1. Tektite specimen found in Limbang area.

JALUR BATU KAPUR: FORMASI MACINCANG ATAU BATU KAPUR SETUL?

IBRAHIM Bin Abdullah, Jabatan Geologi, UKM, Bangi, Selangor.

Abstrak

Jalur batu kapur nipis dalam Formasi Macincang berhampiran sempadan atas menunjukkan ciri litologi yang bersamaan dengan batuan Formasi Setul yang menindih di atasnya. Kajian geologi struktur pada batuan Formasi Macincang dan Formasi Setul di beberapa lokasi berhampiran Kuala Kubang Badak menunjukkan batuan telah terlipat dengan gaya lipatan yang rebah. Lipatan kecil dan sesar songsang dan sesar sungkup menunjukkan angkutan tektonik ke arah barat. Pemerhatian pada jalur batu kapur yang sebelum ini ditafsirkan sebagai sebahagian Formasi Macincang menunjukkan ia bersesuaian dengan gaya struktur pada Batu Kapur Setul dan seterusnya ditafsirkan sebagai sebahagian daripada Batu Kapur Setul yang telah terlipat.

Abstract

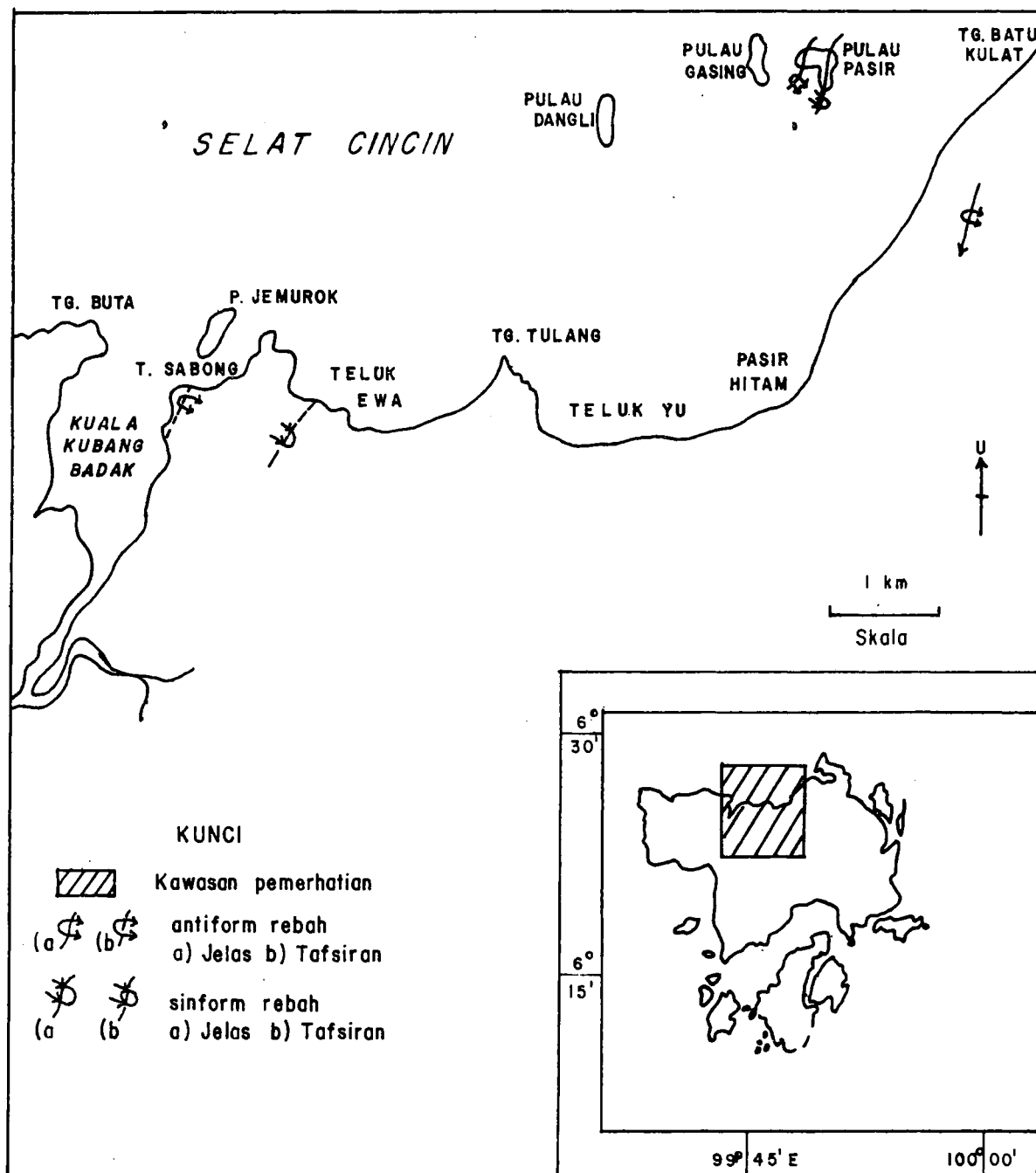
A thin band of limestone which occurs near the top of Macincang Formation, shows a similar lithological characteristics to the overlying Setul Limestone. Structural geological investigation near Kuala Kubang Badak, Langkawi shows the rocks of Macincang and Setul Formations have been folded into recumbent folds. Small scale folds, reverse faults and thrust faults indicate westward tectonic transport. Investigation in the limestone band shows that the rocks have also been folded with similar structural style to that of the Setul Limestone and therefore is interpreted as a part of the folded Setul Limestone.

Pengenalan

Formasi Macincang terdiri daripada urutan batuan yang utamanya kuarzit disamping serpih, subgreywack dan juga konglomerat. Ia dipercayai berusia Kambria Atas yang merupakan teras dan batuan yang tertua di Kepulauan Langkawi. Formasi Batu Kapur Setul menindih Formasi Macincang secara selaras. Batuan Formasi ini umumnya adalah batu kapur berhablur yang keras, rapuh, berwarna gelap dan berlapisan tebal. Dalam formasi ini terdapat pula ahli gersik yang terdiri daripada lapisan kuarzit, serpih berkarbon, sabak disamping bahan berchert hitam. Di Tanjung Sabong (Rajah 1) ditemui satu jalur batu kapur berstilolit serta bersilika berselang lapis dengan kuarzit dan batu keping (Jones, 1978). Kehadirannya di lapangan telah ditafsirkan sebagai satu jalur yang terapat dalam Formasi Macincang.

Pemerhatian

Kajian dan pemerhatian di lapangan menunjukkan terdapat struktur lipatan rebah dalam Formasi Batu Kapur Setul. Di antaranya adalah di Pulau Pasir, selatan Batu Kulat dan Tanjung Cawat.



Rajah I. Peta menunjukkan lokasi pemerhatian yang dinyatakan dalam teks.

Berdasarkan kepada sesar songsand dan sesar sungkup (Pulau Pasir dan Pulau Dangli), ditafsirkan angkutan tektonik ke arah barat. Rajah 2 adalah keratan rentas struktur di Pulau Pasir.

Pemerhatian yang dilakukan di Pulau Jemuruk dan Tanjung Sabong menunjukkan Batuan Formasi Macincang ditindih secara selaras oleh Batu Kapur Setul dengan kemiringan 10° ke timur. Lapisan silang dalam kuarzit menunjukkan lapisan di sini masih berada dalam keadaan normal.

Jalur batu kapur pada tanjung berhampiran dengan Telok Sabong menunjukkan ia ditindih oleh Formasi Macincang secara selaras dengan kemiringan 25° - 30° ke timur. Tjia (hubungan lisan) telah memerhatikan lipatan kecil yang rebah dalam lapisan nipis batu kapur bersilika. Arah dan tunjaman paksi lipatan kecil tersebut adalah 35/0, manakala jurus dan kemiringan foliasi (ira satah paksi?) adalah 35/21. Di sini juga ditemui lapisan silang dalam batu pasir berkapur yang menunjukkan lapisan berada dalam kedudukan terbalik.

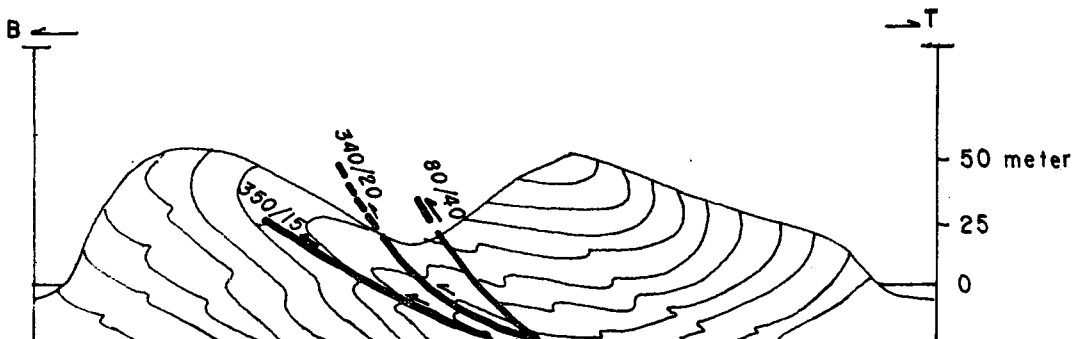
Kesimpulan

Daripada gaya lipatan rebah yang diperhatikan dalam Batu Kapur Setul, ditafsirkan mungkin terdapat satu lipatan rebah yang lebih besar di kawasan ini. Daripada struktur dan lapisan silang yang diperhatikan, dapat ditafsirkan ujudnya satu lipatan rebah yang lebih besar yang melibatkan sempadan Formasi Macincang dan Batu Kapur Setul (Rajah 3). Seterusnya, Jalur Batu Kapur dalam Formasi Macincang (Jones, 1978) adalah lebih cenderung untuk ditafsirkan sebahagian daripada Batu Kapur Setul berdasarkan litologi dan perkaitan strukturnya.

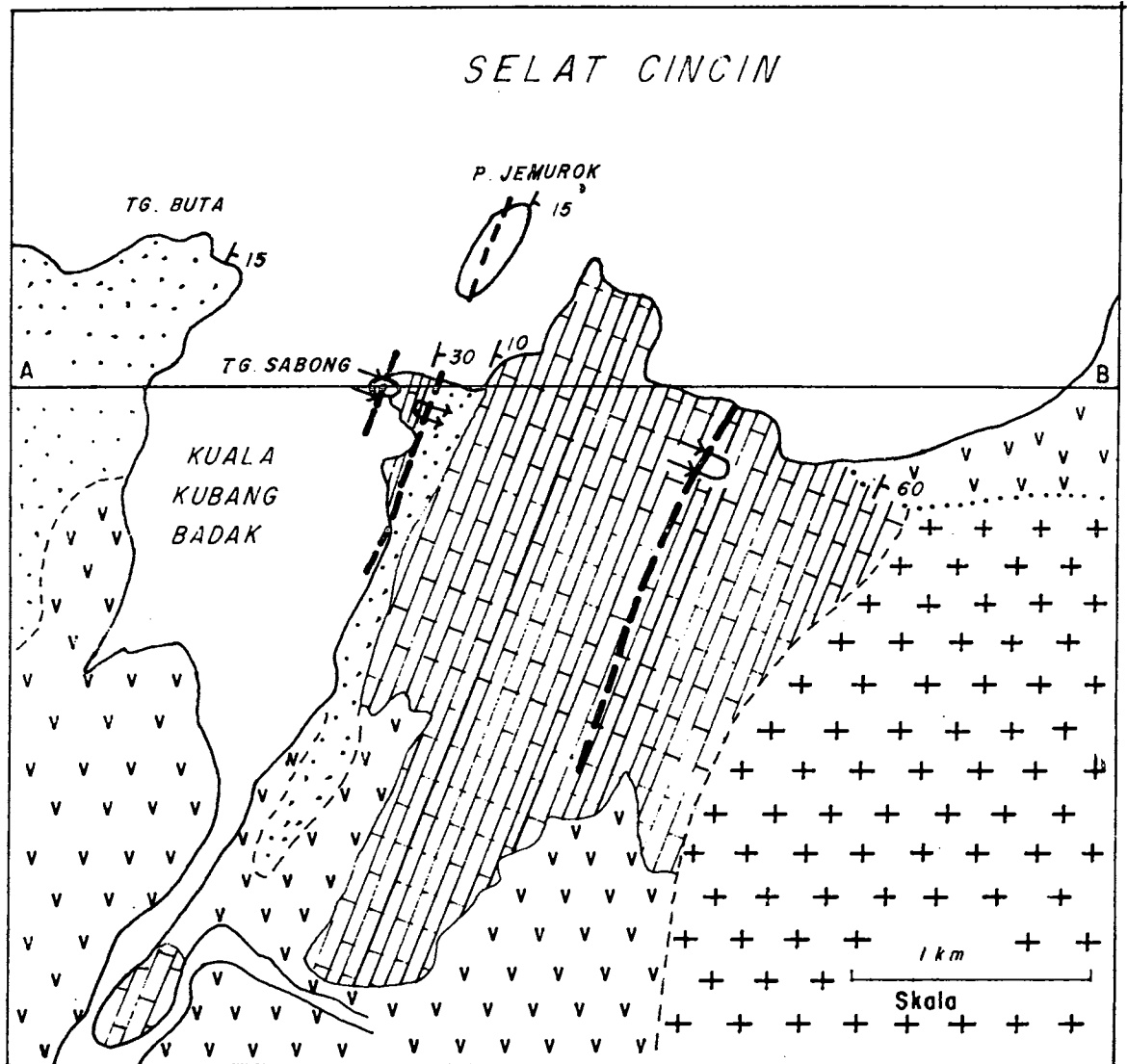
Rujukan

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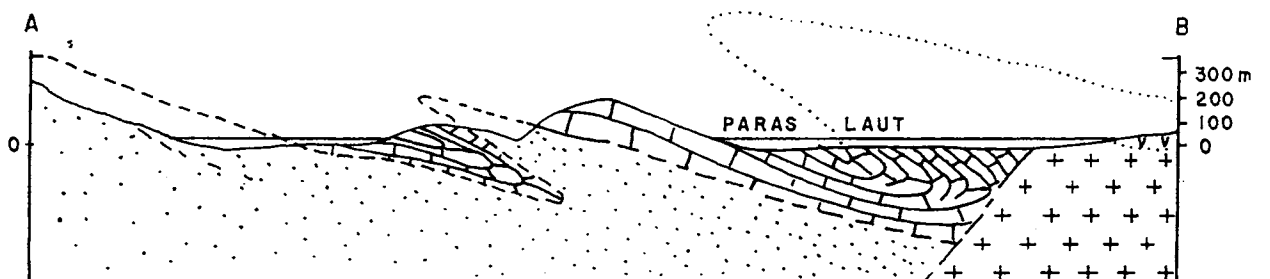
Manuskrip diterima 27 Mei 1983



Rajah 2: Gaya struktur lipatan rebah dan sesar sungkup di Pulau Pasir.



1. Formasi Macincang 2. Formasi Setul 3. Granit 4. Aluvium 5. Jurus dan Kemiringan
6. Sempadan Geologi 7. Sinform rebah 8. Antiform rebah.



Rajah 3. Peta geologi kawasan Kuala Kubang Badak (Jones, 1966) dan keratan geologi yang ditafsirkan.

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

EXCERPTS FROM THE WRITINGS OF KARL TERZAGHI

TAN Boon Kong, Jabatan Geologi, UKM, Bangi, Selangor.

Professor Karl Terzaghi, generally regarded as the Father of Soil Mechanics, was very much a geologist. Besides publishing numerous papers in soil mechanics and foundation engineering, he also wrote many papers in geology and engineering geology, often highlighting the role or significance of geologic factors in engineering works.

The following excerpts are taken from the book entitled: "From theory to practice in soil mechanics - Selections from the writings of Karl Terzaghi", edited by L. Bjerrum, A. Casagrande, R.B. Peck and A.W. Skempton, John Wiley and Sons, New York, 1960. Although these statements by Terzaghi were made in the fifties, some of the messages carried in them appear to be relevant and still applicable to the present time, in particular with respect to the Malaysian situation!

Excerpt 1

In his presidential address at the Fourth International Conference on Soil Mechanics and Foundation Engineering, London, 1957, Terzaghi spoke on the role of geology in engineering works as well as on the teaching of geology to civil engineering students:

"On account of the decisive influence of geological factors on the success of earthwork operations it was more than a coincidence that the first geological map was prepared, and published in 1813, by an engineer, William Smith, and not by a geologist. For similar reasons most of the major engineering operations involving deep excavation or tunnelling were preceded by a painstaking geological survey and disappointing results such as important differences between actual and estimated costs of a project were often attributed to inadequate geological investigation of the site.

Such was the status of earthwork engineering in 1900, when I entered the university. Every student in civil engineering was compelled to take a stiff course in geology. Considering in retrospect the topics covered in the course, it is obvious that the teacher had not the foggiest idea of the function of geology in engineering practice. The course was given by an expert in the realm of crystallography and the scope of his course reflected this fact. The poor student was unable to discriminate between what is useful and what is irrelevant. All he could do was to grin and bear it."

"Examining the array of useful knowledge which has filtered into my own system and crystallized into sound judgement. I find that it contains one ounce of geology for

every pound of theory of structures and soil mechanics. the one ounce of geology is as essential as the yeast in the processes of fermentation, but it represents only a minute fraction of the vast domain covered by the sciences of the earth. Therefore I believe that a two-semester course combined with field trips fully serves its purpose provided that the course represents the combined efforts of a geologist who appreciates the requirements of engineers and an engineer who has learned from personal experience that geology is indispensable in the practice of his profession. A few fortunate individuals combine the training and viewpoint of the geologist with that of the engineer. Such persons are ideally equipped to give a course in engineering geology."

Excerpt 2

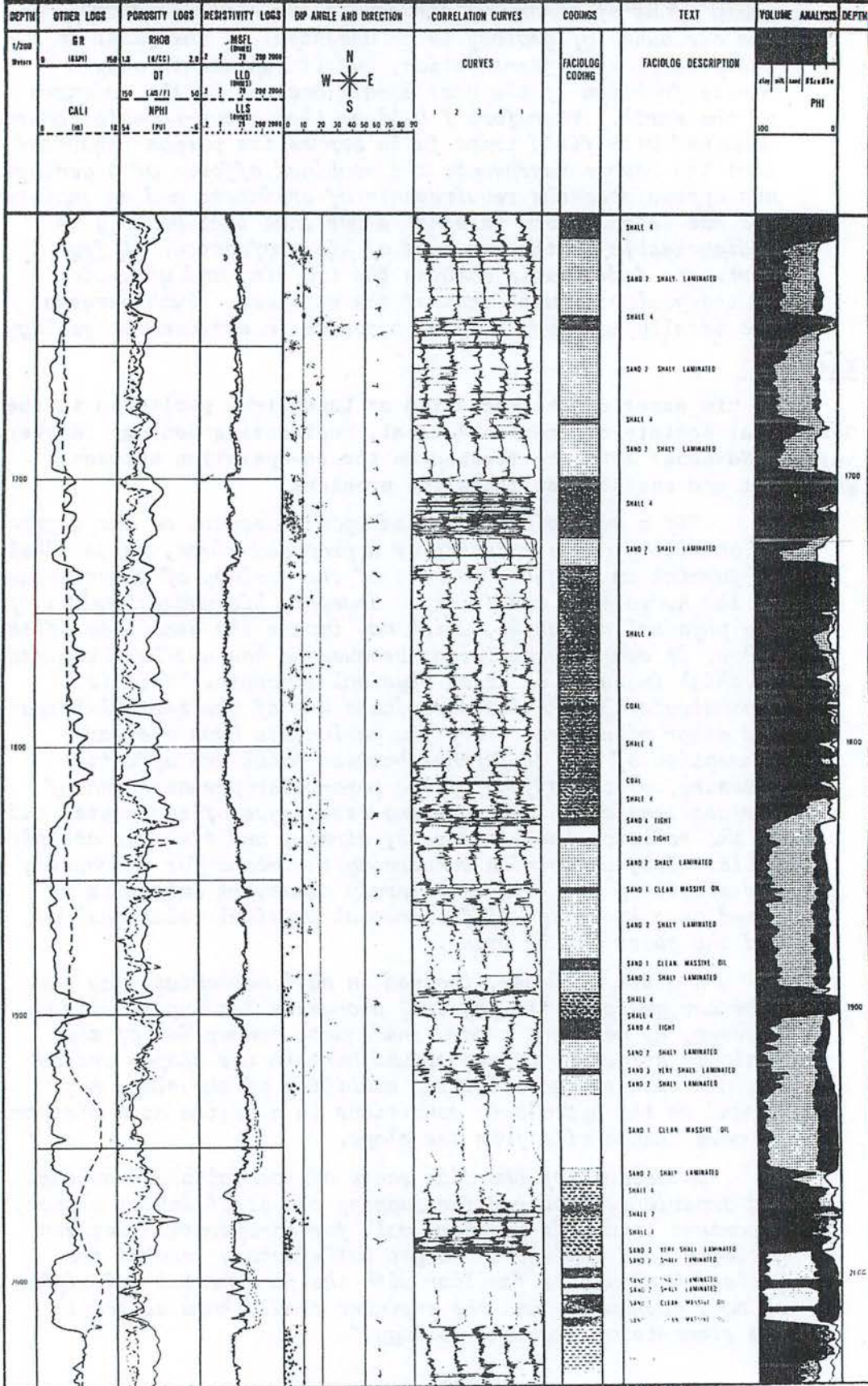
In his paper on the Mechanism of Landslides published in the Geological Society of America Journal, Engineering Geology (Berkey) volume, November 1950, he touched on the co-operation between geologist and engineer on landslide problems:

"If a geologist is called upon to report on the degree of stability of an existing or a proposed slope, he is likely to furnish an adequate account of the geology of the site and of the hydrologic conditions. However, his understanding of the physical processes, which may impair the stability of the slope, is commonly deficient because he has not been trained to think in terms of exact physical concepts. This is demonstrated by the indiscriminate use of the term "lubrication" and other misnomers. Very few geologists have a clear conception of the difference between total and effective pressure, of the effect of the pore-water pressure and of surface tension on the shearing resistance of sediments, and of the relation between stress, strain, and time for cohesive soils. Yet, an opinion concerning the means for increasing the stability of a slope is merely guesswork unless it is based on a knowledge of fundamental physical relationships, and the guess may be wrong.

A civil engineer, trained in soil mechanics, may have a better grasp of the physical processes leading to slides. However, he may have a very inadequate conception of the geologic structure of the ground beneath the slopes and be may not even suspect that the stability of the slope may depend on the hydrologic conditions in a region at a distance of more than a mile from the slope.

On account of the wide range of specialized knowledge and experience required for judging the stability of slopes, important landslide problems call for co-operation between geologist and engineer. To get satisfactory results the geologist should be familiar with the fundamental principles of soil mechanics, and the engineer should know at least the elements of physical geology."

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.

PERTEMUAN PERSATUAN
(MEETINGS OF THE SOCIETY)

PETROLEUM GEOLOGI SEMINAR '83 - A REPORT

The Seminar this year was initially planned as a one-day affair but due to the overwhelming response from the constant supporters of the Seminar it was again stretched over 2 days, on the 5 & 6th December at Hotel Holiday Inn, Kuala Lumpur.

The Seminar was declared open by YB Datuk Dr. James Ongkili, Minister in the Prime Minister's Department. In his opening address he said that exploration results in Malaysia so far have indicated that Malaysia has remaining recoverable oil reserves estimated at 2.57 billion barrels. In addition, this country has natural gas reserves of about 39 trillion cu. ft., the equivalent in the heat value of three times its oil reserves.

Dr. Ongkili then informed the gathering that Malaysia is now producing oil at the rate of 380,000 barrels a day. About 205,000 barrel are consumed domestically each day. At this moment, oil makes up some 93% of Malaysia's energy demand. As Malaysia has more natural gas than oil, the development of its gas reserves both for the revenue purposes and for local consumption will change this pattern. The first shipment of 57,000 tonnes of liquified natural gas (LNG) from the Sarawak offshore gas field at Bintulu on January 29, 1983 marked Malaysia's debut as a significant producer and exporter of LNG.

The gas processing plant in Kerteh, Trengganu, when completed in 1985 will process substantial gas reserves discovered offshore Trengganu for domestic use. Initially, the gas processed in Kerteh will be used locally. Later, it will be piped and utilized in the whole country. By then dependency on oil is projected to fall to 67% while gas will account for 24% of energy supply. Sabah gas industries plants when completed on Labuan Island will supply gas for planned gas-powered industry projects in Sabah.

Dr. Ongkili warned that petroleum is a depleting resource and it must therefore be carefully managed. Proper management of petroleum resources involves, among other things, a comprehensive, intensive and systematic exploration. This is to ensure that we obtain more and accurate information as to the size of the reserves that we have.

The Minister then went on to say that Malaysia is blessed with a broad shallow continental shelf which occupies a significant portion of the Sunda Shelf. Six sedimentary basins, all offshore have been identified as petroleum bearing and it is estimated that about 364,00 sq km of Malaysia's continental shelf is underlain by thick tertiary sediments which have hydrocarbon potential. Although a large part of this area has not been tested by drilling, based on the reconnaissance surveys, it is likely that most of the available large oil and gas fields in Malaysia have been discovered.

However, prospects for additional petroleum discoveries appear excellent because with a good understanding of petroleum geology,

better technology and exploration methods, there is a chance to make a new discovery or more. Dr. Ongkili suggested that exploration of the deep water areas in offshore Sabah and Sarawak be initiated as they have so far escaped the attention of the operating people.

Dr. Ongkili said exploration work in Malaysia at present is being undertaken by 6 companies. Sarawak Shell Berhad and Elf Aquitaine are working in Sarawak, Sabah Shell Petroleum Company and Carigali-BP in Sabah, while ESSO Production Malaysia Inc. and Petronas Carigali Sdn. Bhd. concentrate in Peninsular Malaysia. Petronas has also conducted its own geophysical surveys in the Straits of Melaka in its attempt to intensify exploration in that area. The study on this area is still in progress.

The Minister noted that the potential for discovery of hydrocarbon resources in Malaysia is high. The exploration success ratio in Malaysia is as good as 1 in 6, which is very favourable compared to the world average of 1 in 10. The exploration success ratio provides only one guide; other factors such as geological structure and the existence of offshore sedimentary basins also indicate that exploration efforts in Malaysia will be worthwhile.

Dr. Ongkili commended the Geological Society of Malaysia for its continuous efforts in promoting the exchange of information on petroleum geology and exploration among local and foreign experts through this Annual Petroleum Geology Seminar.

The Society greatly appreciates the generous support for the Petroleum Geology Seminar 1983 from the following companies:

1. Marathon Petroleum Exploration Ltd.
2. Robertson Research (S) Private Ltd.
3. Petroliam Nasional Berhad (PETRONAS)
4. Geophysical Company of Norway A.S. (GECO)
5. Cities Service East Asia, Inc.
6. Schlumberger Overseas S.A.
7. Getty Oil Development Co. Ltd.
8. Hyundai Corporation
9. BP Malaysia Sdn. Bhd.
10. Esso Production Malaysia Inc.
11. Shell
12. Geomex Survey Ltd.
13. Teikoku Oil Co., Ltd.
14. Gearhard (Malaysia) Sdn. Bhd.
15. Chinese Petroleum Corp.
16. Exploration Consultant Ltd.
17. Geophysical Service International
18. Japan Petroleum Expl. Co.

G.H. Teh

Programme

Monday, 5th December 1983

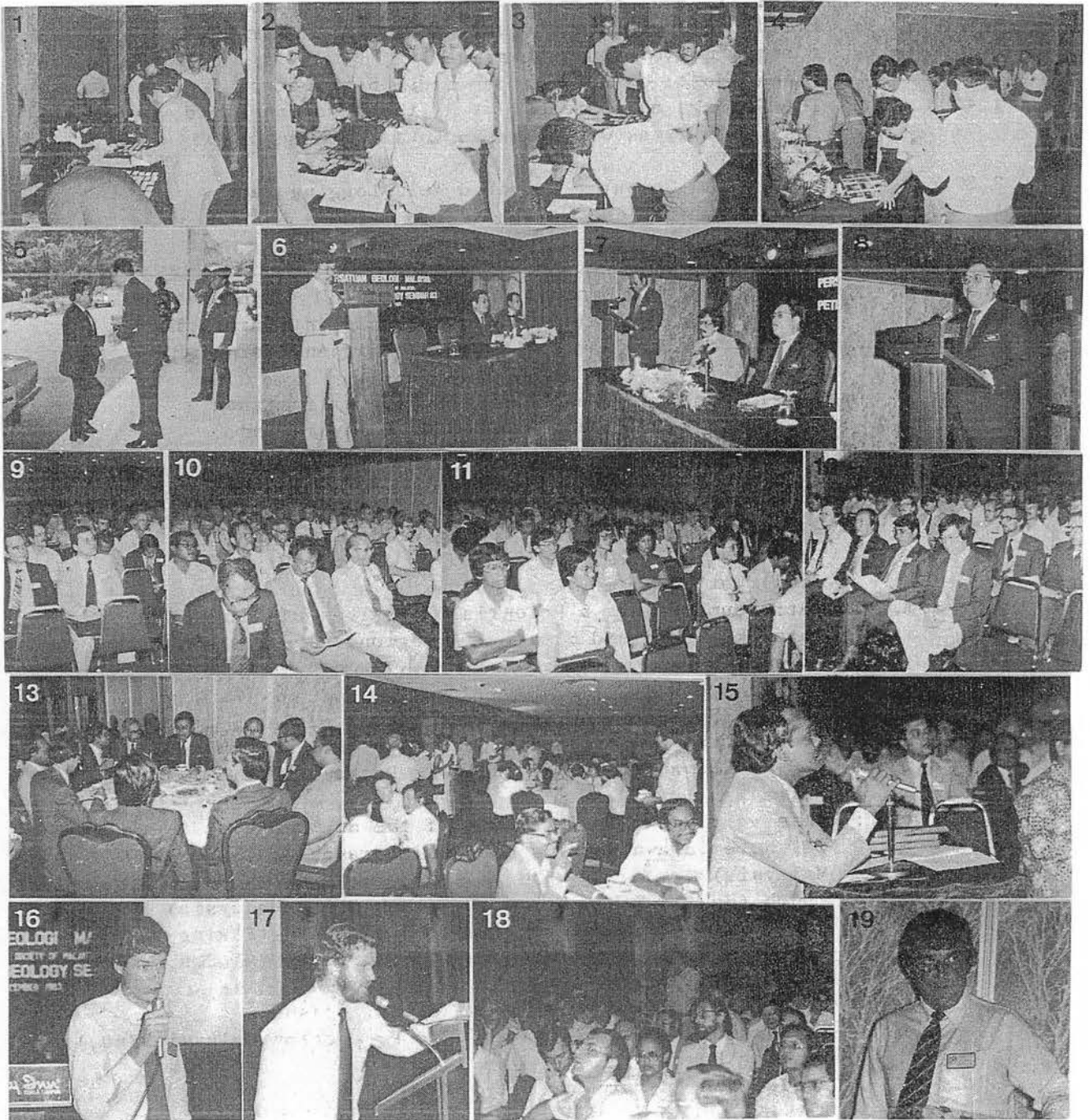
- 8.00 a.m. : Registration
 8.40 a.m. : Arrival of invited guests
 8.50 a.m. : Arrival of YB Datuk Dr. James Ongkili, Minister,
 Prime Minister's Department

- 9.00 a.m. : Welcoming address by Dr. T.T. Khoo,
President of the Geological Society of Malaysia
- 9.10 a.m. : Opening address by YB Datuk Dr. James Ongkili
- 9.30 a.m. : Coffee Break
- 10.00 a.m. : The Geology of Labuan Island as a Guide to Hydrocarbon
Occurrence in Offshore West Sabah - B. Levell (Sarawak
Shell Berhad, Malaysia)
- 10.45 a.m. : Computer Aided Interpretation of Seismic Data - Palle
F. Miller (Geophysical Company of Norway A.S., Norway)
- 11.30 a.m. : An Overview of the Application of An Intergrated
Satellite and Underwater Acquistic System to Oil
Field Exploration and Development - A.R. Horne
(Geomex Survey Ltd., Singapore)
- 12.15 p.m. : Lunch (Host: Geomex Survey Ltd., Singapore)
- 1.45 p.m. : The Geology and Development of the Pamaguan Field,
East Kalimantan - D. Harahap (Huffco Indonesia,
Indonesia)
- 2.30 p.m. : VAX-11/780 Computer Oriented Well Logging Data
Analysis Technique - Juin-wei Ku
(Chinese Petroleum Corporation, Taiwan)
- 3.15 p.m. : Coffee Break
- 3.30 p.m. : Advance Seismic Processing in 2D and 3D - Application
to Sedimentological and Stratigraphic Interpretation
- J.P. Cordier (Societe Nationale Elf Aquitaine (P),
France)
- 4.15 p.m. : Development of Kepong Field, Offshore Trengganu -
Zainuddin Yusof (Esso Production Malaysia Inc.,
Malaysia)

Tuesday, 6th December 1983

- 9.00 a.m. : Brunei Shell's 1983 Shallow Water Seismic Campaign
in Seria - Ramli Hitam and D.W.W. Pronk (Brunei
Shell Petroleum Co. Ltd., Brunei)
- 9.45 a.m. : Petroleum Geology & Potential Resources of Offshore
Sarawak, Sabah and Brunei - A regional synthesis
- Keith Robinson (U.S.G.S.)
- 10.30 a.m. : Coffee Break
- 10.45 a.m. : Seismic Evidences of Relative Changes of Sea Level in
the Tertiary Depositional Sequences near Taiwan
- C.H. Liu and Y.S. Pan (Chinese Petroleum Corporation,
Taiwan)
- 11.30 a.m. : Reservoir Geological Aspects of the Bokor Field,
Offshore Sarawak - M.C. Budding (Sarawak Shell Berhad,
Malaysia)
- 12.15 p.m. : Lunch (Host: Schlumberger Overseas S.A., Malaysia)
- 1.45 p.m. : Hyper-Fix - A Shore Based Radio Positioning Fixing
System - R.F. Shepperd (Racal-Decca Survey (M) Sdn.
Bhd., Malaysia)
- 2.30 p.m. : History and Geology of Tinggi Field, Offshore
Trengganu - Mohammad Yusof (Esso Production Malaysia Inc.)
- 3.00 p.m. : Closing Remarks
- 3.15 p.m. : Coffee and Adjourn

PETROLEUM GEOLOGY SEMINAR '83



GSM pix by G.H. TEH

PETROLEUM GEOLOGY SEMINAR '83



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GSM PETROLEUM GEOLOGY SEMINAR 1983

Captions to figures

- 1 - 4: At the registration desk - very orderly and friendly.
- 5: Y.B. Datuk Dr. James Ongkili being greeted on arrival by the President.
- 6: Organising Committee Chairman, Nordin Ramli, starting off the opening ceremony.
- 7: The President and his welcoming address.
- 8: Y.B. Datuk Dr. James Ongkili and his opening address.
- 9 - 12: The large audience at the opening ceremony.
- 13: The main table at tea after the ceremony.
- 14: General view at tea after the ceremony.
- 15: Session Chairman, Khalid Ngah starting off the First Session.
- 16: B. Levell with his contribution on Labuan Island.
- 17: Palle F. Miller on Computer Aided Interpretation of Seismic Data.
- 18: K.T. Yap with a question from the floor.
- 19: A.R. Horne on the Application of An Integrated Satellite and Underwater Acoustic System.
- 20: It is lunch time - Courtesy of Geomex Survey Ltd., Singapore.
- 21: Lunch time on the Second Day - Courtesy of Schlumberger Overseas S.A., Malaysia.
- 22: R.A. Cory presenting EPMI's contribution.
- 23: H.Y. Schmidt of SSP with SHELB's contribution.
- 24: S.H. Hsieh of CPC with their contribution.
- 25: Eve Howell and ECL's contribution to the Seminar.
- 26: J.P. Cordier on 2D and 3D Advance Seismic Processing.
- 27: EPMI's Mohammad Yusof on the Tinggi Field.
- 28: Zainuddin Yusof of EPMI and the Kepong Field.
- 29: Session Chairman, K.F. Ho congratulating Ramli Hitam and D.W.W. Pronk.
- 30: K. Robinson with his interesting paper on offshore Sarawak, Sabah and Brunei.
- 31: C.S. Hutchison with a comment and question.
- 32: Another question from the floor.
- 33: H.S. Hsieh presenting his colleague's paper.
- 34: M.C. Budding with his paper on the Bokor Field.
- 35: R.F. Shepperd on Shore Based Radio Positioning Fixing System.
- 36: A further question from the floor.
- 37: D. Harahap on the Pamaguan Field, East Kalimantan.

PETROLEUM GEOLOGY SEMINAR '83 - ABSTRACTS OF PAPERS

Reservoir Geological Aspects of the Bokor Field, Baram Delta Province, Offshore Sarawak

M.C. BUDDING and W.Z. VAN Driel, Sarawak Shell Berhad

The Bokor Field came on stream in late 1982. Eleven wells were drilled from the Bokor-A drilling platform and a second 15 slot platform is planned for the development of the western part of the field.

The Bokor structure is a domal uplift, dissected by a system of east-west trending growth and antithetic faults. The uplift was the result of a NE-SW anticlinal trend superimposed on a local rollover structure. The hydrocarbons are trapped in the northern part of the field against the main antithetic fault, which formed due to crestal collapse.

The prospective sequence comprises a 4000 ft thick sequence of siliciclastic coastal and shallow marine sediments of Late Miocene to Early Pliocene age. Some 50 reservoir sands are present, ranging in thickness from 5 to 50 ft. At least 30 of these were effectively separated by sealing shales during migration of the oil.

An extensive coring program was carried out during development drilling. The soft, unconsolidated stage of most of the reservoir interval called for unusual coring techniques: a special wide core barrel with an eight inch diameter fibreglass inner sleeve proved to give exceptionally good results. A comprehensive core analysis programme is presently in progress. The results will be integrated with the outcome of a production geological study of the drilling results in order to link reservoir geometries and permeability distribution to a genetic reservoir model.

Preliminary results and depositional model for part of the reservoir sequence will be presented.

Computer Aided Interpretation of Seismic Data

Palle F. MILLER, Geophysical Company of Norway A.S

The development of new technology for acquisition and processing of closely spaced seismic data, the so called 3D surveys, have created the basis for a new and much more detailed evaluation and interpretation procedure.

With the immense volumes of data acquired in 3D seismic surveys, seismic data interpretation likewise requires powerful tools to relieve the interpreter of routine data handling. Today, interactive computer graphic displays are the tools that free the interpreter to concentrate on the creative task at hand.

The Geophysical Company of Norway (GECO) has developed a highly advanced interactive graphic computer system which can be used for analyzing and interpretation of large volumes of seismic data.

The system features: modern hardware for interactive colour-graphics and real time image processing; user friendly man-machine dialogue which is tailored to the seismic interpreters vocabulary; real time access to the full seismic database; real time access to the interpretation database; options for real time image processing; and geological map generation and map modifications.

The man-machine interface has been made very user friendly by using menu-driven computer dialogue reflecting the seismic interpreters vocabulary. Even an interpreter without any prior computer experience can use the system after a few hours of training.

Any seismic section, vertical or horizontal (time slices) or any composite of these can be retrieved from the seismic database and overlaid with interpretation. The interpretation can be carried out by either an automatic horizon tracking or a manual tracking, and the interpretation will automatically be stored in a tailor made interpretation database, and can be retrieved from that at any time. Any interpretation made on one section can later be viewed on other section marked at the points of intersection.

The seismic data display can be altered by real time image processing as e.g., 2D filtering, scaling, zooming, colour-coding, etc.

Data can also be flattened to aid in structural and stratigraphic interpretations and a unique animation technique helps the interpreter to a better understanding of the three-dimensional structural development.

A colour-coded structural map can be displayed at any time during the interpretation of a horizon and in this way help the interpreter to decide the next step.

When the last seismic data is interpreted the interpretation database can be directly used as input to various automatic mapping procedures.

An Overview of the Application of an Integrated Satellite and Underwater Acoustic System to Oil Field Exploration and Development

A.R. HORNE, Geomex Survey Ltd.

Improved Depth Sections by Combination of Ray Tracing and Wave Equation Migration

H. BUCHHOLTZ, Prakla-Seismos, GmbH

VAX-11/780 Computer Oriented Well Logging Data Analysis Technique

Juin-well KU, Chinese Petroleum Corporation

A computer program has been developed by OPED, CPC for well logging data analysis as an aid in interpretation. For some time

past, what we used as a tool for logs data analysis were chart books and calculator, it could impose a substantial man-hour cost. VAX-11/780 computer implemented technique greatly improve the accuracy and capability of the processed data, the program uses the shaly sand and complex lithology reservoir analysis theory to result the formation water saturation, effective porosity and clay content, etc. Those results are not only necessary for reservoir interpretation but also important for the study in sedimentology and stratigraphy.

This paper described the program structure and reviews the technique of analysing the shaly sand and complex lithology reservoir. Some examples of practical interest in wells in Taiwan area are discussed. Log data cross-plots used to determine shale parameters are shown.

Advanced Seismic Processing in 2D and 3D - Application to Sedimentological and Stratigraphic Interpretation

J.P. CORDIER, Societe Nationale Elf Aquitaine (M)

The base of the seismic stratigraphy (definition of the seismic sequences) are briefly recalled, with presentation of a few examples, the two main characteristics of a seismic sequence: geometry and seismic facies are analysed. Then, the various technics of seismic processing which can improve either the geometry or the determination of seismic facies are reviewed; as little theory as possible is used, many examples are shown:

- (1) For the geometry definition:
 - Residual static corrections
 - Velocity analyses - internal velocities
 - Migration
 - FK Filtering
- (2) For a better knowledge of the signal characteristics:
 - Stratigraphic deconvolution
 - Pseudologs of acoustic impedance
 - Preservation of amplitudes
 - Complex analytic signal
 - Synthetic seismograms

It is shown that the use of 3D surveys gives a much better fault delineation and structural resolution than 2D surveys.

Finally some examples of lithologic and stratigraphic predictions from seismic data are discussed.

Development of Kepong Field Offshore Trengganu

ZAINUDDIN Yusof, Esso Production Malaysia Inc.

Kepong is a small oil field developed by using a satellite platform and is linked to a processing platform. It is the sixth field, offshore Peninsular Malaysia, to be produced by EPMI.

Production is from the group J reservoirs of Early Miocene age. An unexpected change in the quality of the J-20/21 reservoir rock reduced the originally assessed oil volume by almost two thirds. This reduction was, however, offset by almost the same oil volume found in J-18/19 sandstone, which was originally interpreted to contain non-associated gas. Due to highly accurate depth predictions required for completions in the tin oil column, seismic velocity analysis and sandstone continuity proved to be very significant factors in the development of Kepong.

Brunei Shell's 1983 Shallow Water Seismic Campaign in Seria

RAMLI Hitam and D.W.W. PRONK, Brunei Shell Petroleum Co. Ltd.

The Seria oilfield, discovered in 1929, is located in the western part of Brunei, and straddles the coast. Hydrocarbons occur within a highly faulted, elongate, asymmetrical, ENE-WSW trending anticline. In the western and central part of the field the dominant faults head to the north and in the east they head to the south. The structure is developed in Upper Miocene and Pliocene clastic sediments of the Baram depocentre.

The Seria field now produces 30,000 bbls oil/day and is in a late stage of primary depletion although infill drilling will sustain this for many years yet. Enhanced recovery utilizing water and gas injection is now actively underway. Major gaps in seismic coverage recently existed over that part of the field which lies in the surf zone, as the shallow water depths there do not permit conventional marine acquisition methods. In order to fill this gap and complete the structural picture of the field, Brunei Shell conducted a combined shallow marine and land seismic survey along the coastal strip in the summer of 1983. Use was made of Telseis, an acquisition system, developed by Fairfield Industries Inc., in which seismic signals received at hydrophones are relayed to the recording unit using FM radio transmission. The survey was carried out by Seismograph Services Ltd., with two Telseis engineers operating the Telseis equipment. Two sets of weighted marker buoys were pre-laid by a topographical survey boat, indicating every other shotpoint and every received point. Weighted hydrophones, connected to a floating transmitter/aerial system were attached to the latter. Shot and receiver intervals were 50 m and 25 m respectively and 96 channels were recorded, resulting in a 24 fold coverage.

The shooting was done in broadside manner with a 100 m offset, using 10 lb dynamite charges at a depth of 1.25 m. In the case of a land-sea tie, an additional 24 shots were fired at sea into a 96 channel hydrophone spread on land, in all other cases 4 nine pattern shots on land sufficed for coverage up to the beach. Recording was done on land, using a truck mounted base station, which housed the Telseis receivers, and the SN 348 analogue to digital converters and recording unit.

In total some 400 km of lines were shot in 80 days. Data quality was excellent. The success of such an operation depends heavily on weather. Possible problems for this kind of shallow water acquisition are drift of marker buoys, caused by wave action

currents, wave action noise, a too high surf for safe operation of the small boats, and possible interference by other radio transmitters. None of these affects the survey greatly, they will be discussed in detail in the paper. It is expected that the resulting seismic will help to resolve the complicated structural pattern on the crest of the Seria field, and that it will define new deep stratigraphic prospects on the flanks of the field. Examples of the processed results are shown in the paper.

**The Geology and Development of the Pamaguan Field, East Kalimantan
DAUD Harahap, Huffco Indonesia.**

The Pamaguan Field is located on the east coast of Kalimantan about 70 kilometers northeast of the town of Balikpapan.

The field was discovered in 1974 by the Pamaguan no. 1 well. To date it has been delineated and developed by a total of 16 wells and has produced approximately 2.4 million barrels of oil.

The Pamaguan Field which is 8.5 kilometer long and 1 kilometer wide lies on the south plunging nose of the Sanga-Sanga anticline. The anticline is an elongated and asymmetric structural ridge with a steep west flank. Steep reverse faults bound the structure on the west and the east. Minor normal cross faults cut the anticline at places, however, at Pamaguan no cross faults have been clearly demonstrated.

The Pamaguan Field produces from sands of the Middle Miocene Balikpapan Formation. The sands which were deposited as distributary channel fills and as marine bars in the paleo-Mahakan Delta formed a series of combined structural stratigraphic traps across the "three way structural closure" Pamaguan Feature.

The "shoestring" geometry of the reservoirs present problems in planning the development of the field.

**Seismic Evidences of Relative Changes of Sea Level in the Tertiary
Depositional Sequences near Taiwan**

C.H. LIU and Y.S. PAN, Chinese Petroleum Corporation

It is generally conceived that the tectonic evolution of Taiwan can be attributed to interaction of crustal plates. In this plate tectonic model, the island of Taiwan is situated on the juncture between the continental Eurasian plate on the west and the oceanic Philippine Sea plate on the east. The foreland basin formed on the Eurasian plate to the west of the Central Range, covering foothills, coastal plain and offshore areas, has been considered a prolific province consisting of a thick sequence of Tertiary to Pleistocene clastic sediments.

The Miocene basin to which this study is referred is a fine example of a combined structural-stratigraphic development.

Deposition has occurred concurrently with intermittent structural movement, which in turn has had substantial influence on the migration and accumulation of hydrocarbons. The primary hydrocarbon migration and accumulation was probably determined in late Miocene time, but the hydrocarbons remained trapped only if subsequent Pliocene/Pleistocene movements did not move the trapping mechanism.

The sandstone members within the Talu shale sequence (middle Miocene) have proven to be the most prolific producers of hydrocarbons in northwestern Taiwan. Although excellent production is obtained from them on shore, efforts to extend the production offshore into the studied area has not been so successful. However, prolific production was obtained from one well, which suggests that the sequence offshore is capable of producing hydrocarbons provided proper condition for entrapment exist.

Taking correlative reflections as formation boundaries, this paper describes the seismic facies for the various formations encountered in the studied area. During the course of deposition, the relative rise of sea level as determined by the rate of terrigenous influx gave rise to the associated reflection configurations and variations in amplitude, frequency and continuity of reflections. By use of these criteria, the environmental setting and estimates of lithology of each formation are interpreted as an aid for the further appraisal of the prospect.

The Geology of Labuan as A Guide to Hydrocarbon Occurrence in Offshore West Sabah

Bruce LEVELL, Sabah Shell Petroleum Company Limited

Labuan island forms part of the Labuan Muara ridge, one of a series of roughly North-South trending reverse-faulted anticlinal structures offshore West Sabah. The Sabah Ridges appear to be due to a continuing process of compressional sinistral wrench faulting that was contemporaneous with deposition of a thick Neogene sedimentary prism. The ridges separate broad synclinal basins which have had a continuous history of subsidence and have accumulated more than 12 km of sediment.

Labuan itself is a northward-plunging, asymmetrical, anticlinal nose with a steeper western limb. The core of the anticline exposes the Lower Miocene Temburong (turbidites and olistostromes) and Setap (slope clays) Formations, whereas the fluvial-coastal sandstones of the Middle Miocene Belait Formation outcrop on the flanks.

Numerous oil and gas seeps are known from Labuan but no commercial hydrocarbon accumulations have yet been found. The island is however an interesting place to study the sedimentology and stratigraphic relationships of some of the units which do contain significant hydrocarbons elsewhere offshore West Sabah.

The Kubong Bluff-Bethune Head section through the Belait Formation at the northernmost tip of the island contains potential reservoir sandstones deposited in fluvial channel, crevasse-splay and tidal shoal environments. The section contains thick lacustrine/

lagoonal shales rich in potential source rock material including coals up to 4 m thick, abundant coalified plant matter, and resins. Historically an important oil seep is known from coal mining records. Equivalent basal Middle Miocene sandstones contain oil and gas in a number of small accumulations in the southern Sabah Ridges area. One such accumulation is illustrated on logs and by a seismic line. Oil typing studies demonstrate that the oils in these accumulations were land plant derived and hence were very probably generated from intraformational source rocks.

A second section through the Belait Formation at Layang-Layangan on the northwest coast, exposes different sedimentary facies, interpreted as delta-front deposits. This sequence, which is not exposed and which in fact is probably absent in the north of the island is older than the base of the section at Kubong Bluff. There has been a long controversy over the nature of the contacts between these delta-front transitional deposits and both the "true Belait Formation" fluvial deposits above and the Setap Formation below. Seismic shot in the shallow water jut offshore Labuan shows no clear unconformity between Belait and Setap Formations. However field and age relationships suggest that the Layang-Layangan sequence wedges out towards Kubong Bluff. One possible explanation of this is that the Labuan Ridge is a syn-depositional structure and that during the regional Base Middle Miocene tectonic event it was uplifted. Erosion on the crest gave way gradually down-flank to deposition of an expanded section in somewhat deeper water. In the broad Labuan-Paisley syncline to the west relative sea level rise and deposition were continuous and there is no hint of the important Base Middle Miocene unconformity. The synchronicity or otherwise of local unconformities on growing structures leads to important problems in establishing a regional seismostratigraphic correlation framework. These concepts will be illustrated with panels from seismic sections on the west flank of the Labuan anticline.

The final outcrops from which lessons are drawn regarding offshore Western Sabah lie near the Sabah Shell Petroleum Company crude oil terminal in the southwest of the island. Here an olistostrome and two types of turbidite are exposed in a strongly faulted section. The turbidites are either thin-bedded deposits of low density turbidity currents or thicker-bedded deposits of high density turbidity currents. Both facies contain abundant disseminated organic matter which yields oil on test-tube pyrolysis in the field. The association of relatively coarse turbidites, together with slumped blocks of turbidite sands redeposited in an olistostrome, and abundant detrital organic matter suggests a tectonic shelf edge or delta-slope close to the coast. It is possible that the ancestral Labuan ridge was such a tectonic line and that wholesale slumping of lower coastal plain and coastal deposits initiated the turbidity currents.

Elsewhere in the ridges province of southern Sabah minor quantities of hydrocarbons are known from age equivalents of the Temburong Formation in a turbidite facies and, again, hydrocarbons are thought to have been generated from within this sequence. One of these accumulations will be illustrated by logs. In the Upper Miocene a similar ridge-like structure became the source area for a major turbidite basin, in which Exxon Production Malaysia's Tembungo Field is to be found. The activity of this ridge will be illustrated with seismic sections.

The presentation draws on the work of successive teams of SSPC and Shell geologists. I would particularly like to acknowledge the work of A.J. Bol, B. van Hoorn and A. van Vliet.

Hyper-Fix - A Shore Based Radio Position Fixing System

R.F. SHEPPERD, Racal-Decca Survey (M) Sdn. Bhd.

Almost all offshore operations related to hydrocarbon exploration or development, demand an ability to establish horizontal position with great precision, typically ± 10 metres. Also, the system used must be able to provide fix coverage over a large area and provide fix data at an acceptable rate, typically once per second or better. The requirements tend to limit the type and number of systems available. In practice, the choice is limited to a radio aid, employing a chain of shore based radio transmitting stations, with an ability to 'see' over the horizon.

Recent system developments have concentrated on two objectives: maximising the area coverage provided by a single chain of stations, and maximising quality control for the system's end users. Quality control is the business of detecting and measuring inherent systematic errors, and of applying the appropriate corrections.

This paper shows how the Hyper-Fix system, which has been operational offshore Malaysia for the past year, achieves both objectives.

History and Geology of Tinggi Field Offshore Peninsular Malaysia

MOHAMMAD Yusof and J.B. BRAMI, Esso Production Malaysia Inc.

The Tinggi field, which was discovered in 1980, is the fifth field, offshore Peninsular Malaysia, to be produced by EPMI and the first to be proposed for development on the basis of only one exploration well. Twenty-seven development wells are currently planned for this field and of these, twenty-three have been drilled thus far. It is a small field that produces from group J reservoirs of Early Miocene age and a group K reservoir of Oligocene age. Sandstone quality ranges from poor to excellent. A shallow gas-bearing sandstone caused a prominent anomaly and sag effects on seismic sections and posed a potential drilling hazard.

TECHNICAL TALKS

Keith ROBINSON: Tertiary development and petroleum geology of Offshore Sabah, Sarawak and Brunei

Dr. Keith Robinson of the U.S. Geological Survey who is presently working with CCOP/ESCAP Bangkok on a pilot project for the World Energy Resource Programme and Circum-Pacific Map Project gave the above-mentioned talk to a huge audience of about 80 on December 7 at the Department of Geology, University of Malaya.

With the help of isopach maps and their corresponding environments from Eo-Oligocene to Pleistocene, Dr. Robinson focused attention on the Tertiary Basins of S.E. Asia and the possible areas of new and untapped plays. Essentially the source areas of materials was from the north and northwest in Late Miocene. However, in Middle Miocene, seafloor spreading was towards NW towards Indo China. In Pliocene there was the driving of the sea to the NW, thinning of sedimentation and transgression at Natuna and regression at Central Luconia.

Next with beautifully prepared coloured slides, Dr. Robinson went on to vividly illustrate the sequential geological and palaeo-environmental development of offshore NW Borneo in the Tertiary. This included the development of the Baram Delta Province, the Central Luconia and Balingian Provinces, the Western Luconia Province and finally the Western Luconia-Central Luconia-Baram Delta Province.

G.H. Teh

V. SCHENK: Geotechnical investigations for tunnels and open cuts of a new express railway system in the Federal Republic of Germany.

The first Technical Talk in Kuching was held on 8 December, 1983. Despite a heavy thunderstorm, a total of 16 members and civil engineers gathered at the Conference Room, Geological Survey of Malaysia, Kuching to listen to Dr. Volker Schenk. Dr. Schenk is the Chief Geologist and Head of the Geotechniques Division of Lahmeyer International, Frankfurt and the engineering geology expert for the feasibility studies of the Pelagus and Bakun hydroelectric projects.

Dr. Schenk talked on the geotechnical investigations for tunnels and open cuts for the new express railway system linking Hannover in north Germany to Wuerzburg in the south, a distance of about 330 km. This project, one of the largest traffic projects in Europe, includes a total of 118 km of tunnel and 192 km of open cuts, dams and bridges.

The new railway system will carry trains with speeds of up to 250 km/h and, hence, has to be designed with wide-radial curves and low gradients. In view of the dense population along the route and

TECHNICAL TALKS



The audience at GLH, University of Malaya



K. ROBINSON



V. SCHENK



C.H. Kho giving the
vote of thanks



General view of part of the audience
at Kuching

the demands of environmentalists, the railway system has to be so routed that it harmonises with the infrastructural, geographical settings.

For investigation, planning and design purposes, the railway system is subdivided into numerous planning sections each of which has a length of approximately 30 km, with a few exceptions such as areas of rail road stations.

The tunnels have cross-sectional areas of 120-150 m² and are generally at least 10 m high. The geology encountered by the tunnels are the marls and limestones of the Middle Triassic Muschelkalk system and sandstones, shales and siltstones of the Lower Triassic Buntsandstein system.

Taking as example planning sector 4 located between Geottingen and Kassel in northern Germany, extensive geotechnical investigations were carried out for the design and construction of 3 tunnels with a total length of 15.5 km and 5 km of open cuts and bridges. These field investigations included drilling a total of 7,500 m of drill cores with individual borehole to a maximum depth of 150 m, geophysical logging mainly gamma log and resistivity log, water-pressure tests, and in situ rock mechanical tests including dilatometer, flat jack and shear tests.

Stability analyses were carried out to determine the safe design for open-cut slopes in soil and rock. Slope stability calculations always present some problems. In some cases, open cuts were designed with an initial slope of 1:1 for construction and subsequently backfilled to a slope of 1:1.5.

Dr. Schenk answered a number of questions raised by the audience. Mr. C.H. Kho of the Geological Survey of Malaysia proposed a vote of thanks on behalf of the Society for Dr. Schenk's interesting talk.

Denis Tan

DIALOGUE SESSION - PROFESSIONAL GEOLOGISTS & GSM COUNCIL - A REPORT

A meeting of Professional Members and members of the Council was held on 3rd November 1983 in the Department of Geology, University of Malaya at 5.30 p.m. (The meeting was convened as a result of a request in the last AGM of the Society).

Present: T.T. Khoo (Chairman)

Professional members: A. Spykerman, S.S. Almashoor,
M.A. Hasan, M.K. Choo, Lye Yue Hong,
K.K. Cheang

Council members: E.B. Yeap, K.M. Leong, J.K. Raj,
G.H. Teh

Observer: Tan Boon Kong

1. The Chairman gave a brief account of the history of the proposed Mineral Engineering Act, the role of the Society and aspects of the proposed Act.
2. The following points were noted:-
 - a) The proposed Act is much inclined towards mining.
 - b) There will be 2 bodies involved in the proposed Act, the Institute of Mineral Engineering (IME) and the Society.
 - c) There will be a Board of Registrars made up of 12 Members, 4 of them will be from the IME and 2 from the Society.
3. The Members present were of the opinion that the proposed Act may not fully cover the professional practices of geologists such as in various areas of the petroleum industry, geotechnical fields, hydrology, ceramic technology and others.
4. The Members present considered the possibility of seeking amendments to the proposed Act to cover the full spectrum of the practices of professional geologists and the alternative of seeking a new Act called the Professional Geologists Act. The latter alternative would have to start from scratch. After deliberations the Members present were all in favour of seeking a Professional Geologists Act (PGA) to regulate the practices of Professional geologists in Malaysia.
5. It was suggested that the Society should help to establish an Institute of Professional Geologists which will be the body directly involved with the proposed PGA. Only qualified members of the Institute will be eligible for registration under the proposed PGA. Members present agreed that the Professional Members of the Society will form the initial core of the membership of the proposed Institute and after the registration of the Institute the Society will cease to admit Professional Members. Existing Professional Members of the Society will remain in that status as a reminder of an important historic development. The proposed Institute will cater for the profession and the Society will continue to promote the science as stated in its Constitution.
6. It was suggested that Council should call an Extraordinary General Meeting to discuss the proposals for the Institute and the proposed PGA and to pass appropriate resolutions if the Council agrees with the proposals after considerations.
7. Other matter discussed include the criteria for election as Professional Members of the Society and it was felt that those without recognized degrees could be considered for admission if they have the equivalent in terms of experience and expertise. It was thought desirable that the code of ethics should be periodically reviewed. It was suggested that Professional Members should be issued with membership certificates.
8. The meeting ended at 6.45 p.m.

T.T. Khoo

OPEN-HOUSE DISCUSSION - PROFESSIONAL MEMBERS & GSM COUNCIL MEMBERS - A REPORT

Report of an open-house discussion on the proposals made by a meeting of Professional Members of the Society and Council Members present as regards to the regulation and practices of Professional Geologists in Malaysia and a proposed Professional Geologist Act.

Date: Tuesday, 6th December 1983
Venue: Holiday Inn, Jalan Pinang, Kuala Lumpur
Time: 4.30 p.m. to 5.30 p.m.

Present: T.T. Khoo (Chairman)
Leong Khee Meng
T.W. Koh
Mohamad Shah Abdullah
J.K. Raj
Muthuveerappan
Khalid Ngah
Tan Chin Tong
Low Keng Lok
Albert T.H. Loh
Chin Lik Suan
Tan Bock Kang
Foo Wah Yang
Lee Chiong Ting
K. Ganesan
Mohamad Ali Hasan (Secretary)

1. The Chairman highlighted the history of the proposed Mineral Engineering Act, the role of the Society and some aspects of the proposed Act. He stressed that the proposed Act is biased towards mining industries. He supported the view that we should strive for an independent Act (Professional Geologists Act) and establish the Institute of Professional Geologists Malaysia. The chairman also explained that the Society is for the advancement of science whereas the Institute focuses on the advancement of the scientists (geologists).
2. GSM sent a delegation (Leong Khee Meng, A.S. Gan and T.T. Khoo) together with IME to discuss the matter with the Honorable Minister of Primary Industries on 17th November 1983. The Honorable Minister seems to agree to the urgency and needs to regulate the practices of geologists. However the Institute of Engineers, Malaysia (IEM) objected strongly to the use of the word 'engineers' in the proposed Act as the Institute is more less the 'umbrella' for all engineers.

The Honorable Minister has advised both (GSM & IME) representatives to study further the proposed Act.
3. T.W. Koh, the chairman of the Vetting Committee of Professional Membership GSM reiterated that geologists are not really 'small' in numbers. He questioned why the proposed Act has only 2 members from the Society (whereas 4 from IME) making up the Board of Registrars?

4. Contributions/discussions from members present were as follows:
- 1) Members were of the opinion that a Professional Geologists Act separate from the proposed Mining Engineering Act should be pursued since the proposed Act do not cover the geological professions fully.
 - 2) Members also agree that the proposed Professional Geologists Act will
 - regulate the practices of geologists
 - to prevent malpractices especially of nonqualified geologists
 - 3) At present, geologists cannot sign documents on work done by themselves.
 - 4) In the Philippines, fresh or new graduates have to sit for geological professional exams.
 - 5) Additional knowledge on law and management can be picked up through practising. 2 years minimum experience is required to cover management experience wanted by the profession.
 - 6) However, there are other Professional Acts that does not require any legal/management aspects in their professions.
 - 7) Valuers Act: valuers are allowed to assess quarry land. Right now petroleum geologists also assess reservoir valuation.
5. At present, there seems to be an inadequate identification/regulating body to check or regulate professionalism, e.g. hydrogeology.
6. Members agree to the formation of the Institute of Professional Geologists rather than an Association of Geologists.
7. Other items agreed upon include:
- an advertising campaign and recruitment of new members to join as professional members now.
 - need to state 'professional allowance' in the Act.
 - not open to associate members but only full members.
 - while in its formation, GSM will play the role of the 'Institute'.
 - once 'Institute' is formed then there is the need to push forward the Professional Geologist Act.

The meeting ended at 5.30 p.m.

EGM ON PROPOSED PROFESSIONAL GEOLOGISTS ACT - A REPORT

The Extraordinary General Meeting (EGM) was held on Tuesday, 6 December 1983 at 5.30 p.m. at Holiday Inn, Jalan Pinang, Kuala Lumpur.

Present: T.T. Khoo (Chairman)
 J.K. Raj
 Muthuweerappan
 Khalid Ngah
 Low Keng Lok
 Albert T.H. Loh
 Lee Chiong Ting
 Leong Khee Meng
 Mohamad Shah Abdullah
 Chin Lik Suan
 Foo Wah Yang
 K. Ganesan
 Koh Tuck Wai
 Mohamad Ali Hasan (Secretary)

The following resolutions were unanimously adopted by members present at the EGM.

1. The Society helps to foster the formation of an independent body called 'Institute of Professional Geologists Malaysia' to regulate and govern the practice of geology in Malaysia.
2. Prior to the registration of the proposed Institute of Professional Geologists Malaysia, the Society undertakes to seek the passing of an Act of Parliament that will regulate and govern the practice of geology in Malaysia.
3. In view of the Society undertaking to seek the passing of a separate Act of Parliament, the Society hereby dissociates itself from the proposed Mineral Engineering Act.
4. The Society extends its thanks to the Institute of Mining Engineering Malaysia for its cooperation and hopes that this cooperation will continue in the future.

The meeting adjourned at 6.00 p.m.

BERITA PERSATUAN (NEWS OF THE SOCIETY)

GEOSEA V - PROGRESS REPORT (Nov. 1983)

Following the issue of the First Circular from the end of January 1983 and announcements which appeared in various publications including the Episodes, AGID News, Geotimes, Bulletin IMM, Commonwealth Science Council ESP Newsletter and the Bulletin of Science and Technology Malaysia, we have had encouraging response from geoscientists from within and outside the GEOSEA core region in all the activities mentioned in the programme for GEOSEA V. Many organizations and individuals have also given their full cooperation and goodwill towards the organization of the GEOSEA V activities. The response and encouragement have reinforced the general belief

that GEOSEA is the most important congress for geoscientists interested in the geology, mineral and energy resources of the Southeast Asian region.

Papers

About 160 papers have been offered for presentation in the Congress to date. A total of 67 abstracts of the papers offered have been received for consideration of acceptability. So far 27 papers have been accepted for presentation. Papers for GEOSEA Congress will be received for consideration up to 8th February 1984 and geoscientists who have not submitted titles of papers earlier may still do so together with the abstracts. Papers submitted for consideration must be on the geology, mineral and energy resources of the GEOSEA core region as defined in the First Circular. Papers from the periphery areas of the core region will only be acceptable if they have relevance to the core region. General papers will also be acceptable if the contents are of general interest and important relevance to the core region.

In addition to the papers mentioned above, the organizing committee is inviting several keynote papers from eminent geoscientists and also planning to hold a special session on recent advances in the knowledge of the geology, mineral and energy resources of each country within the GEOSEA core region since 1981 (date of GEOSEA IV). We hope the papers on recent advances will be available in a bounded volume in time for GEOSEA V.

Papers presented in GEOSEA V will be considered for publication after GEOSEA V Congress. The Editor of the Proceedings will contact the speakers in due course.

Venue

The GEOSEA V Congress will be held in the Federal Hotel, Kuala Lumpur. Two large halls capable of accommodating 500 participants each will be used simultaneously for paper presentation. In addition 5 smaller rooms seating 50 - 80 participants will be used if necessary.

Training Courses

The following training courses will be held:

- i) CCOPE-ASCOPE-GEOSEA Course on Carbonate Diagenesis
(Instructors: Prof. R.G.C. Bathurst and others)
- ii) SEATRAD-GEOSEA Course on Geochemical Exploration In Tropical Terrains
(Instructors: Prof. W.K. Fletcher and others)
- iii) Evaluation of Alluvial Deposits
(Instructors: Staff of Malaysian mining companies)

Other courses which are being organized and awaiting further details are Plate Tectonics - Concept & Development, Granite, Coal - Exploration and Evaluation (in cooperation with AMF) and others. Further details of the courses will be available in the Second Circular.

Field Trips

From the replies to our First Circular, it appears that the following field trips will be well participated:

- 1) Kota Kinabalu - Tawau, Sabah
- 2) Lupar Line - Bau, Sarawak
- 3) Eastern Belt, Peninsular Malaysia
- 4) Northwest Peninsular Malaysia
- 5) Kuala Lumpur Tinfield - Genting Highlands

Details of the duration and cost will be available in the Second Circular.

Associated Activities

Several other meetings will be held associated with GEOSEA V. Meetings in which the Geological Society of Malaysia is directly involved are the Training Seminar on Urban Geology of Southeast Asia and Landplan II. Circulars of these events will be posted to all interested.

Dates

The dates for GEOSEA V Congress and other activities are given below.

- 27-31 March 1984: Training Seminar on Geological/Geotechnical Problems of Urban Centres (organized by University of Malaya in collaboration with S.E. Asia Regional Network of Geosciences, Geological Society of Malaysia, AGID and AIT)
- 2-5 April 1984: Landplan II - Workshop on Role of Geology in Planning and Development of Urban Centres in Southeast Asia (organized by Geological Society of Malaysia, AGID, & Geological Society of Thailand)
- 3-8 April 1984: GEOSEA V Training Courses
- 9-13 April 1984: GEOSEA V Congress
- 14-20 April 1984: GEOSEA V Field Trips

Second Circular

The Second Circular is under preparation and will be available in December 1983 after important details are available and arrangements finalized.

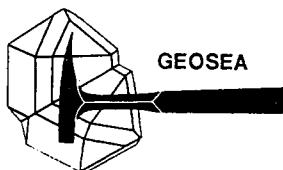
Organizing Chairman



PERSATUAN GEOLOGI MALAYSIA
GEOLOGICAL SOCIETY OF MALAYSIA

**FIFTH REGIONAL CONGRESS ON
GEOLOGY, MINERAL AND
ENERGY RESOURCES
OF SOUTHEAST ASIA**

GEOSEA V



LETTER TO THE EDITOR

January 14, 1983.

Dr. G.H. Teh
 Geological Society of Malaysia,
 c/o Department of Geology,
 University of Malaya,
 Kuala Lumpur 22-11,
 Malaysia.

Dear Dr. Teh,

Thank you very much for your letter of January 4, 1983 to let me know that our paper on "Rock Geochemical Exploration at Thabyebintaung Pb-Zn Prospect, Bawsaing, Southern Shan State, Burma" is now in page proof stage and to ask me full details of two references. These two references are as follows:

Aung Pwa (1982). Detailed rock geochemical exploration in Bomintaung area, Bawsaing, Kalaw township, Southern Shan State: Paper read at Burma Earth Science Research Congress (1982).

U Khin Zaw, U Aung Pwa, and U Thet Aung Zan (1983 in preparation). Lead-zinc mineralization at Theingon Mine, Bawsaing, Southern Shan State, Burma: A Mississippi Valley-type deposit?

I will send the second paper to you to be published in the Malaysia Geological Society Bulletin after I have completed the revision. Dr. J. A. Briskey, Pb-Zn Comodity Expert of USGS, recently has reviewed the manuscript.

I greatly appreciate, with many thanks, your kind editorial work, your patience and the time you have spent on our Rock Geochemical Exploration paper. I appreciate your sending me reprints of our paper at your earliest convenience.

Please assure that the Bulletin of Geological Society of Malaysia is the only and the one journal which publishes about Geology and Mineral Resources of S.E. Asia, East Asia and the Pacific. We would think our Theingon paper also will be well suited for your journal.

I shall look forward to hearing from you.

Yours sincerely,

Signed U Khin Zaw
 Dept. of Applied Geology,
 Arts and Science University,
 Thamaing College P.O.
 Thamaing,
 Rangoon,
 Burma.

GSM COUNCIL NOMINATIONS 1984/85

At the close of nomination, (Friday 30th September 1983), only one proposal was received by the Hon. Secretary for the post of Editor. As such, the Editor's post has been fitted by Dr. Teh Guan Hoe (Proposed by Aw Peck Chin and seconded by Prof. H.D. Tjia).

The following therefore make up the 1984/85 Council Members:

President	: Mr. Leong Khee Meng (Carigali-BP)
Vice President	: Dr. John Kuna Raj (UM)
Hon. Secretary	: Mr. Mohamad Ali Hasan (UM)
Hon. Asst. Secretary	: Mr. Koh Tuck Wai (Petronas-Carigali)
Hon. Treasurer	: Mr. Gan Ah Sai (Geol. Survey Malaysia)
Editor	: Dr. Teh Guan Hoe
Councillors (2 year)	: Dr. Abdul Hamid Mohammad (UKM)
	Mr. E.H. Yin (Geol. Survey Malaysia)
	Mr. Michael Leong Pheng San (Petronas)
	Dr. S. Paramanathan (UPM)
	(1 year) : Mr. Andren Spykerman (MMC)
	Mr. Choo Mun Keong
	Dr. Syed Sheikh Almashoor (UKM)
	Dr. Yeap Fe Beng (UM)
Immediate Past President:	Dr. T.T. Khoo (UM)

Hon. Secretary

WE APOLOGIZE FOR THE LATE PUBLICATION
OF THIS ISSUE OF WARTA GEOLOGI.
THE DELAY IS DUE TO UNFORESEEN CIRCUMSTANCES
RELATING TO EDITORIAL PROCEDURES AND GUIDELINES
BEYOND THE CONTROL OF THE EDITOR.

EDITOR

KEAHLIAN (MEMBERSHIP)

The following applications for membership were approved:

Full Members

- Nik Ramli bin Nik Hassan, Department of Geology and Mineralogy,
Oxford University, Parks Road, Oxford OX1 3PR, U.K.
Tuan Besar Tuan Sarif, Pusat Pengajian Sains Gunaan, USM, P. Pinang.
Ali Mehmet Celal Sengor, ITU Maden Fakültesi, Geologi Bölümü
Tevsikiye, İstanbul, Turkey.
Keith Grant, Amoco Indonesia Expl., 4th Floor, Citibank Building,
P.O. Box 27/JKWK, Jakarta, Indonesia.
Larry S. Grubbs, Texaco, 2000 Westchester Ave., White Plain, N.Y.
10650, USA.
Mohd. Khair H. Abd. Kadir, P.O. Box 12407, Kuala Lumpur.
Abu Samad b. Nordin, P.O. Box 12407, Kuala Lumpur.
Jamlus Md. Yasin, P.O. Box 12407, Kuala Lumpur.
K.G. Manoharan, P.O. Box 12407, Kuala Lumpur.
Md. Nazri Ramli, P.O. Box 12407, Kuala Lumpur.
Abd. Wahid Musbah, P.O. Box 12407, Kuala Lumpur.
Mohd. Zain Che 'Lah, P.O. Box 12407, Kuala Lumpur.
Margaret E. Hall, P.O. Box 12407, Kuala Lumpur.
Muhamad Suhaimi b. Abdul Aziz, P.O. Box 12407, Kuala Lumpur.
Ong Hock Thye, P.O. Box 12407, Kuala Lumpur.
Mohd. b. Kadir, P.O. Box 12407, Kuala Lumpur.

Student Members

- Mohd. Badzran Mat Taib, Komsis F, UKM, Bangi, Selangor.
Mohd. Abir Mat Hassan, Komsis F, UKM, Bangi, Selangor.
Robert A. Apel, Department of Geology, University Wisconsin,
Madison, Wisconsin, USA.

Institutional Members

- Thai Shell Exploration and Production Co. Ltd. 10, Soonthornkosa
Road, Bangkok 10110, Thailand.

PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

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

- Seet Chin Peng, Makmal Penyiasatan Kajibumi, P.O. Box 1015, Jalan
Scrivenor, Ipoh, Perak.
James K. Blake, Orchard Shopping Centre, Suite 901, 321 Orchard Road,
Singapore 0923.
Chronic John, 5943 Spellman, Houston TX 77096, U.S.A.
Ghulam Mohammed Hashim, Soil Science Branch, MARDI, Peti Surat 12301,
Pejabat Besar Pos, Kuala Lumpur 01-02.

PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The following publications were added to the library:

1. Geosciences NL. vol. 6, no. 1, 1983.
2. Annual Record, Inst. Geoscience, The U. of Tsukuba, no. 9, 1983.
3. Schrittenreihe fur geologische wissenschaften, heft 17 (1981).
4. Vermessungs technik, 6/83.
5. Veroffentlichungen des Zentralinstituts fur Physik der Erde, no. 66 & annex (1982): no. 72 (1982), no. 73 (1982), no. 77 (1983).
6. Commonwealth Science Council, no. 6, 1983.
7. IMM, Transactions Sect. A, vol. 92, Oct. 1983.
8. Univ. of Kansas, Paleontological Contributions, Paper 107, 108, 1983.
9. Oklahome Geology Notes, vol. 43, nos. 1-3, 1983.
10. Geosurvey Newsletter, v. 15, nos. 13-18, 1983.
11. Annales Academiae Scientiarum Fennicae, 137, 1983.

BERITA - BERITA LAIN

(OTHER NEWS)

SEATRAD CENTRE - INTERNATIONAL SEMINAR ON MINING

TECHNIQUES FOR ALLUVIAL TIN DEPOSITS - FIRST CIRCULAR

The SEATRAD Centre will organise an international seminar on mining techniques for alluvial tin deposits to be held from 8-11 October 1984 at Hotel Excelsior, Ipoh. The seminar will focus mainly on gravel pump mining and dredging techniques which are commonly used in Southeast Asia for mining alluvial tin deposits.

The gravel pump tin mining sector in Southeast Asia is currently facing two major problems, namely declining grades of ore being worked and high costs of energy for the mining operation. As a result, there has been an increasing trend for large scale operation using bigger pumps, diesel engines and motors, as well as earth-moving equipment to excavate and transport the material. New problems arise, particularly with regard to high interest rates and volatile metal prices. There is, therefore, a need to review the present situation, discuss advantages and disadvantages of large scale operation and use of earth-moving equipment, and propose improvements or new methods which can result in lowering cost of tin production.

In the dredging sector, there is a need to design dredges of high capacity and for deep deposits, in view of the lower grade of ground being worked as well as the discovery of the deep alluvials. With increasing costs of energy and spares, there is also a need to improve efficiency and test new materials which may have better wear-resistance properties.

It is therefore timely that an international seminar be organised to bring together gravel pump miners, dredge operators and designers, equipment suppliers and researchers in order to discuss the problems, exchange ideas and propose improvements. It is envisaged that the seminar will be divided into two sessions; the first session on gravel pumping and the second session on dredging techniques. Papers would be presented at the sessions, and ample time allotted to discussions on each paper as well as a panel discussion at the end of each session.

An exhibition of mining and mineral processing equipment, particularly for use in alluvial tin mining, is also being planned.

A one-day field trip will be organised for visits to a gravel pump mine and dredge near Ipoh, Malaysia.

Persons interested in presenting papers should send abstracts of the proposed papers to reach SEATRAD Centre no later than 31 January 1984. On notification, full texts of accepted papers should be received by 30 June, 1984. Information on registration, exhibition and other details of the seminar are available by writing to:

The Director
SEATRAD Centre,
Tiger Lane,
Ipoh, Malaysia.
Tel. 05-559366

SEATRAD CENTRE - NEW BUILDING

The official opening of the Southeast Asia Tin Research and Development (SEATRAD) Centre Building at Ipoh was officiated by Dato' Leong Khee Seong, Minister of Primary Industries, on 5 November 1983.

In his message in the souvenir programme Dato' Leong said that Malaysia is proud to be associated with the SEATRAD Centre since its inception, and the commitment of funds and provision of this new building reflects the importance that Malaysia places on tin production research to be carried out on a regional basis. The cooperative effort and assistance amongst member countries would be mutually beneficial for the development of new techniques and procedures in the exploration, mining, processing and smelting of tin ores.

His Ministry feels that the time has come to seek ways to diversify the tin industry and in this connection, research and development work at the Centre on exploration for primary tin deposits and processing of complex tin ores is highly commendable. In addition, there is a need for us to scrutinize our traditional mining methods, namely gravel pumping and dredging, and seek ways to improve them, particularly by lowering the costs of production as well as improving their efficiency.

Background of the Centre

The proposal for the establishment of a regional centre to carry out research in tin production was first mooted at the Second Technical Conference on Tin held in Bangkok in November 1969 by Professor K.F.G. Hosking, who was then Professor of Applied Geology, University of Malaya, Kuala Lumpur. This proposal was well supported by the representatives of the major tin producing countries in the region, namely Indonesia, Malaysia and Thailand, as well as the Economic Commission for Asia and the Far East (ECAFE). A joint report was then made to the Commission for assistance by the United Nations Development Programme (UNDP) to set up the Centre. In 1971 the ECAFE appointed a consultant to look into the feasibility of undertaking the project and the recommendations of the consultant were discussed at a meeting of Government representatives of Indonesia, Malaysia and Thailand which was held in Bangkok in January 1972. It was agreed that such a regional research centre be set up, and assistance of the UNDP be sought during the initial phase. On 28 April 1977 an Agreement establishing the Southeast Asia Tin Research and Development Centre was signed by the Governments of Indonesia, Malaysia and Thailand.

The inaugural session of the Board of Management was held from 24-29 April 1978 and was opened by His Excellency Mr. Leong Khee Seong, the Deputy Minister of Primary Industries of Malaysia. During the first session, important decisions were made with regard to the organisation of the Centre, rules of procedures for Board meetings, the work plan for the Centre, premises, financial contributions, by member countries and UNDP technical assistance. In early 1979 the Centre was operational at its temporary premises at 14 Tiger Lane, Ipoh, Malaysia.

The Centre is charged with the responsibility to promote, conduct and coordinate research and training in exploration, mining, mineral procession and smelting of tin. It carries out its functions and responsibilities through the Board of Management which comprises of one representative with plenipotentiary authority from each member country who may be assisted by a number of aides representing the government organisation and the tin industry. A national coordinator from each country also sits on the Board to act as the normal channel of communication on matters relating to the work of the Centre. The Director is responsible to the Board for the implementation of the Centre's activities.

During the initial phase of development, the Centre receives technical assistance from UNDP, as outlined in the Project Revision Document, in the form of personnel, equipment and fellowships. The professional staff of the Centre consists of national professionals recruited from the three member countries whilst supporting staff are recruited locally within Malaysia. United Nations experts act as technical advisers in the various divisions of the Centre. Research work carried out closely follows the Work Programme approved by the Board of Management. The current research and development programmes of the Centre are in the following areas:

1. Development of drilling techniques and improvement of sampling and ore reserve calculation methods for detrital tin deposits.
2. Methodological approach to the exploration for primary deposits of tin and associated elements.
3. Mineral distribution study for by-product minerals from the tin industry.

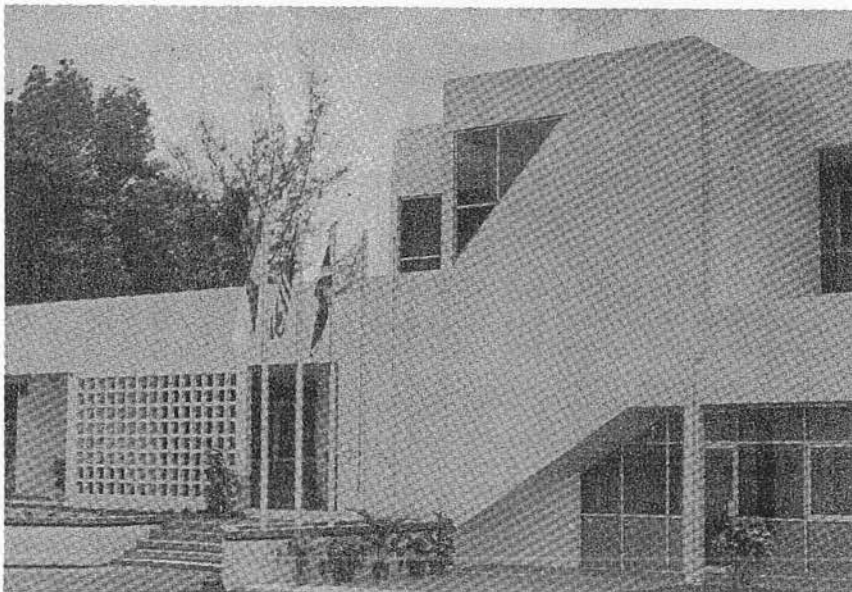
4. Development and improvement of hydraulic mining techniques to lower costs of mining.
5. Environmental management and rehabilitation of mining land.
6. Review of dredging problems.
7. Recovery of tin from complex ores.
8. Recovery of Nb/Ta minerals associated with tin.
9. Process control of treatment plant operations.

In carrying out these projects, the Centre works closely with national research institutes, government departments and tin industry of the three member countries.

Besides the research and development programmes, the Centre also seeks to increase and broaden technological knowledge within the tin industry by organising seminars, training courses, lectures and on-the-job training of personnel in member countries. Three seminars have been held during the 1979-82 period namely, Seminar on Drilling and Sampling Techniques in Tin Prospecting, Ipoh, 6-8 September 1979; Seminar on Complex Tin Ores and Related Problems, Bandung, 9-11 April 1981; and the Seminar on the Beneficiation of Tin and Associated Minerals, Bangkok, 7-9 October 1982. The proceedings of these seminars have been published and are available from the Centre.

In April 1983 the Centre moved into its permanent premises which has been contributed by the Malaysian Government, the host country. This building, besides being the headquarters of the Centre, also houses the sample preparation, mineral processing, mineralogical and analytical laboratories, pilot plant, library and a computer room.

In addition to its research and development activities, the Centre offers training programmes for the benefit of staff of government organisations and the tin industry. It organises regular seminars on related topics of interest to the industry, conducts workshops, group training and in-service training programmes, as well as organises fellowships for training abroad funded by the United Nations. The Centre also issues various publications including a quarterly Bulletin, Reports of Investigation of work carried out as well as proceedings of various seminars organised by the Centre.



G.H. Teh

SEATRAD

CENTRE



Workshop on
GEOSCIENCE CURRICULUM DEVELOPMENT
IN SOUTHEAST ASIA
at Rincome Hotel, Chiang Mai, Thailand
30 - 31 January, 1983

PROCEEDINGS

Organized by:

Southeast Asia Regional Network of Geosciences
Association of Geoscientists for International Development
(AGID)

In co-operation with:

Department of Geological Sciences, Chiang Mai University
Geological Society of Malaysia (GSM)

Supported by:

UNESCO Regional Office for Science and Technology for
Southeast Asia

Those interested please contact:

Dr. T. Thanasuthipitak,
Dept. of Geological Sciences,
Chiang Mai University,
Chiang Mai 50002,
Thailand.

and enclose Bank Draft / Cheque worth US\$25.00 (inclusive
of air-mail postage).

SHORT COURSE ON QUATERNARY GEOLOGY OF MALAYSIA

- FIRST CIRCULAR

- Place Department of Geology,
Universiti Kebangsaan Malaysia,
Bangi, Selangor.
- Date Ten days in October-November 1984
(Exact date to be announced in the 2nd circular)
- Organized by The Department of Geology, Universiti Kebangsaan
Malaysia and United Nations ESCAP-CCOP.
- Open to Geologists, physical geographers and soil
scientists with at least three years tertiary
education in any of the mentioned disciplines.
Fourth-year students in any of these disciplines
are especially welcome. Upon completion a
certificate will be issued.
- Course lecturers Quaternary geologists from ESCAP-CCOP and relevant
scientists from Malaysian universities, research
institutions and the Geological Survey. The
courses will be conducted in Malaysian and
English.
- Course content See attached information.

Course and registration fees

Pre-registration (in May 1984)	M\$ 10.00
Course fee (at the beginning of th the course)	M\$140.00
Total	<u>M\$150.00</u>
For registered students:	
Pre-registration (in May 1984)	M\$ 10.00
Course fees	M\$ 20.00
Total	<u>M\$ 30.00</u>

The fees cover course notes; participation in the course, practicals, excursions; refreshments during the course and an inaugural dinner.

- Housing Lodging facilities are available at the
Universiti's hostels at the rates shown in the
registration form. Several students' and
staff canteens are on the campus.

Suitable candidates interested to follow the course are requested to send in the completed pre-registration form attached to this circular. The maximum number of course participants will be 40 and places will be allocated on a first-come-first-served basis. A second circular will be mailed to responders in May 1984.

H.D. Tjia

GASTECH 84

The 10th International LNG/LPG Conference & Exhibition

RAI Congress & Exhibition Centre Amsterdam November 6-9, 1984

Conference Programme

Tuesday, November 6

Session 1: World gas supplies

- 13.45 Opening remarks
 14.00 Natural gas supplies in the world energy market - opening address
 14.30 World gas reserves and availability
 15.00 The West European gas market to 2000
 16.00 Availability and utilisation of natural gas in India
 16.30 Pricing for LNG
 17.00 Offshore gas utilisation in Norway, Argentina and Malaysia
 18.00 - 20.00 Gastech Welcome Party for all delegates and exhibitors

Wednesday, November 7

09.00 - 17.00 Session 2: LPG production and trade

Session 3: Safety and training

- 11.00 Legislation - is there a further need?
 11.30 The development of emergency LNG ship-to-ship transfer equipment
 12.00 A review of the developments in LNG storage safety as reflected by risk assessment
 14.00 The filling limits of cargo tanks - a review of the IMO Gas Code requirements
 14.30 On-board operations and safety training for LGT personnel
 15.00 Safety in the design of gas terminals
 16.00 Operation and maintenance safety audit for an existing liquefied natural gas export facility
 16.30 An independent hazard and operability audit during the design and construction of a major natural gas liquids facility
 17.00 Rapid assessment of the consequences arising from LPG release

Thursday, November 8

Session 4: Transportation, technology & operations

- 09.00 Report on the year's activities of the Society of International Gas Tanker & Terminal Operators
 09.30 Interdependence of plant, port, shipping and customer's facilities in an LNG project
 10.00 High pressure oil/gas transportation
 11.00 A 30,000 m³ semi-pressurised LNG ethylene carrier
 11.30 Optimisation of LPG carrier design and its influence on long-term operating costs
 12.00 The prediction of the sloshing pressure in the rectangular tanks of LNG carriers
 14.00 Trends in NGL recovery from natural and associated gases

- 14.30 Fuel cost optimisation in LNG transport
 15.00 Cryogenic performance of the new generation of LNG carriers
 16.00 LPG carriers at Nord Mediterranee - experience and new trends
 16.30 Structural integrity monitoring of LNG tankers
 17.00 On the structural details of gas tankers
- Session 5: Commercial documentation & contracts
- 11.00 Commercial performance in LNG contracts
 11.30 A general outline of shipping and trading documents needed for the international LPG market

Friday, November 9

- Session 6: Liquefied gas terminals and storage
- 09.00 Dynamic load attenuation for double-wall tanks
 09.30 A new method of protective insulation for the outer reservoir of a double-walled cryogenic storage tank
 10.00 Experimental dynamic compaction of Perlite insulation
 11.00 An experimental study on the behaviour of the outer concrete wall of a double-wall LNG storage facility under extreme thermal loads
 11.30 Planning and building of the Antwerp Gas Terminal
 12.00 Design and construction of the Port Botany, Australia LPG/butane import terminal
- Session 6: Continued
- 14.00 Design of an in-ground storage tank for refrigerated propane
 14.30 Internal pressure equalising system to reduce boil-off
 15.00 Second generation concrete storage barges
 16.00 Verification of P.U.F. insulation reliability
 16.30 Vapour recovery from liquid hydrocarbon storage tanks
- Session 7: Gases as transportation fuels
- 11.00 European automotive LPG - prospects for growth
 11.30 LPG as a transportation fuel and how it will affect LPG demand in the United States through the 1980's
 12.00 Portability: the key to new gas markets
 14.00 Canadian prospects for natural gas-fuelled vehicles
 14.30 The marketing of natural gas as an alternative automotive fuel in New Zealand

For further information:

Head Office
 Gastech Secretariat
 2 Station Road
 Rickmansworth
 Herts WD3 1QP
 England
 Telephone: Rickmansworth (0923) 776363
 Telex: 924312

Official travel agents for Singapore, Malaysia, Indonesia and Brunei:

Mr. Stacey Muruthi
 Tour World International Pte. Ltd.
 B1-25 Sim Lim Tower
 Jalan Besar
 Singapore

Telephone: 2971951
 Telex: 28333 Travel RS

WORKSHOP PROGRAMME - "EXPLORATION FOR CARBONATE RESERVOIRS"

9th-13th July, 1984

Venue: Australian Mineral Foundation, Glenside, South Australia.

This course is designed to update Exploration Managers and Exploration and Production Geologists and Geophysicists in specific aspects of carbonate exploration for the occurrence of oil and gas.

The Course

The course will review the present state of knowledge of carbonate depositional environments and the distribution of porosity and permeability in carbonate rocks. Emphasis is on the prediction of favourable facies for the occurrence of oil and gas.

The details of the programme are as follows:

1. Modern carbonate patterns
2. Carbonate reservoirs: reefs, Sabkhas (supratidal flats), high porosity trends, vertical sequences
3. Relation of carbonate facies to paleogeography
4. The development of carbonate reservoirs
 - a. Diagenetic history
 - b. Lithologic control of porosity and permeability
 - c. Modification of carbonate reservoir characteristics
 - d. Effect of dolomitization
 - e. Carbonates as source rocks
5. Evaporites and carbonate facies
 - a. Relation of evaporite units to source beds
 - b. Evaporites as petroleum seals
 - c. Evaporite minerals and porosity
 - d. The role of evaporites in hydrocarbon accumulation
6. Secondary porosity
7. Lithification, structure and depositional environment as controls for carbonate reservoirs
8. Case histories of structural, stratigraphic and diagenetic traps

The Course Leader

The course will be led by Dr. Gerald M. Freidman. Dr. Freidman has been Professor of Geology, Rensselaer Polytechnic Institute since 1964 and he is a Geological Consultant. He holds B.Sc. and D.Sc degrees from University of London and a Ph.D. from Columbia University. He is presently an instructor with Oil and Gas Consultants International, Inc.

Course Fee

Member: \$A1300
 Non-Member: \$A1425
 Including luncheons and course breakfast.

WORKSHOP PROGRAMME - "ELECTRICAL METHODS IN MINERAL EXPLORATION"

13th-17th August, 1984

Venue: Australian Mineral Foundation, Glenside, South Australia.

This fundamental course will be of particular interest to those people involved in oil and gas, mining, geothermal, coal and groundwater exploration.

The Course

Studies on the course will range from layer cake stratigraphy to the most complicated of three-dimensional earths. Theoretical and field examples will be timely and will include results not yet published.

The course will cover the following areas:

Introduction

- * Basic principles
- * Electromagnetic theory
- * Electrical properties of rocks
- * Analogue circuits of rocks
- * Time and frequency domains
- * Instrumentation
- * Interpretation procedures
- * General applications

Resistivity and induced polarization methods

- * Basic principles
- * Arrays
- * Survey procedures
- * Problems
 - Natural field noise
 - Cultural noise
 - Geological noise
 - Overburden masking
 - Topography
 - Electromagnetic coupling

- * Magnetic induced polarization and resistivity
- * Interpretation
 - Layered earth (1D) forward and inverse solutions
 - Two-Dimensional (2D) forward and inverse solutions
 - Three-Dimensional (3D) forward and inverse solutions
 - Electric field patterns in the earth
 - Analysis of 2D and 3D responses
- * Depth of exploration
- * Drill hole methods
- * Applications
 - Deep sulphide mineralization
 - Coal exploration
 - Oil and gas exploration
 - Groundwater
 - Geothermal
 - Drill hole

Electromagnetic methods

- * Basis principles
- * Natural field methods
 - Survey procedures
- * Controlled source methods (CSEM)
 - Survey procedures
 - Arrays
- * Problems
 - Natural field noise
 - Cultural noise
 - Geologic noise
 - Overburden masking
 - Topography
 - Current channelling
- * Inductive induced polarization
- * Interpretation
 - Scaled physical modelling
 - Recent time domain EM model results
- * Field configurations, natural field methods
 - The magnetotelluric method (MT)
 - The audiofrequency MT method (AMT)
 - The controlled source AMT method (CSAMT)
- * Field configurations, CSEM
 - Ground
 - Airborne
 - Drill hole
- * Applications
 - Deep sulphide mineralization
 - Structural mapping in oil, gas and coal exploration
 - Resistivity mapping with airborne EM
 - Delineation of geothermal systems
 - Current channelling and detection of ore deposits
- * Basis for selecting ground, airborne and drill hole EM systems
 - Transmitting loop size
 - Domain of acquisition
 - Decades of spectrum
 - Ratio of signal to noise
 - Lateral resolution
 - Coil configurations
 - Depth and range of exploration

Course Leader

The course will be led by Professor Stanley H. Ward. He is a Professor at the University of Utah and Director of the Earth Science Laboratory of the University of Utah Research Institute. He earned his Ph.D. degree from the University of Toronto in 1952 for research in electromagnetic methods of exploration.

Course Fee

Member: : \$A1500
 Non-Member: \$A1625
 Including luncheons and course dinner

ITC SHORT COURSES IN REMOTE SENSING

International Institute for Aerial Survey and Earth Sciences (ITC),
 Enschede, The Netherlands.
 Co-sponsored by UNESCO

INTRODUCTION TO DIGITAL IMAGE PROCESSING (N.10.2)

12 February - 5 April 1985

The course concentrates on numerical analysis of remote sensing data. It builds on the physics of remote sensing and linear algebra and includes such topics as elements of pattern recognition, statistical methods, image processing, decision-making and classification. Applications include Landsat RBV, MSS and TM data, Seasat SAR data and airborne radar. Hands-on experience with digital image processing equipment forms part of the course.

The course is intended for students, research workers and engineers holding at least a B.Sc degree who are actively involved in the numerical analysis and application of remote sensing data.

Admission

Participants must have a good knowledge of mathematics and the fundamentals of qualitative and quantitative remote sensing. A B.Sc degree or equivalent is the minimum requirement. It is essential that participants are proficient in English. Application should reach ITC at least three months before the course begins. Participants who satisfactorily complete the course receive a certificate of attendance.

REMOTE SENSING APPLICATIONS COURSE FOR EARTH SCIENCES

(N.10.1)

5 November - 14 December 1984

4 November - 13 December 1985

The course will emphasize visual interpretation of various types of imagery (Landsat, SLAR/SAR, MSP, etc). In addition to updating and extending their knowledge of the various aspects of remote sensing systems, the participants will also become acquainted with digital processing techniques for earth science applications.

Admission

The course is intended for professionals with solid experience in photo-interpretation; the duration is six weeks. Applicants with little photo-interpretation experience wishing to follow the course should apply for a preliminary course, starting in September each year, which includes general training in image interpretation applied to geology or geomorphology (courses N.1.1, N.2.1 or N.3.1).

Cost

Expenses are shown in Dutch Guilders (DG):

Registration fee	DG	100
Tuition fee	DG	1000
Extra expenses for books and lecture notes	(approximately) DG	250
Health insurance premium, excluding DG 75 "own risk"	(approximately) DG	160
Lodging, food and personal expenses (single person)	(approximately) DG	2000

Annual increases in cost of living are approximately 8 percent

Accommodation

Course participants are obliged to stay in ITC's student guest house, "Schermerhorn Hall", during the full duration of the course. This guest house is situated in the centre of town and only five minutes walk from ITC's main building.

Fellowships

Short courses are usually not included in the Netherlands government's fellowship programme for international development and technical cooperation. In exceptional circumstances, however, UNESCO may provide limited funds through ITC to cover - wholly or partly - travel and living expenses for some geologists and geomorphologists. Before applying for such assistance, however, it is advisable to appeal first to your own organization or national authorities for financial assistance.

Additional information

Additional information on admission, application, selection and study programmes can be obtained from:

The Student Registration Office,
ITC, P.O. Box 6,
7500 AA Enschede,
The Netherlands.

Telephone 053 - 320 330

Telex: 44525

Cables AERSUR, Enschede, Netherlands.

KURSUS-KURSUS LATIHAN (TRAINING COURSES)

A bracketed date (Mar-Apr 1983) denotes entry in that issue carried additional information.

January 1984-March 1984

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.

January 16-July 13, 1984

Post-experience courses on water resources technology in developing countries (Birmingham, U.K.). For information: Dr. N.T. Kettegoda, Dept. Civil Engineering, University of Birmingham, Box 363, Birmingham, U.K. B15 2TT.

February 1984 - March 1984

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

February 1984 - November 1984

Photointerpretation applied to geology and geotechnics (Bogota, Colombia). Course organized by the Interamerican Centre of Photointerpretation (CIAF) in cooperation with ITC and Unesco. Spanish. For information: Academic Secretariat of the CIAF, Apartado Aereo 53754, Bogota 2, Colombia.

February 15 1984 - December 15 1984

Geothermics (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. Telephone (050) 41503 or 46069.

March 5 - 30 1984

Geological and hydrological hazards (Denver, Colorado, USA). Training course for foreign scientists organized by the U.S. Geological Survey. English. For information: Training Section, Office of International Geology, U.S. Geological Survey, National Center, M/S 917, Reston, VA 22092, USA.

March 1984 - April 1984

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

April 23 - May 25 1984

Applications in geologic and hydrologic exploration and planning (Sioux Falls, South Dakota, USA). International Workshop. For information: Chief, Training and Assistance, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD57198, USA. Telephone: (605) 594-6114.

May 28 - June 29 1984

Remote sensing: geologic applications (Flagstaff, Arizona, USA). Advanced training program for foreign scientists organized by U.S. Geological Survey. English. For information: U.S. Geological Survey Training Center, 917 National Center, Reston, Virginia 22092, USA.

July 1984

Regional geochemical exploration in tropics (Recife, Brazil). 3-week workshop. For information: Prof. Arao Horowitz, Coordenador do Programa de Mestrado em Quimica, Univ. Federal de Pernambuco, Cidade Universitaria, 50000 Recife, Brazil.

July 1984 - August 1984

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. Spanish. For information: Prof. T. Monseur, Departamento de Geologia y Geoquimica, Facultad de Ciencias, Universidad Autonoma de Madrid, Canto Blanco, Madrid 34, Spain.

September 1984 - November 1984

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

September 1984 - November 1984

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. English. For information: ITC (ME), 3 Kanaalweg, 2628 Delft, The Netherlands.

October 1984 - November 1984

Tectonics, seismology and seismic risk assessments (Potsdam, G.D.R.). One month training course organized annually by East German Academy of Sciences in collaboration with Unesco. English. For information: Prof. Dr. H. Kautzleben, Director, Central Earth's Physics Institute, Academy of Sciences of the German Democratic Republic, Telegraphenberg, DDR 1500 Potsdam, G.D.R.

October 1 - November 2, 1984

Remote sensing: Geologic applications (Flagstaff, Arizona, USA). Advanced training program for foreign scientists organized by U.S. Geological Survey. English. For information: U.S. Geological Survey Training Center, 917 National Center, Reston, Virginia 22092, USA.

October 1984 - September 1985

Fundamental and Applied Quaternary Geology (Brussels, Belgium). Annually organized training course leading to a Master's degree on Quaternary Geology by the Vrije Universiteit Brussel (IFAQ) and sponsored by Unesco. English and French. For information: Prof. Dr. R.

Paepe, Director of IFAQ, Kwartairgeologie, Vrije Universiteit
Brussel, Pleinlaan-2, B-1050, Brussels, Belgium.

KALENDAR (CALENDAR)

A bracketed date (Mar-Apr 1983) denotes entry in that issue
carried additional information.

1984

- March 18 - 25 : Land subsidence (3rd International Symposium),
Venice, Italy. Sponsored by IAH. (A. Ivan Johnson,
3rd International Symposium on Land Subsidence,
Woodward-Clyde Consultants, 7600 East Orchard
Road, Englewood, Co. 80111, USA).
- March 19 - 23 : Offshore Mineral Resources (2nd International Semi-
nar), Brest, France, Languages: French and English
(Mr. Louis Galtier, Association Germinal, B.P.
6009, 45060 Orleans, Cedex, France).
- March 25 - 29 : Soil salinity under irrigation - processes and
management (International Meeting), Bet Dagan,
Israel. Sponsored by ISSS and Israel Society of
Soil Science. (Dr. B. Yaron, P.O. Box 3054, Tel-
Aviv 61030, Israel).
- March 26 - 30 : Computer applications in the mineral industries
(18th International Symposium), London, U.K.
Organized by the Institution of Mining and Metallurgy.
(The Conference Office, Institution of Mining and
Metallurgy, 44 Portland Place, London W1N 4BR, UK).
- March 26 - 30 : Recent advances in mineral science and technology
(International Conference), Johannesburg, South
Africa. Sponsored by the South African Council
for Mineral Technology. (The Conference Secretary
(C.25), Mintek, Private Bag X3015, Randburg, 2125
South Africa) (May-Jun 1983).
- March 27 - 31 : Landplan II - Geoscience applied to urban problems
in SE Asia (Workshop), Kuala Lumpur. (Organizing
Secretary, Landplan II, Dept. of Geology, Univer-
sity of Malaya, Kuala Lumpur 22-11, Malaysia).
- April 9 - 13 : Geology, Mineral and Energy Resources of Southeast
Asia (GEOSEA V), Kuala Lumpur, Malaysia. Sponsored
by Geological Society of Malaysia. (T.T. Khoo,
Dept. of Geology, University of Malaya, Kuala Lum-
pur 22-11, Malaysia).
- April 12 - 13 : Diagenesis and low-temperature metamorphism (Meeting),
Bristol, U.K. (D. Robinson, Department of Geology,
The University, Queen's Building, University Walks,
Bristol BS8 1TR, U.K.).
- May 10 - 12 : Mineralisation in volcanic processes (Geological
Society and Volcanic Studies Group Joint Meeting),
Aberystwyth, Wales, U.K. (Geological Society,
Burlington House, Piccadilly, London W1V 0JU, UK).

- May 14 - 18 : Geomechanics (4th Australia-New Zealand Conference), Perth, Western Australia. (The Conference Manager, 4th A.N.Z. Geomechanics Conference, The Institution of Engineers, Australia, 11 National Circuit, Barton, ACT 2600, Australia).
- May 20 - 23 : Industrial minerals (6th International Congress), Toronto, Canada. (B.M. Coope - Editor, Industrial Minerals, 45/46 Lower Marsh, London SE1, UK).
- May 21 - 23 : Aggregates (International Symposium), Nice, France. Sponsored by IAEG. Languages: English and French. (M. Louis Prime), L.C.P.C., 58 boulevard Lefebvre, 75732 Paris Cedex 15, France).
- May 21 - 23 : Climate: Present, past and future (Symposium), New York, N.Y., USA. Sponsored by Columbia University in honour of Rhodes W. Fairbridge. (John E. Sanders, Dept. of Geology, Columbia University, 606 West 120 Street, New York, NY 10027, USA).
- May 21 - 23 : Groundwater resource utilization and contaminant Hydrogeology (International Symposium), Montreal, Quebec, Canada. Sponsored by Canadian National Chapter of IAH and CWWA. Languages: English and French. (Mr. H. Sommelet, Geomines Ltd., 1010 Sherbrooke St. W., Suite 2202, Montreal, Quebec, Canada H3A 2R7).
- June 5 - 11 : Geology of the Himalayas (International Symposium), Chengdu, China. Field excursion to Tibet. Languages: Chinese and English. (Mr. Li Tingdong, Secretary-General of the Organizing Committee, c/o Chinese Academy of Geological Sciences, Baiwanzhuan, Beijing, P.R. China).
- June 6 - 9 : Interpraevent (Interdisciplinary Symposium on mountain rivers, torrents, snow avalanches, slope stability, etc.) Villach, Austria. (Interpraevent 1984, Postfach 134, A-9501, Villach, Austria).
- June 15 - 17 : Sedimentology of nearshore and shelf sands and sandstones (Research Symposium), Calgary, Canada. (R. John Knight, Petro-Canada, P.O. Box 2844, Calgary, Alberta, Canada T2P 3E3).
- June 18 - 23 : 7th International Peat Congress, Dublin, Ireland. Study tours and post-congress tours. (International Peat Congress, c/o Bordna Mona, Lower Baggot Street, Dublin 2, Ireland).
- June 20 - 23 : Geomembranes (International Conference), Denver, Colorado, USA. Conference to precede the Impermeable Barriers for Soil and Rock Symposium. (A. Ivan Johnson, Woodward-Clyde Consultants, P.O. Box 4036, Denver, Co. 20204, USA).
- June 23 - 26 : Practical applications of groundwater geochemistry (Workshop), Banff, Alberta, Canada. (Dr. E.I. Wallick, Alberta Research Council, 5th Floor, Terrace Plaza, 4445 Calgary Trail South, Edmonton, Alberta, Canada T6H 5R7).

- June 23 - 30 : Melanges of the Appalachian Orogen (Penrose Conference), Newfoundland. (B. Lorenz, Department of Earth Sciences, Memorial University, St. Johns, Newfoundland, Canada A1B 3X5)
- June 24 - 27 : Codata (9th International Conference), Jerusalem, Israel. (The Secretariat, 9th International CODATA Conference, 122 Hayarkon Street, P.O. Box 3054, 61030 Tel Aviv, Israel)
- June 26 - 28 : Deep structure of the continental crust (International Symposium), Ithaca, N.Y., USA. (Muawia Barazangi, Department of Geological Sciences, Cornell University, Ithaca, NY 14853, USA).
- July : Volcanic Soils (International Panel) Tenerife, Canary Islands. (M.E. Fernandez Caldas, Dpto. de Edafologia, Univ. de la Laguna, Tenerife, Islas Canarias, Spain)
- August : Mapping of the soil-water balance (Meeting), Budapest, Hungary. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Aug 4 - 14 : 27th International Geological Congress, Moscow, USSR. (N.A. Bogdanov, General Secretary, Organizing Committee of the 27th IGC, Staromonetny per. 22, Moscow 109180, USSR)
- Aug 9 - 18 : Crystallography, (13th General Assembly and International Congress), Hamburg, F.R.G. (E.E. Snider, American Crystallographic Association, 335 East 45th Street, New York, NY 10017, USA).
- Aug 24 - 30 : 6th International Palynological Conference, Calgary, Canada. Sponsored by ICP, CAP, CSPG, the University of Calgary, and Arctic Institute of North America. Pre- and post-Conference excursions. (L. Kokoski, Conference Office, Faculty of Continuing Education, Education Tower Room 102, Calgary, Alberta, Canada T2N 1N4)
- Aug 27 - 31 : Water movement in heavy clay soils (Meeting), Wageningen, Netherlands. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Sept 3 - 8 : Caledonide Orogen, (IGCP Project 27, Working Group Meeting), Edinburgh, Scotland. Pre-Meeting excursions in Ireland, Scotland, England and Wales. (A.L. Harris, The University of Liverpool, Jame Herdman Laboratories of Geology, Brownlow Street, P.O. Box 147, Liverpool L69 3BX, UK)
- Sept 10 - 14 : Titanium (5th International Conference), Munich, F.R.G. (Deutsche Gesellschaft für Metallkunde EV, Adenauerallee 21, D-6370 Oberursel 1, F.R.G.)
- Sept 16 - 22 : Landslides (4th International Symposium), Toronto, Canada. Sponsored in part by IAEG (Mr. J.L. Seychuk, Chairman, Organizing Committee, ISL/84, P.O. Box 370, Station A, Rexdale, Ont., Canada M9W 5L3)

- Oct 1 - 5 : Remote sensing of environment (18th International Symposium), Paris, France. (Environmental Research Institute of Michigan, P.O. Box 8618, Ann Arbor, MI 48107, USA)
- Oct 14 - 20 : Mineral processing and extractive metallurgy. (International Conference), Kunming, P.R. China. (The Secretary, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK)
- Oct 31 - Nov 7 : Seismology and physics of the earth's interior (Regional Assembly of the International Association) Hyderabad, India. (Organizing Committee, IASPEI, Regional Assembly, National Geophysical Research Institute, Hyderabad 500 007, India)
- Nov/Dec : Land evaluation for soil erosion hazard assessment (Meeting), Enschede, Netherlands. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Nov 5 - 8 : Geological Society of America (Annual Meeting), Reno, USA. (S.S. Beggs, Geological Society of America, P.O. Box 9140, 330 Penrose Place, Boulder, Co. 80301, USA)
- Nov 19 - 22 : 12th World Mining Congress, New Delhi, India (Organizing Committee, Institute of Engineers, 8 Gokhale Road, Calcutta 700 020, India)
- Nov 20 - Dec 5 : Late Quaternary Sea-Level Changes (International Symposium and Field Meeting), Argentina and Chile. IGCP - 200 and INAU Commission on Quaternary Shorelines. (Prof. Dr. Enrique Schnack, Centro de Geologia de Costas, C.C. 722, Correo Central, ARG-7600, Mar del Plata, Argentina)
- Dec 2 - 5 : Future petroleum provinces of the world (AAPG W.E. Pratt Memorial Conference), Phoenix, Ariz., USA. (AAPG, P.O. Box 979, Tulsa, OK 74101, USA)
- Dec 2 - 6 : Society of Exploration Geophysicists, (54th Annual Meeting), Atlanta, Georgia, USA. (J. Hyden, SEG, Box 3098, Tulsa, Oklahoma 74101, USA)

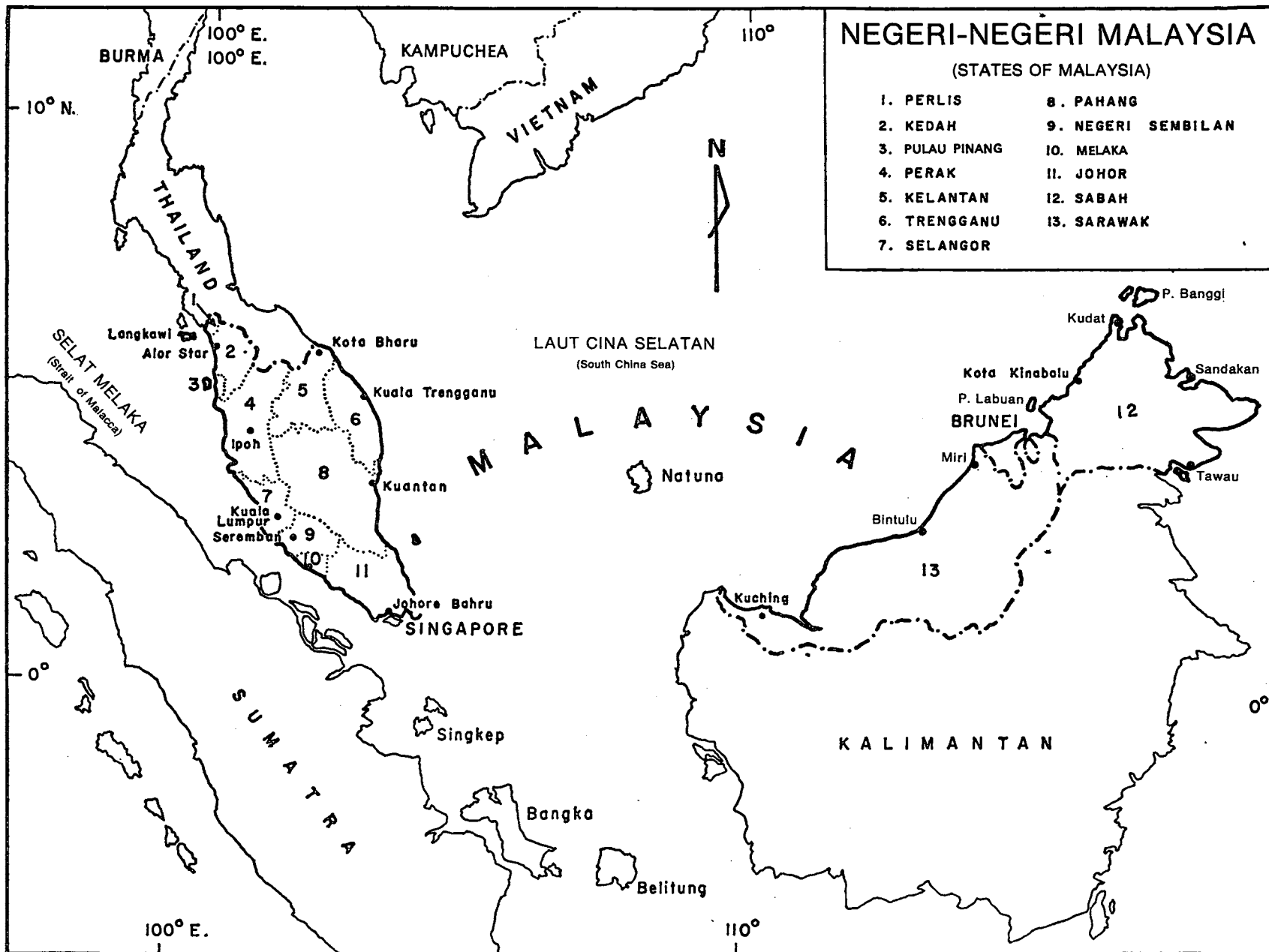
1985

- January : International Association of Hydrogeologists (International Congress), Tucson, Arizona, USA. Sponsored by IAH and AGU. (Eugene S. Simpson, Dept. of Hydrology and Water Resources, College of Earth Sciences, The University of Arizona, Tucson, AZ 85721, USA)
- January : Acid-Sulphate Soils (meeting), Dakar, Senegal. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Feb 11 - 14 : Asian Mining '85 (2nd Conference), Manila, Philippines. (Meeting Secretary, The Institute of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK)

- April 10 - 12 : Forum on the Geology of Industrial Minerals, ann. mtg. Tucson, Arizona. (H. Wesley Peirce, Arizona Bureau of Geology & Mineral Technology, 845 N. Park Ave. Tucson 85719. Phone 602/621-7906)
- June : Tunnelling (4th International Symposium), Brighton, UK. (The Secretary, Institute of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK)
- 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)
- July 28 - Aug 2 : 8th International Clay Conference, Denver, Colorado. Sponsored by AIPEA. (Dr. A.J. Herbillon, Groupe de Physico-Chimie Minerale et de Catalyse, Univ. Catholique de Louvain, Place Croix du Sud 1, B-1348 Louvain-la-Neuve, Belgium)
- Aug 19 - 23 : Sixth Gondwana Symposium. Columbus, Ohio, USA. Sponsored by IUGS and Geological Society of America. (D. Elliott, Inst. of Polar Studies, Ohio State University, 103 Mendenhall, 125 South Oval Mall, Columbus, Oh 43210, USA)
- Sep 8 - 13 : Hydrogeology in the service of man (18th IAH Congress - International Symposium), Cambridge, UK. (J. Day, Hydrogeology Unit, Maclean Building, Crowmarsh Gifford, Wallingford, OX10 8BB, UK)
- Sept 9 - 13 : Fossil and living brachiopods (Meeting), Brest, France. (Congres Brachiopodes, Univ. Bretagne occidentale, Laboratoire du Paleozoique - 6, av. Le Gorgen 29283 Brest Cedex, France)
- Sept 15 - 21 : Geomorphology, resources, environment and the developing world (International Conference), Manchester, UK. (Prof. Ian Douglas, School of Geography, University of Manchester, Manchester M13 9PL, UK)
- Sept 22 - 28 : Chemrawn IV: Chemistry and resources of the global Ocean (Meeting), Woods Hole, Mass., USA. (Prof. G. Ourisson, Centre de Neurochimie, Universite Louis Pasteur, 5 rue Blaise Pascal, F-67084 Strasbourg, France)
- Sept 22 - 26 : High heat production granites, hydrothermal circulation and ore genesis, mtg. St. Austell, Cornwall. (Institution of Mining & Metallurgy, 44 Portland Place, London W1N 4BR. Phone: 01-580 3802. Tel-ex. 261410)

1986

- May 11 - 16 : Mining and Metallurgical Congress (13th), Canberra, Australia. (Council of Mining and Metallurgical Institutions, 44 Portland Place, London, W1N 4BR, UK)
- July 13 - 18 : International Mineralogical Association (General Meeting), Stanford, Calif., USA. (Prof. C.T. Prewitt, Dept. of Earth and Space Sciences, State University of New York, Stony Brook, NY 11794, USA)
- Aug 11 - 15 : Kimberlite (4th International Conference), Perth, Western Australia. (Dr. A.F. brendall, Geological Survey of Western Australia, 66 Adelaide Terrace, Perth, W.A., Australia)
- Aug 13 - 20 : Soil Science (13th International Congress), Hamburg, F.R.G. (Prof. Dr. K.H. Hartge, Inst. fur Bodenkunde, Univ. Hannover, Herrenhaserstrasse 2, D-3000 Hannover 21, F.R.G.)
- Aug 25 - 29 : IAS Sedimentological Congress (12th International), Canberra, Australia. (Dr. K.A.W. Crook, Dept. of Geology, Australian National University, P.O. Box 5, Canberra, ACT, 2600, Australia).



NEGERI-NEGĒRI 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 | |

