

## PERSATUAN GEOLOGI MALAYSIA

# WARTA GEOLOGI

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# CATATAN GEOLOGI

## (GEOLOGICAL NOTES)

### AN UNUSUAL TIN MINE IN LIMESTONE POTHOLE, NEAR PUSING, PERAK\*

AW, P.C., Geological Survey Malaysia, Ipoh, Perak

#### INTRODUCTION

Most of the gravel pump tin mines in the Kinta Valley, Perak, are operating in alluvium with pinnacled limestone bedrock. Ng Yew Loong Tin Mine is the only mine known to the writer that is working on alluvium from a single limestone pothole.

This mine is of geological interest because of the size of the pothole and the nature of the cassiterite-bearing alluvium. The significance of potholes in tin mining and the methods of detection of potholes underlain by alluvium are discussed in this short note.

Pothole is defined (non-genetically) in this note as a natural steeply inclined hole in limestone. Pothole is a better term to describe the feature under discussion than sinkhole or doline which both have genetic connotations.

#### LOCATION AND ACCESS

Ng Yew Loong Tin Mine is situated about 1 km south of the small township of Pusing and about 16 km from Ipoh. It is located at map reference point vD 355 966 of Topo Sheet 53 and on Lots 35220 and 33705 on the 8-chain map sheet. It is accessible by an unsurfaced mine track off the Ipoh-Parit road.

#### NG YEW LOONG TIN MINE

The Mining Leases are held by 2 brothers, Messrs. Ng Yew Koi and Ng Yew Loong. Mining under the present lease started in late 1978. The area had been mined previously, however, details are not known.

Records in the Geological Survey archives show that the area was prospected in 1940. The area on Lot 35220 and Lot 33705 to the south was prospected by Chen Sang for Ghee Lee Kongsí. It was bored (probably by Banka drill) on a 2-chain east-west and 4-chain north-south grid. Based on the results of 17 holes, depth of alluvium was found to range from 20 to 50 ft., the average depth being 36 ft. All the holes bottomed on limestone bedrock. The cassiterite value recorded range from 0.08 to 1.72 kati per cubic yard, with the computed average value of 0.63 kati per cubic yard.

Official statistics from the Mines Department in Batu Gajah on the tin-ore production of Ng Yew Loong Mine in 1979-80 is shown in Table 1.

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\* Permission to publish this note is given by the Director-General, Geological Survey Malaysia.

Table 1. Tin-ore production of Ng Yew  
Loong Tin Mine (in piculs)

	<u>1979</u>	<u>1980</u>
January	14.28	66.04
February	1.80	103.20
March	10.79	69.86
April	15.07	88.41
May	23.26	115.75
June	9.17	91.60
July	12.75	110.62
August	16.72	100.70
September	9.17	119.19
October	-	98.97
November	11.02	90.54
December	36.56	163.77
	<u>160.59</u>	<u>1219.65</u>

It is apparent that from the beginning (for the most part of 1979), the mine was operating on lean tailing ground. Owing to the unprofitable venture, the Ng brothers subcontracted the mine and since then the operation of the mine has changed hands a number of times. Currently, 8 different parties have financial interest in the mine.

The mine struck paydirt in the beginning of 1980. It could be the top of the 'virgin ground' in the pothole. When the writer last visited the mine in April 1981, mining was at a depth of 45 m (150 ft). The bottom of the pothole was still unknown.

Owing to the deep and steep mine hole, a number of high-capacity machines are being used. Some of the more important machinery are as follows:

1. First stage vertical pump, 700 HP
2. Second stage vertical pump, 480 HP
3. Crane, 35-tonne, to lower/lift machinery, workers and waste boulders
4. Pressure pump, 250 HP capacity
5. Excavator, to dig the stiff clay so that the monitors can break it up with high water pressure
6. Tractor (Ford 5000) - 4 units, 3 in mine hole and 1 outside.

#### LIMESTONE POTHOLE

The pothole is nearly circular in outline. The north-south diameter at the top is about 80 m, whilst the east-west diameter is about 90 m. The area is about 5200 m<sup>2</sup> (1.3 acres).

It is walled on all sides by crystalline limestone (marble). The

sides are steeply inclined, slightly inwards (Fig. 1). However, the bottom is believed to be closed by limestone as there was no significant seepage of water from below according to Mr. Ng Yew Koi.

### ALLUVIUM

The cassiterite-bearing alluvium in the pothole is very poorly sorted. It ranges from boulders of more than 1 m diameter down to clay-sized fractions. The alluvium is very stiff and firm. It requires a hydraulic excavator to dig it up before the monitors can break it up with water under pressure (Plate 1).

### Size analysis

Three samples collected at about 40 m depth were wet-sieved. The results are shown in Table 2.

Table 2. Size distribution of alluvium from Ng Yew Loong Tin Mine

	Size fraction	Sample 1	Sample 2	Sample 3
Gravel	+2.00 mm	43.1%	57.1%	16.8%
Very coarse sand	-2.00			
	+1.00 mm	5.4	5.2	2.3
Course to medium sand	-1.00 mm			
	+125 $\mu$ m	18.5	12.2	11.3
Fine to very fine sand	-125 $\mu$ m			
	+63	4.4	3.6	3.8
Mud	-63 $\mu$ m	28.6	21.7	65.8
		100%	99.8%	100.0%

Based on Folk's classification (1954), samples 1 and 2 may be termed muddy gravel, whilst sample 3 may be called gravelly clay. However, there are some boulders which occur sporadically in the alluvium are excluded in the classification. The boulders are, nonetheless, significant from a mining point of view, since they are a hindrance during mining operations. The boulders occur in sufficient volume to require tractors to group them together in the mine hole and a crane to remove them to the mine dump (Plates 2 & 3).

### Composition

From the mine dump, angular cobbles and boulders of various rock types can be found. They are mostly tourmalinized meta-arenite, vein quartz, quartz-tourmaline and marble. The marble blocks are probably derived from recent blasting of wall rock by the miner. According to Mr. Ng, massive blocks of cassiterite up to 605 kg (1 pikul) in weight have occasionally been found. Plate 4 shows a block of cassiterite with some well formed cassiterite crystals.

Of more common occurrence, however, is cassiterite-quartz veins

in tourmalinized meta-arenite cobbles/boulders (Plate 5). The amount of cassiterite that could be obtained from mine dump was sufficient to attract a few men and women who sifted through the waste pile in search of the cassiterite-bearing cobbles/boulders. On the writer's visit in April 1981, about a dozen of these cassiterite 'scavengers' were seen waiting for new piles of boulders to be lifted from the mine hole (Plates 2 & 3). It was because of a fight among the scavengers over their rights to the boulders that the miners banned them from the mine.

The qualitative estimate of the rock/mineral fragments in the gravel/sand fractions obtained by wet-sieving is shown in Table 3. The fragments, except for the siderite, are angular. The granitoid fragments are mostly aplitic in texture. The authigenic siderite, which is of interest, is described in more detail below.

Table 3. Qualitative estimate of rock/mineral in gravel/sand fractions of alluvium

Angular fragments of	Gravel	Coarse to medium sand	Fine sand
Meta-arenite	++	+	-
Quartz	+	+	++
Quartz-tourmaline	+	+	-
Quartz-feldspar granitoid	+	+	--
Slate, phyllite	-	-	--
Cassiterite	0	-	--
Authigenic siderite	-	+	--
Tourmaline	0	--	--
Muscovite	0	--	--

Key: ++ = very abundant (> 50%)  
 + = abundant (10 - 50%)  
 - = rare (< 10%)  
 -- = trace (< 1%)  
 0 = not detected

From x-ray diffraction, the clay size fraction (minus 2  $\mu\text{m}$ ) is shown to be made up mainly of kaolin and small amounts of illite and geothite (Leong Kok Hoong, personal comm.)

#### Sphaerosiderite

Sphaerosiderite occurs as dark brown globular forms, mainly in the 500-250  $\mu\text{m}$  size range. It also forms botryoidal masses and concretions on rock fragments and besides acting as a cement, binding clay and sand into various size aggregates. Under the binocular microscope, individual glabular siderite can invariably be found on the surface of most gravels.

### FORMATION OF LIMESTONE POTHOLE AND ALLUVIUM

The wall on all sides of the limestone pothole is smooth, indicating that solution plays a major role in its formation. Insignificant water seepage from underground suggests that the pothole is closed at the bottom. The above evidence shows that the pothole was likely to have been formed along a river channel in crystalline limestone bed-rock by running water and detritus.

The poorly-sorted nature of the alluvium and the size and angularity of the enclosed cobbles/boulders, show that the alluvium was deposited under high energy environment, probably at the upper reaches of a palaeo-river. The immediate dominant source rocks appeared to be meta-sediments, particularly meta-arenite which was extensively tourmalinized and veined by cassiterite, quartz and tourmaline. Boulders, cobbles and finer detritus were occasionally carried by high-capacity water and deposited in the pothole.

The form and characteristics of the siderite show that it was formed after the deposition of the alluvium. Although the precise condition could not be determined, it is surmised that within the restricted environment of the pothole, the built-up of the carbonate and ferrous ions led to the precipitation of siderite spherulites, probably under low Eh and high pH (Krumbein & Garrels, 1952).

### THE SIGNIFICANCE OF POTHOLES IN TIN MINING

This unusual tin mine is working on a rich placer, which was deposited in a limestone pothole, under a high fluviatile environment. Although this is the only known pothole tin mine, it is possible that there are other limestone potholes which are still not exposed. In fact, Mr. Ng Yew Koi (personal comm.) claimed that there are 3 other potholes of unknown sizes, detected from Banka drilling in his leases. It is highly probable that these potholes may contain cassiterite-bearing alluvium.

From the low and erratic tin-ore production, initially, mining was apparently unprofitable. However with perseverance and high investment on machinery, the miners succeeded in mining this unusual tin deposit. This successful example also opens a new prospect for mining from this old tin field.

This pothole was uncovered inadvertently by mining. Proper methods should be found to detect the presence of limestone potholes, even in areas which have been mined before. Banka drilling is too expensive a method to use in preliminary survey. Geophysical methods such as sub-surface radar, electrical soundings and microgravity measurements should be tried in the surrounding area to detect any unexposed potholes, which may contain rich tin placers.

### ACKNOWLEDGEMENTS

The writer expresses his thanks to Mr. Soong Chok Seong for the information on the existence of the mine, Mr. Fateh Chand for reading the original draft, Mr. Teoh Lay Hock for comments on the petrography of the gravels and Mr. Mohd. Yusop bin Hj. Basri for assistance in the field.



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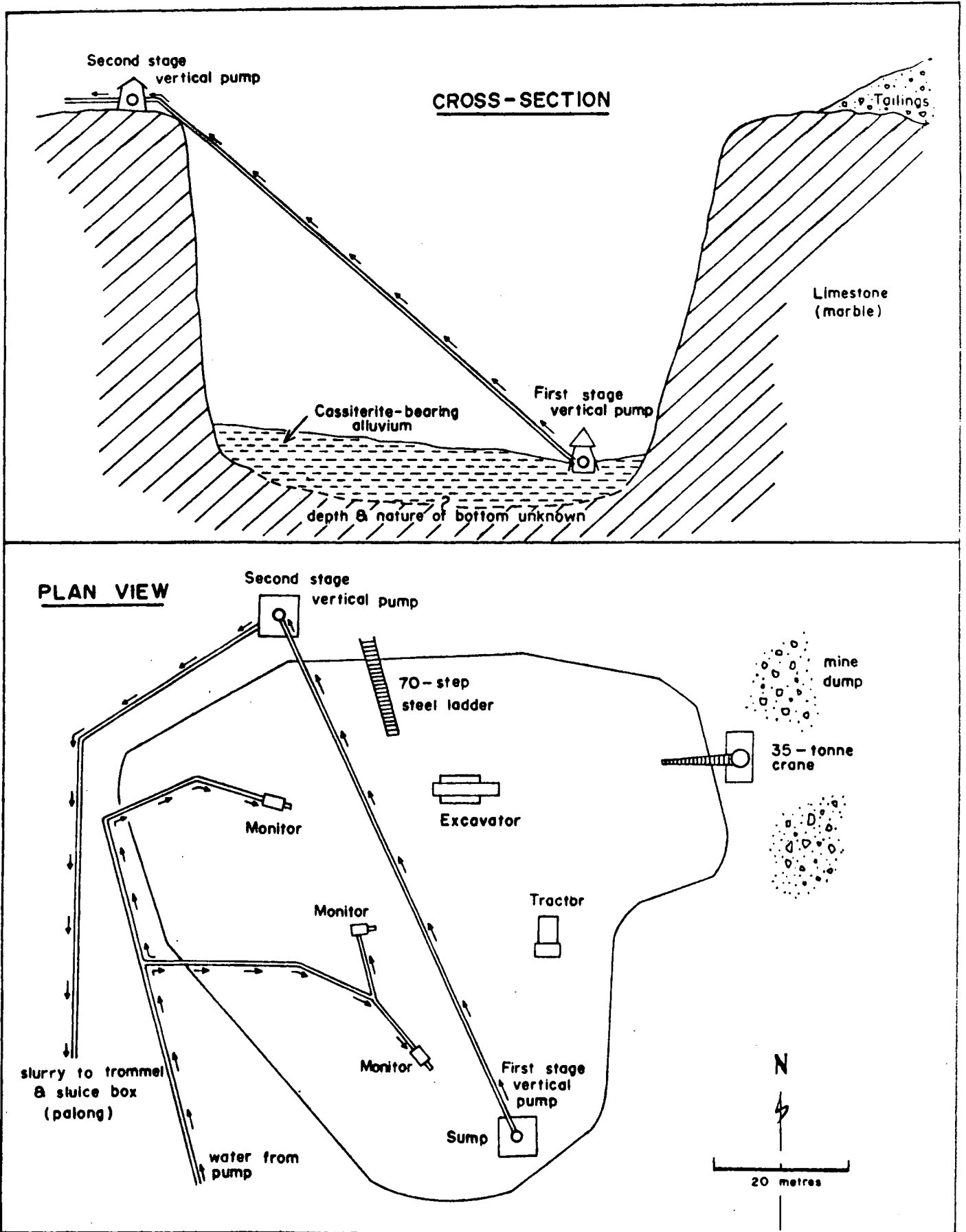
*Manuscript received 24 July 1981*



**Plate 1** Looking down the mine hole from the top. The hydraulic excavator and the monitor pumps are in operation. Note the smoothness of the side wall. The first stage vertical pump is on the left.



FIGURE 1. PLAN AND CROSS-SECTION OF NG YEW LOONG TIN MINE SHOWING THE SIZE OF THE LIMESTONE POTHOLE



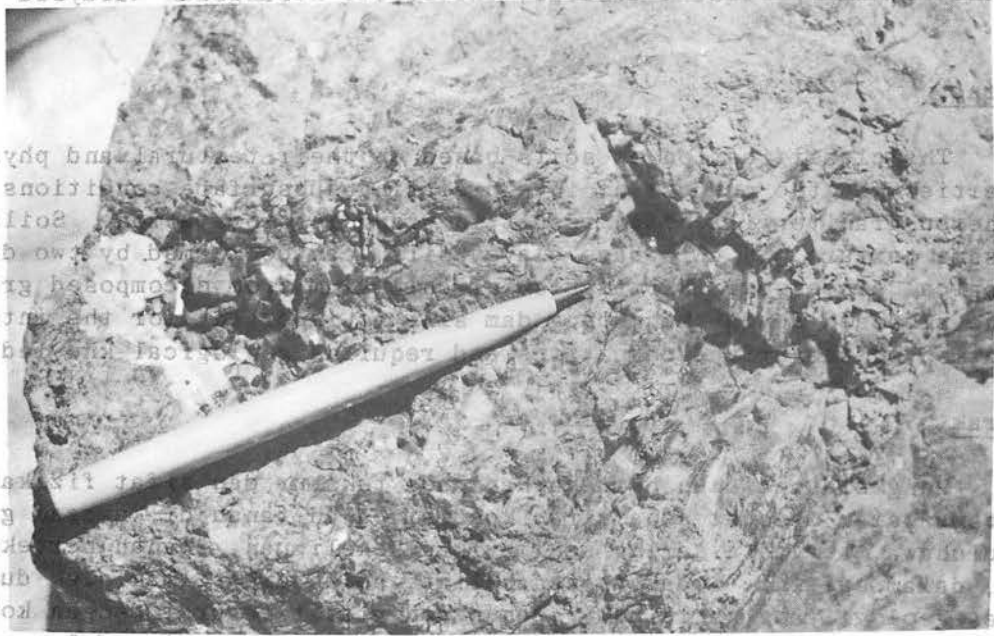


**Plate 2** Top of the mine, looking west. Part of the top of the pothole is visible. Hut with second stage vertical pump and lift crane are in the immediate background

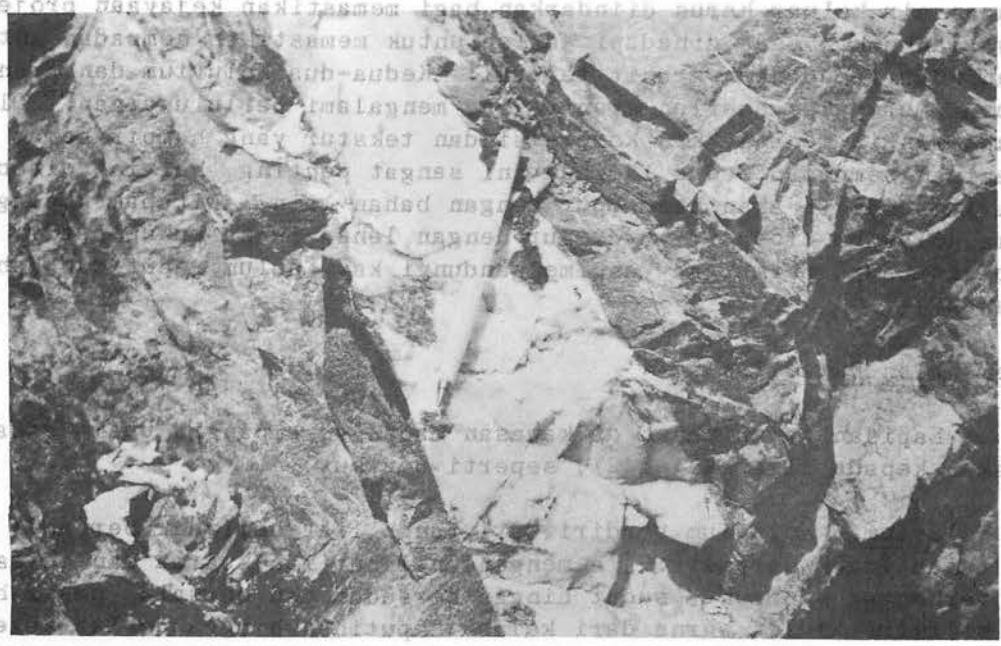


**Plate 3** Foreground shows the mine dump with the rock boulders. Immediate background shows a group of cassiterite scavengers running to search for cassiterite from a new of rock boulders just lifted up by the crane from the mine hole. Steel cage on the left is used to lower and lift up workers.

IRAHIM KOMOD, Institut Geologi, Universitas Kebangsaan, Indonesia



**Plate 4** A block of cassiterite and meta-arenite found among the alluvium from the pothole. Note some of the cassiterite with good crystal faces.



**Plate 5** Close-up of a boulder of tourmalinized meta-arenite showing a cassiterite-bearing quartz vein. Ball pen points to a patch of cassiterite. Arsenopyrite was also noted in the quartz vein.

# GRANIT TERLULUHAWA: KOLUVIUM ATAU GRANIT TERURAI?

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## Abstract

The classification of soils based on their textural and physical properties for the purpose of interpreting subsurface conditions of weathered granite will often result in wrong interpretation. Soils of the same texture, in this case clayey silt, can be formed by two different geological processes. Distinguishing colluvium from decomposed granite at the proposed Sungai Mengkuang dam site is important for the interpretation of subsurface conditions and requires geological knowledge.

## Abstrak

Pengkelasan tanah berdasarkan pada tekstur dan sifat fizikalnya, terutama dalam membuat penafsiran kondisi bawah tanah di kawasan granit terluluhawa, ternyata sering menimbulkan kekeliruan. Tanah bertekstur sama, dalam hal ini lodak bertanah liat, boleh dihasilkan oleh dua proses geologi yang berlainan. Pembezaan granit terurai dengan koluvium di tapak cadangan empangan Sungai Mengkuang adalah penting dalam penafsiran kondisi bawah tanah dan memerlukan pengetahuan geologi.

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Baru-baru ini saya berpeluang dapat menafsirkan kondisi bawah tanah pada tapak empangan utama, cadangan empangan tanah Bukit Mertajam (Rajah 1). Empangan yang akan dibena ini berfungsi sebagai penyimpan air yang akan dibawa dari Sungai Muda di waktu musim hujan. Oleh itu resapan air keluar harus dihindarkan bagi memastikan kejayaan projek ini. Persoalan pokok yang dihadapi adalah untuk memastikan sempadan antara bahan koluvium dengan granit terurai. Kedua-dua koluvium dan granit terurai merupakan hasil granit yang mengalami perluluhawaan. Oleh itu dilapangan ia menunjukkan komposisi dan tekstur yang hampir sama. Penentuan sempadan kedua lapisan ini sangat penting, hal ini disebabkan koluvium umumnya akan bercampur dengan bahan lain. Ditapak empangan utama koluvium didapati bercampur dengan lensa-lensa kukup pasir, tanah liat dan tanah permukaan yang mengandungi kayu belum reput dan bahan organen.

## Pemerihalahan Bawah Tanah

Lapisan bawah tanah di kawasan cadangan empangan utama dapat dibezakan kepada tiga (Rajah 2), seperti berikut:

1. Koluvium. Koluvium terdiri dari tanah liat berlodak berpasir hingga tanah lodak berpasir. Ia mengandungi butiran kuarza dan feldspar terbentuk separuh - sudut hingga bersudut dan bersaiz pasir hingga kelikir. Jujat warna dari kelabu keputihan hingga coklat kekelabuan. Endapan koluvium mempunyai ketebalan sekitar 5 meter, tetapi pada beberapa bahagian ia boleh mencapai hingga 7 meter. Koluvium di sini bersifat heterogen, pada beberapa lubang gerudi dijumpai lensa-lensa kukup pasir, tanah liat lembut, tanah berorganen dengan kayu kayan yang belum reput. Ketebalan lensa-lensa ini boleh mencapai hingga 2 meter bagaimana pun keseluruhan ditafsirkan kurang dari 10 peratus dari isipadu koluvium.

2. Granit terurai. Granit terurai merupakan tanah setempat hasil perluluhawaan batuan granit. Ia terdiri dari tanah liat berlodak berpasir hingga tanah lodak berpasir, bergantung pada darjah luluhawa, komposisi asal dan proses larut lesap. Ia mengandungi butiran kuarza bersaiz pasir hingga kelikir dan umumnya berbentuk bersudut. Granit terurai menunjukkan julat warna antara kelabu keputehan hingga coklat kemerahan atau kekuningan, dan dengan ketebalan yang berbeza antara 7 meter di bahagian tengah hingga sekitar 30 meter di bahagian pinggir dan cerun lembangan. Granit terurai ini boleh juga dikelaskan berdasarkan darjah luluhawa (Little, 1967). Untuk zon granit terurai ia dapat dibagikan pada granit gred IV hingga VI.
  
3. Batuan granit. Batuan dasar pada keseluruhan kawasan empangan terdiri dari batuan granit segar hingga terluluhawa sedikit. Granit berwarna kelabu hingga samar, bersaiz sederhana hingga kasar dan umumnya bersifat porfir dengan mineral mikroklin sebagai fenokrisnya. Sistem rekahan, terutamanya set kekar dan zum ricih bersaiz sederhana hingga rapat. Kehadiran set kekar unggul yang hampir menegak menyebabkan nilai Peranda Mutu Batuan (PMB) yang didapati dari lubang gerudi agak rendah. PMB boleh difahamkan sebagai peratus jumlah panjang teras gerudi yang melebihi 0.1 m dibandingkan dengan jumlah panjang teras gerudi (keterangan lanjut rujuk Deere, 1967). Sempadan antara tanah granit terurai dengan batuan granit segar (Gred I), terdapat lapisan nipis granit Gred III dan lapisan sederhana tebal granit Gred II.

### Perbincangan

Jika diperhatikan dari aspek saiz butiran, warna dan tekstur tanah, kedua-dua kolumium dan granit terurai sukar untuk dibezakan. Penafsiran awal menganggap ke dua jenis tanah ini merupakan satu lapisan yang sama, iaitu granit terurai. Hanya selepas terjumpanya lensa-lensa kukup pasir, tanah liat dan bahan organik serta kayu yang tidak reput, penafsiran awal perlu difikirkan semula. Granit terurai atau tanah granit setempat tidak mungkin boleh mengandungi lensa-lensa kukup dan bahan organikan. Ia harus terdiri dari tanah yang telah mengalami pindahan, tetapi tidak mungkin dipindahkan jauh memandangkan teksturnya seakan tanah setempat.

Satu cerapan yang lebih teliti dilakukan semula pada teras-teras gerudi sebagaimana yang ditunjukkan dalam Rajah 2. Hasilnya menunjukkan memang terdapat sedikit perbezaan mineralogi antara lapisan kolumium dengan granit terurai. Dalam lapisan kolumium sebahagian dari mineral feldspar dan feromagnesium masih belum mengalami perluluhawaan sepenuhnya. Bentuk hablur dan tekstur masih dapat diperhatikan dengan baik. Sebaliknya dalam granit terurai, keseluruhan mineral feldspar dan feromagnesium telah berubah menjadi mineral tanah liat. Dengan berdasarkan pada perbezaan ini sahaja, sempadan antara kedua lapisan kolumium dan granit terurai dapat ditakrifkan dengan baik.

Persoalannya, bagaimanakah hal di atas boleh terjadi? Ini dapat dijelaskan dengan menganggap kedua-dua lapisan mengalami proses luluhawa yang berlainan. Kolumium, bahan lereng bukit dipindahkan kelembangan dalam bentuk bongkah-bongkah granit berserta tanah granit, tanah organikan dan tumbuhan. Selanjutnya bongkah-bongkah granit dalam kolumium mengalami luluhawa fizikal, iaitu penyepaian batuan tanpa perubahan mineral.

Bahawa ia kurang mengalami luluhawa kimia dapat dijelaskan dari tanda-tanda kehadiran kayu yang maseh belum reput dan terdapatnya hablur-hablur feldspar dan mineral feromagnesium yang tidak berubah menjadi mineral tanah liat. Sementara granit terurai merupakan tanah setempat yang telah lama mengalami luluhawa kimia, dan semua mineral yang kurang stabil telah berubah menjadi mineral tanah liat.

Masalah yang sama pernah juga dihadapi oleh Profesor Tjia (dengan perhubungan lisan) semasa beliau cuba membezakan antara tanah granit setempat dengan yang telah dipindahkan di satu kawasan di Kuala Lumpur. Lebih merumitkan lagi kedua-duanya telah mengalami perluluhawaan kimia. Beliau dapat membezakan tanah granit setempat dengan memerhatikan tekstur petrografinya. Miskipun keseluruhan feldspar telah mengalami luluhawa, tetapi sempadan yang jelas dan satah hablur masih dapat diperhatikan. Selain itu, di dalam hablur kuarza boleh diperhatikan satu siri rekahan-rekahan yang selari (Rajah 3). Berdasarkan pada dua ciri petrografi, sempadan hablur feldspar terluluhawa yang jelas dan siri rekahan selari dalam kuarza dapat digunakan untuk membezakan antara tanah granit setempat dengan tanah yang dipindahkan.

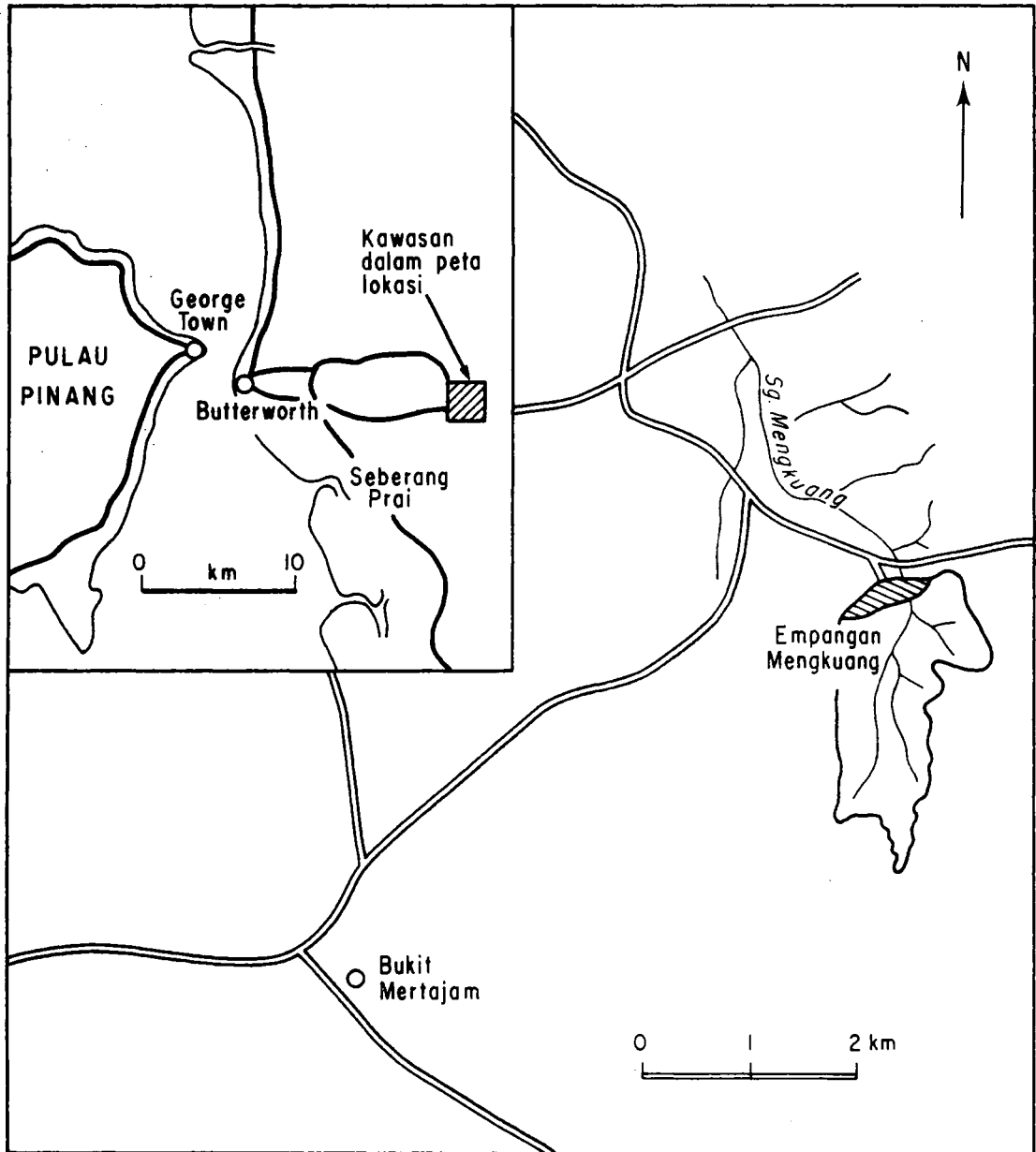
#### Kesimpulan

Penafsiran bawah tanah dalam projek kejuruteraan harus dilakukan oleh seorang ahli geologi. Kesilapan penafsiran sering terjadi jika fahaman geologi tidak dapat benar-benar dihayati. Dua contoh diatas telah memadai betapa fahaman geologi dapat membantu dalam mengkaji kondisi bawah tanah terutamanya pada kawasan granit terluluhawa.

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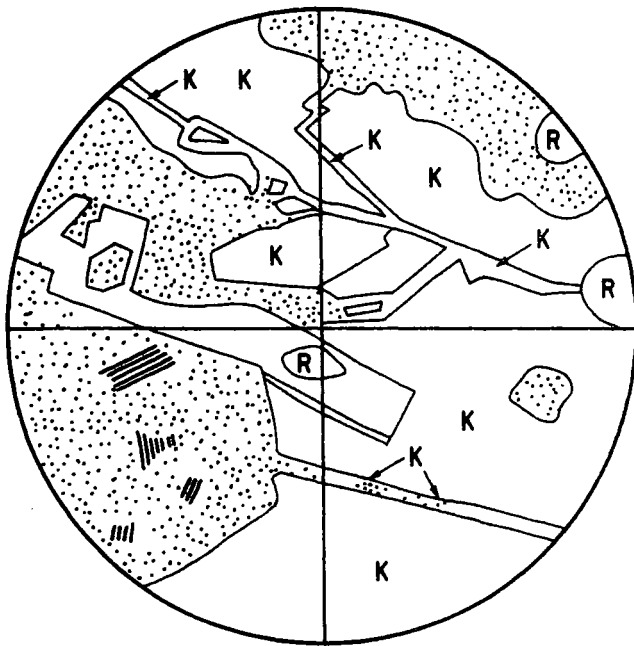
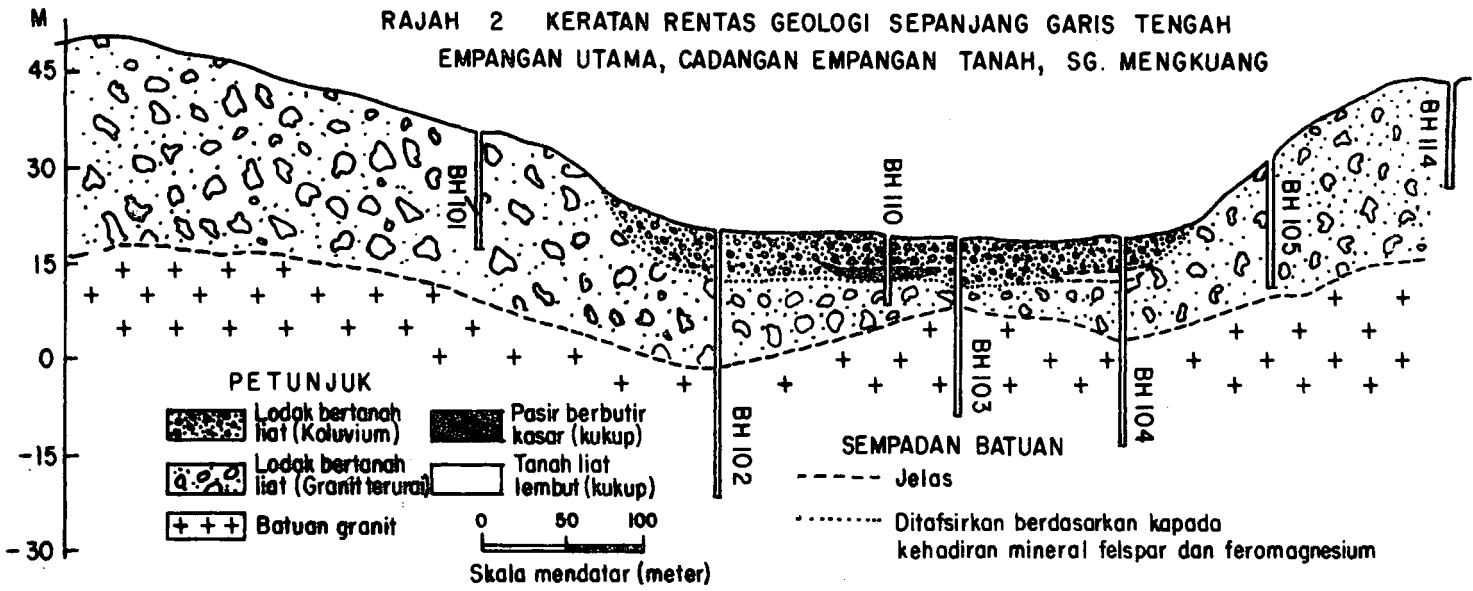
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Rajah 1. Peta lokasi Empangan Mengkuang.



RAJAH 2 KERATAN RENTAS GEOLOGI SEPANJANG GARIS TENGAH EMPANGAN UTAMA, CADANGAN EMPANGAN TANAH, SG. MENGGUANG



Rajah 3.

Tanah granit setempat. Pembersaran pandangan di bawah mikroskop. Perhatikan sempadan felspar terluluhawa yang jelas dan rekahan-rekahan selari pada kuarza.

- K Kuarza (mengalami rekahan)
- Feldspar terluluhawa
- Biotit dan muskovit
- Rongga

Skala: Garis pusat bidang pandangan = 1 sm.

- K Kuarza (mengalami rekahan)
- Felspar terluluhawa
- Biotit dan Muskovit
- Rongga

Skala: Garis pusat bidang pandangan = 1 sm

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

TEHNNICAL TALKS

A. SALVADOR: Geologic history of the Gulf of Mexico and the Caribbean

Dr. Salvador, Chief Geologist, EXXON Company, USA, gave a talk entitled "Geologic history of the Gulf of Mexico and the Caribbean" on Tuesday, 21 July 1981 at PETRONAS, Wisma Peladang, Kuala Lumpur.

The talk which started at 4.30 p.m. attracted an audience of 25.

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CHRIS R. LAWSON: Use of TERRAM membranes in Geotechnics

The talk, by Mr. Chris R. Lawson, Consultant to I.C.I. (Malaysia), took place on Friday, 16th October 1981 at the Department of Geology, University of Malaya and attracted about 20 members. In his illuminating account, Mr. Lawson, began by explaining the nature of the TERRAM membranes and how they work. The main emphasis of his presentation was on the usefulness of terram membrane in various areas of geotechnics. The speaker also discussed the major use of terram membrane as being basically a separator and filter in the treatment of soft soils. In the last part of his talk, Mr. Lawson showed numerous examples of the application of the membranes in various parts of Asia and Australasia on colourful slides demonstrating the use of these membranes in road pavements; coastal protection; railways; revetments; subsoil drainage; land reclamation and earth reinforcement.

A number of questions from the floor at the end of the talk included queries on the life-span, cost-effectiveness and possible applicability of the membranes in landslide or slope protections and minimising sea water encroachment. All of these questions were satisfactorily answered by the speaker.

Mr. Lawson is currently based in Australia giving technical advice to authorities on the treatment of soft, saturated soils throughout Asia and Australia. His visit to this country was arranged by ICI, Malaysia.

Mohamad Ali Hasan

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W. GOCHT: Relationships between structural pattern and tin mineralization in SW Thailand

Despite a delayed arrival on a flight in from Bangkok and the heavy traffic on the Kuala Lumpur-Klang highway due to the Rulers' Conference at Klang, Prof. Gocht managed to make it to the Dept. of Geology, University of Malaya, with half an hour to spare before the start of his talk, the second planned for the evening of 16th October 1981.

PROCEEDINGS OF THE SOCIETY OF TECHNICAL TALKS

TECHNICAL TALKS

A. SALVADOR: Geologic history of the Gulf of Mexico and the Caribbean. Dr. Salvador, Chief Geologist, visited Geologic history of the Gulf of Mexico and the Caribbean on Tuesday, 21 July 1961 at 4:30 p.m. The talk which started at 4:30 p.m.

TECHNICAL TALKS

CHRIS R. LAWSON: Use of TERRAM... The talk, by Mr. Chris R. Lawson, took place on Friday, 19th October 1961 at the University of Malaya and attracted about...



C.R. LAWSON



W. GOCHT

...the second planned for the evening of 19th October 1961. ...at Kuala Lumpur, Kuala Lumpur Highway due to the ... of Geology, ...at Kuala Lumpur, with half an hour to spare before the start of ... University of Malaya, with half an hour to spare before the start of ... his talk, the second planned for the evening of 19th October 1961.

Prof. Dr. Werner Gocht is presently the Director of the Research Institute for International Technical and Economic Cooperation (RIITEC), RWTH Aachen, West Germany.

Prof. Gocht commenced his talk by stating that the general relationship between tectonics and the intensive plutonism in the Burma-Thai-Malaya orogen is undisputed. A special role can be attributed to the repeated granitic intrusions (Permian, Late Triassic, Late Cretaceous). Certain details are, however, more difficult to decipher, such as

- the concentration of tin deposits in specific areas of the 2500 km long tin belt (Tavoy, Ranong, Phuket, Kinta Valley, Bangka)
- the occurrence of characteristic mineralization types in certain tin ore districts (quartz veins in Tavoy district, disseminated cassiterite in Ranong district, pegmatites in Phuket, hydrothermal veins/skarns in Kinta Valley and Bangka).

The positioning of the tin granites in SW Thailand has been determined by transverse faults. More important than these general interdependence are the following relationships:

- the pegmatite veins on Phuket Island are related to a local fault pattern, set out mainly in NE-SW direction. All pegmatitic tin deposits presently being mined (Thosung, Sutut, Tantikovit, Wichai, Pravat mines) fit into this framework
- disseminated cassiterite occurs predominantly at the intersections of two transverse faults (NW/SE - NE/SW) where the local fracture system has obviously effected an intrusive channel for (late syn-genetic) mineralized solutions.

For the mapping of regional and local fault patterns, the ERTS 1 and 2 multispectral photographs have proved their usefulness. Instrumental interpretations have been made using an Image Analyser System of the ISI Corporation. A high level of contrast in the appearance of significant fault systems is highlighted in MSS channel 5. By applying electronic density analysis, structural informations additional to that of the former mapping results, were obtained. It has been shown that a relationship exists between these newly discovered photolineations in the NW-SE direction and tin mines on Phuket Island.

The spectral channels of ERTS photographs are also outstanding for their useful sea water transparencies. The MSS channels 4 and 5 supply information on sediment accumulation in the nearshore area which could provide the first indications of the presence of offshore tin placers.

The tests in SW Thailand indicated that remote sensing can provide the tectonic and sedimentological framework for the planning of tin prospecting.

G.H. Teh

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

### COUNCIL 1982/83 ELECTIONS

At the close of nominations, the following was nominated for the post of Councillor:

Yeoh Gaik Chooi (Esso Production Malaysia)

He was proposed by M.G. Johnson and seconded by J.N. Bubb.

As such, an election is now in progress for the four 2-year Councillors. The complete list of candidates are:

Abdul Aziz Hussein (Universiti Teknologi Malaysia)  
Khoo Kay Khean (Geological Survey Malaysia)  
Michael Leong (Petronas)  
Lim Teong Hua (Pernas Charter Management)  
Yeoh Gaik Chooi (Esso Production Malaysia)

Official ballot papers have been sent to members and you are reminded that they must be returned in the special envelopes to the Election Officer before 31 December 1981.

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### FORTHCOMING BULLETIN

The Society's Bulletin 14 should be available during the Petroleum Geology 1981 Seminar on 7th and 8th December 1981. It will contain the following papers:

- \* Baram Delta geology and hydrocarbon occurrence  
E.J.H. Rijks
- \* The North Palawan Block, Philippines: its relation to the Asian Mainland and its role in evolution of the South China Sea  
N.H. Holloway
- \* Beach changes on a monsoon coast, Peninsular Malaysia  
P.P. Wong
- \* Gabbroic rocks from the southern Malay Peninsula and their relation to similar rocks of other orogenic zones  
S. Chandra Kumar
- \* The Tekka tin deposit, Perak, Peninsular Malaysia  
G.H. Teh
- \* Short communications
  - Permian and Early Triassic conodonts from Northwest Peninsular Malaysia  
I. Metcalfe
  - On the supposed existence of the Kisap thrust in the Langkawi Islands, Northwest Peninsular Malaysia  
B.K. Tan
  - Tourmaline greisenization in Langkawi - a reinterpretation using the available composition model  
T.T. Khoo
  - Use of rice husk ash for soil stabilization  
M.S. Subrahmanyam, Lee Lih Cheran, Lee So Cheran

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## GSM PETROLEUM GEOLOGY SEMINAR '81

The programme for the Seminar has been finalised as follows:

## MONDAY, 7th December 1981

- 8.00 a.m. : Registration
- 8.40 a.m. : Arrival of invited guests
- 8.50 a.m. : Arrival of YB Datuk Leo Moggie, Minister of Energy, Telecommunications and Posts

## OPENING SESSION

- 9.00 a.m. : Welcoming address by Dr. Mohammad Ayob, President of the Geological Society of Malaysia
- 9.10 a.m. : Opening address of YB Datuk Leo Moggie, Minister of Energy, Telecommunications and Posts
- 9.30 a.m. : Coffee Break
- 10.00 a.m. : Geophysical and Geological Aspects of the Exploration of Carbonate Buildups in Central Luconia, Sarawak: Lim Tee Peng and Goh Leng Siang (Sarawak Shell Berhad, Malaysia)
- 10.45 a.m. : 3D-Marine Seismic Data Recording and Processing: H. Koitka (Prakla-Seismos GMBH, Federal Republic of Germany)
- 11.30 a.m. : Cuttings Gas Analysis and its Application in Petroleum Geochemistry: K. Le Tran (Societe Nationale Elf Aquitaine, France).
- 12.15 p.m. : Lunch
- 1.45 p.m. : The Geology and Development of the Bekok Field, Offshore Peninsular Malaysia: Abdullah Haron and S.E. Sabatka (Esso Production Malaysia Inc., Malaysia)
- 2.30 p.m. : EPMI's Use of the HP-41C for Wellsite Log Analysis: Don M. Murdock (Esso Production Malaysia Inc., Malaysia)
- 3.15 p.m. : Coffee Break
- 3.30 p.m. : Origin and Distribution of Pores in Cenozoic Volcanic Rocks for Potential Hydrocarbon Reservoir: Osamu Sato (Teikoku Oil Co. Ltd., Japan)
- 4.15 p.m. : Extended Baseline of a Modified Hifix/6 Chain: Lee Swee Guan (Petronas-Carigali Sdn. Bhd., Malaysia) and Derek Alder (Racal-Decca Survey (M) Sdn. Bhd., Malaysia)
- 4.45 p.m. : Sedimentary History and Palaeofacies Development of Upper Oligocene to Pleistocene in the Balingian, Southwest and Central Luconia Provinces of Sarawak: Martin J. Brolsma (Sarawak Shell Berhad, Malaysia)
- 7.00 p.m. : COCKTAIL PARTY  
(Host: Schlumberger Overseas SA, Malaysia)

## TUESDAY, 8th December 1981

- 9.00 a.m. : Regional Tectonics and the Neogene Geology of N.W. Sabah: V.P. St. John, Leong Khee Meng and Philip Frank (Carigali-BP, Malaysia)
- 9.45 a.m. : Use of the Lithology Density Tool (LDT) to Improve Lithology Identification and Gas Detection: B.A. Marchette and M. Jennings (Schlumberger Overseas SA, Malaysia)
- 10.30 a.m. : Coffee Break
- 10.45 a.m. : Seismic Reflection Applied to Sedimentology: J. Delaplanche (Compagnie Generale de Geophysique, France)
- 11.30 a.m. : In-place Hydrocarbon Volume Calculation Techniques: Abdul Malek Rani and Yew Chee Cheong (Esso Production Malaysia Inc., Malaysia)

- 12.15 p.m. : Lunch  
 1.45 p.m. : Quality Control of Navigation: M. James (Racal-Decca Survey (M) Sdn. Bhd., Malaysia)  
 2.30 p.m. : The Search for Hydrocarbons in Bangladesh with German Assistance: Dr. Karl Hiller (BGR, Federal Republic of Germany)  
 3.15 p.m. : Coffee Break  
 3.30 p.m. : Structural and Stratigraphic Interpretation of Marine 3-D Data: Ted Selby (Geophysical Service Inc., Singapore)  
 4.15 p.m. : Application of Palynology to the Stratigraphic Study of Neogene Series, Offshore Sabah: Cl. Poumot (Societe Nationale Elf Aquitaine, France).  
 5.00 p.m. : CLOSING REMARKS

The members of the GSM Petroleum Geology Seminar '81 Organising Committee comprise :

Michael Leong (Chairman)  
 G.H. Teh  
 Ahmad Said

For further inquiries on the Seminar, please contact:

The Organising Chairman  
 GSM Petroleum Geology Seminar '81  
 Dept. of Geology  
 University of Malaya  
 Kuala Lumpur 22-11, Malaysia.

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## GSM PENINSULAR THAILAND - MALAYSIA BORDER CORRELATION WORKSHOP

Venue: Haadyai, Thailand

The date of the Workshop is not fixed yet, pending discussions with the Thai counterparts, however, it will probably be the later part of 1982. At a discussion meeting attended by 10 invited members, it was agreed to split the Workshop into 4 sections:

- a) stratigraphy
- b) plutonism
- c) hydrocarbons
- d) economic minerals

The stratigraphy section will be further subdivided into 3 sessions:

- i) Palaeozoic
- ii) Mesozoic
- iii) Cenozoic/Quaternary.

A Malaysian and a Thai keynote paper will be presented in each session. In addition short papers of about 20 minutes duration will also be accepted but they must be relevant and have important new data. Support to speakers for travelling and stay in Haadyai during the Workshop will be looked into.

The publication and distribution of keynote papers and working group reports will be worked out with the Geological Society of Thailand.

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## GSM GEOSCIENCE EDUCATION WORKSHOP

This Workshop (title tentative) will be held probably in April 1982 in conjunction with the AGM. Topics of interest in this Workshop include:

- a) Geoscience curriculum
- b) Cooperation between local universities and other sectors
- c) Types of geoscience graduates required by the Government and the private sector
- d) Role of local geoscience societies and institutes
- e) Geoscience education in secondary schools.

Many more interesting topics for discussions are likely to be brought up. It is hoped that many members from all sectors will attend this Workshop. More information will be sent to members in due course.

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## GSM - A COOPERATING ORGANISATION OF THE 3RD CPEMR CONFERENCE

The Society has accepted an invitation to join a group of distinguished scientific societies from many parts of the world as a Cooperating Organisation for the Third Circum-Pacific Energy and Mineral Resources Conference, a major international scientific conference to be held in Honolulu, Hawaii, August 22-28, 1982.

Details on the Conference are given in our "Other News" section.

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## KEAHLIAN (MEMBERSHIP)

The following persons have joined the Society:

- Full Membership:**
- 1) A. Hamid Mohamad, Jabatan Geologi, Universiti Kebangsaan Malaysia, Kuala Lumpur.
  - 2) Abdul Hanif Hussein, Esso Production, Kuala Lumpur.
  - 3) Jon L. Rau, Dept. of Geological Sciences, Univ. of British Columbia, Vancouver, B.C., Canada.
  - 4) David A.C. Manning, Dept. of Geology, The University, Manchester M13 9PL, U.K.
  - 5) Soundararajan Perumal, No. 2, 6/6, Jalan Anak Gasing, Petaling Jaya.
  - 6) Robert L. Pile, BP Pet. Dev., Tanlin P.O. Box 288, Singapore 9124.
  - 7) Ir. Rafli Ibrahim, Geoteknologi Sdn. Bhd., 267A, Jln. Genting Kelang, Setapak, Kuala Lumpur.
  - 8) Richard Hwang, Kiso-Jiban Consultants, 1st Floor Tan Jin Chwee Industrial Building., 60 Kallang Pudding Road, Singapore 1334
  - 9) Kenny Oh Woo Pui, Occidental Oil International Inc., 16 Palace Street, London SW1E 5BQ, England.
  - 10) Arthur W. Ball, Jr., c/o Husky Oil International, 1980 South Post Oak Boulevard, Suite 2000, Houston, Texas 77056, USA.
  - 11) Henry L. Ott, c/o AMOSEAS Indonesia, Inc., P.O. Box 158, Jl. Kebon Sirih 52, Jakarta, Indonesia.

Student Membership

- 1) Chong Lock Ping, 3206 Catalina Drive, Austin, Texas 78741, USA.
- 2) Tee Peow Keong, 1, Lorong Batu Uban 3, Batu Uban, Penang.
- 3) Ramli Mohd. Osman, Dept. of Geology, Universiti Malaya, Kuala Lumpur.
- 4) Teoh Phaik Eng, L5-8, Taman Free School, Penang.
- 5) Lim Kian Beng, 329/217, Desasiswa Permai, Universiti Sains Malaysia, Penang.
- 6) Mustapa Albakri Md. Nasib, 345/124, Desasiswa Aman, Universiti Sains Malaysia, Penang.
- 7) Ho Teck Foh, 23 Minden Heights Road 1, Gelugor, Penang.

Associate Membership

- 1) Roslin Ismail, Dept. of Geology, University of Malaya, Kuala Lumpur.
- 2) Mohd. Ruslan Abdullah, 120 Jalan Ara, Kuala Lumpur.
- 3) Tung Nai Choy, 7A, Jalan 18/14, Taman Kanagapuram, Batu 6, Jalan Klang, Petaling Jaya.

Institutional Membership

- 1) Outokumpu Oy, Engineering Division, P.O. Box 27, SF-02201 ESPOO 20, Finland.
- 2) Sepakat Setia Perunding, P.O. Box 904, Kuala Lumpur.

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## PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

The following have informed the Society of their new addresses:

1. C.T. Tay, 209, Lorong Ampang Dua, Kuala Lumpur.
2. Romanus Rocky, GEOMEX, Lot A & B, 10th Floor, Angkasa Raya, Jalan Ampang, Kuala Lumpur.
3. Brian W. Hester, 14690 W. 58th Place, Arvada, Co. 80004, USA.
4. Günther Mau, Sachsendam 78, 1000 Berlin 62, West Germany.
5. Mustapha K. Shahrom, The Sungei Besi Mines Malaysia Bhd., P.O. Box 7002, Sungei Besi, Selangor.
6. Gan Lay Chin, c/o Western Mining Corp. Ltd., Exploration Division, P.O. Box 409, Unley 5061, South Australia.
7. Mahillah Bibi Rafek, Dept. of Geology, Lakehead University, Thunder Bay, Ontario, Canada P7B 5E1
8. Ong Chong Keng, c/o Digicon (Nig.) Ltd., Room 1028, Freeman House, PMB 2418, 21/22, Marina, Lagos, Nigeria.
9. Hiroaki Todo, Kiso-Jiban Consultants, Harajima Building, 6 San-ei-cho, Shinjuku-ku, Tokyo 160, Japan.
10. Phang Kun Ted, 329/207 Desa Permai, Universiti Sains Malaysia, Penang.
11. Aim-orn Tassanasorn, Dept. of Geology, Faculty of Sciences, Khonkaen University, Khonkaen, Thailand.
12. J.G. Best, 549 Grose Vale Road, Kurrajong, N.S.W. 2758, Australia.
13. Michael Hordern, c/o Esso Australia Ltd., Esso House, 127 Kent St., Sydney, NSW 2000, Australia.
14. R.B. Tate, c/o China Cement Co. (H.K.) Ltd., 502 Worldwide House, 19 Des Voeux Road C., Hong Kong.
15. D.F. Wetherbee, 3912-B S. Atchison Way, Aurora, Co. 80014, USA.
16. Munabir bin Sahri, Production Dept., P.O. Box 2444, Kuala Lumpur.

17. B. Biswas, Rm. 1606, Esso Resources Canada Ltd., 237, Fourth Ave., S.W., Calgary T2P OH6, Alberta, Canada.
18. Wan Zakaria b. Wan Taib, Production Dept., P.O. Box 24j4, Kuala Lumpur.
19. Radzali Othman, School of Applied Sciences, Universiti Sains Malaysia, Penang.

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## BERITA - BERITA LAIN (OTHER NEWS)

### WORKSHOP ON PALAEOMAGNETIC RESEARCH IN SOUTHEAST AND EAST ASIA - SECOND CIRCULAR

Following the recommendations of the sixth session of the Joint CCOP-IOC Working Group on Post IDOE Studies in East Asian Tectonic and Resources, the Project Office has made the necessary arrangements for convening the Workshop on palaeomagnetic research at Kuala Lumpur, Malaysia, from 1-5 March 1982. The University of Malaya has kindly agreed to act as host organization for the Workshop.

The following abstracts have been received by the Project Office:

- On the determination of primary remanent magnetization existing in rocks by Le Dinh Thand and Nguyen Dinh Giap
- Palaeomagnetic studies of Cenozoic basaltic rocks in Viet Nam by Nguyen Thanh Giang
- Plate Tectonics of Asia (Keynote address) by M.W. McElhinny
- Palaeomagnetism of the Banda Arc by Dr. F.H. Chamalaun
- A keynote address on magnetostratigraphy by Dr. B.J.J. Embleton
- Palaeomagnetism of Southern Marianas and Carolines by J.R. Dunn; M. Fuller; I. Williams and R. McCabe
- Palaeomagnetic studies in China by J.I. Lin; M. Fuller and W.y. Chang.
- Palaeomagnetism of Luzon by J.R. Dunn; M. Fuller; I. Williams; R. McCabe; J. Wolfe and R.Y. Encina
- Post Oligocene evolution of the Mariana Arc-Caroline Ridge: An Example of an island arc - a seismic ridge collision by R. McCabe and M. Fuller
- Preliminary Palaeomagnetic study of late Cenozoic Basalt groups from Datong Province, North China by Liu Chun; Kazuaki Maenaka and Sadao Sasajima
- Preliminary Report of Neogene rotations of Luzon, Philippines by R. McCabe,; Hidetoshi Shibuya; Jose Almasco; M. Fuller and Sadao Sasajima
- Equatorial origin of Red Chert in Central Japan as deduced from its palaeomagnetism by Hidetoshi Shibuya and Sadeo Sasajima
- Palaeomagnetic evidence for clockwise rotation of the northern arm of Sulawesi, Indonesia by Yo-ichiro Otofujii; Sadao Sasajima; Susumi Nishimura; Agus Dharma and Fred Hehuwat
- Dimension of geotectonic units in the Asian continental margin: A palaeomagnetic approach by Yo-ichiro Otofujii; Masayuki Torii and Sadao Sasajima
- Proposed mechanism of the Mariana arc - Caroline Ridge collision by R. McCabe and M. Fuller

- Magnetostratigraphy of the PucanChan and Kabur formations at Sangiran, Jawa, Indonesia, and correlation with the magnetostratigraphy in Japan by Takuo Yokoyama; Akiri Hayashida and Wahyoe Hontoro
- Palaeomagnetic research of Jurassic acid igneous rocks and Cretaceous Red Bed in Hong Kong by Sadao Sasajima; Kazuaki Maewaka, Chak Lam So and Takuo Yokoyama
- Palaeomagnetism and Astrobleme Identification by Prof. P.C. Pal.

Prof. J.C. Briden and Dr. N.S. Haile will present a compilation of palaeomagnetic results from the ESCAP region and a map showing the results, and their preliminary interpretation in terms of tectonic blocks. They will also present a paper on 3 topics: (1) Results of Palaeomagnetic research in E and SE Asia up to 1981. (2) A discussion paper on some possible problems in the ESCAP region to which palaeomagnetic research could contribute. (3) A discussion paper on presentation and evaluation of palaeomagnetic results.

Authors who have not already done so are requested to send abstracts of their papers to the Project Office as soon as possible. For further information, write to:

A. Johannas  
 Project Manager/Co-ordinator  
 UNDP Regional Offshore Prospecting in East Asia  
 c/o ESCAP, UN Building  
 Bangkok 2, Thailand.

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## TOP TENS IN THE ENERGY FIELD (condensed from PETROLEUM GAZETTE, June 1981)

TOP TEN lists are quite the fashion these days, and herewith a compilation of various Top Tens (and the occasional Five) in the energy field. The sources are varied, and include the authoritative industry journals *Petroleum Economist* and *Oil and Gas Journal*, and the British *Shell World*. In general, the statistics are 1979 figures, with some available on a 1980 basis and others from 1978. The latest available comprehensive figures were used.

### OIL RESERVES

The countries with the largest proved, recoverable oil reserves (as at January 1981) were (in billions of barrels):

1. Saudi Arabia	165	6. Iraq	30
2. Kuwait	64.9	7. Abu Dhabi	29
3. U.S.S.R.	63	8. U.S.A.	27.1
4. Iran	57	9. Libya	23
5. Mexico	44	10. China	20

### CRUDE OIL PRODUCTION

The world's top ten oil producers in 1980 were (figures in millions of barrels):

1. U.S.S.R.	4,432	6. Mexico	779
2. U.S.A.	3,753	7. Nigeria	751
3. Saudi Arabia	3,634	8. Libya	654
4. Iraq	998	9. Canada	641
5. Venezuela	790	10. U.K.	603

REFINING CAPACITY

In terms of primary distillation capacity (millions of barrels of crude oil per calendar day), the ranking order of refining countries is:

1. U.S.A.	18	6. West Germany	3.02
2. U.S.S.R.	11.4	7. U.K.	2.63
3. Japan	5.45	8. Canada	2.17
4. Italy	4.09	9. Netherlands	2.02
5. France	3.34	10. Venezuela	1.46

OIL IMPORTERS

The major oil importing countries in 1979 were (figures in brackets representing millions of barrels a day):

1. U.S.A. (6.76)	6. Netherlands (1.2)
2. Japan (4.84)	7. U.K. (1.18)
3. France (2.54)	8. Spain (1.04)
4. Italy (2.34)	9. Brazil (0.88)
5. W. Germany (2.16)	10. Singapore (0.74)

OIL EXPORTERS

According to the available figures for 1979, the top ten oil exporters were (figures in brackets representing millions of barrels a day):

1. Saudi Arabia (9.13)	6. Nigeria (2.12)
2. Iraq (3.27)	7. Libya (1.93)
3. Iran (2.33)	8. Abu Dhabi (1.45)
4. U.S.S.R. (2.17)	9. Venezuela (1.34)
5. Kuwait (2.14)	10. Indonesia (1.28)

OIL CONSUMERS

The top ten non-communist countries in terms of demand for refined oil products in 1979 are ranked as follows (with figures in brackets representing millions of barrels a day):

1. U.S.A. (17.45)	6. U.K. (1.85)
2. Japan (5.38)	7. Canada (1.78)
3. West Germany (3)	8. Brazil (1.07)
4. France (2.38)	9. Mexico (0.96)
5. Italy (1.94)	10. Spain (0.93)

CARGOES

Oil accounts for about six times the annual tonnage of iron ore, its nearest rival as the world's major shipping cargo. In fact, it accounts for about three times the tonnage of its five nearest rivals put together. The commodities accounting for the six major forms of international cargo in 1978 were as follows (with figures in brackets in millions of tonnes):

1. Crude oil (1,422)
2. Iron Ore (278)
3. Grain (169)
4. Coal both coking and steam coal (127)
5. Phosphate (47)
6. Bauxite and alumina (46)

All these figures are from Fearnley and Egers of Oslo. If all forestry products were added together and considered as a single group, they would rank among the top five

### BUSIEST EXPLORATION AREAS

The areas of the world which are producing the greatest activity in exploration - both in terms of wells drilled and area covered are:

1. North America
2. U.S.S.R.
3. Indonesia
4. North Sea
5. Australia.

### NATURAL GAS PRODUCTION

In terms of commercial natural gas production in 1979, the top ten countries are (with figures in brackets representing millions of cubic metres):

- |                         |                          |
|-------------------------|--------------------------|
| 1 U.S.A. (510,000)      | 6 Indonesia (29,000)     |
| 2 U.S.S.R. (407,000)    | 7. Romania (28,000)      |
| 3. Netherlands (93,000) | 8. Algeria (21,000)      |
| 4. Canada (73,000)      | 9 Norway (21,000)        |
| 5. U.K (40,000)         | 10 West Germany (21,000) |

### GAS RESERVES

According to published figures, the countries with the largest proven reserves of natural gas are (figures in brackets representing millions of cubic metres).

- |                         |                            |
|-------------------------|----------------------------|
| 1 U.S.S.R. (30,600,000) | 6 Saudi Arabia (2,100,000) |
| 2. Iran (10,700,000)    | 7 Mexico (1,700,000)       |
| 3. U.S.A. (5,500,000)   | 8. Netherlands (1,600,000) |
| 4. Algeria (2,500,000)  | 9 Nigeria (1,500,000)      |
| 5 Canada (2,500,000)    | 10 Venezuela (1,200,000)   |

### GAS EXPORTS

The countries with the greatest gas exports in 1979 were (figures in millions of cubic metres):

1. Netherlands (46,000)
2. U.S.S.R. (35,000)
3. Canada (25,000)
4. Norway (20,000)
5. Algeria (12,000)

### GAS IMPORTS

The countries with the largest imports of natural gas\* in 1979 were (figures in brackets in millions of cubic metres):

1. West Germany (36,000)
2. U.S.A. (34,000)
3. Japan (19,000)
4. France (17,000)
5. Italy (14,000)

\* includes liquefied natural gas

ENERGY CONSUMPTION

The United States uses more energy annually than any other country. Its massive manufacturing capacity and high living standards have been built on a base of abundant energy. The 1978 figures used for the rankings are for millions of barrels of oil equivalent a day (oil equivalent is the quantity of energy in an average barrel of oil):

- |                       |                       |
|-----------------------|-----------------------|
| 1. U.S.A. (37.5)      | 6. Canada (4.1)       |
| 2. Japan (7.3)        | 7. Italy (2.9)        |
| 3. West Germany (5.6) | 8. India (1.9)        |
| 4. France (4.7)       | 9. Brazil (1.7)       |
| 5. U.K. (4.2)         | 10. Netherlands (1.6) |

ENERGY PER HEAD

In the United States, energy consumption per head of population is more than double that in countries such as Denmark, the Netherlands and the U.K. Among the larger non-communist countries (with figures in brackets showing tons of oil equivalent consumed per head during 1978, excluding non-energy oil products and marine bunker fuels), the order is:

- |                       |                      |
|-----------------------|----------------------|
| 1. U.S.A. (7.7)       | 6. Sweden (4.1)      |
| 2. Canada (6.8)       | 7. Norway (3.8)      |
| 3. Australia (4.5)    | 8. Denmark (3.7)     |
| 4. Belgium (4.1)      | 9. Netherlands (3.6) |
| 5. West Germany (4.1) | 10. U.K. (3.5)       |

Two communist countries - Czechoslovakia (5.1) and East Germany (4.8) - are exceeded only by the U.S.A. and Canada.

MOST VEHICLES

The countries with the most vehicles on the road, based on 1978 statistics, are (figures in brackets representing millions of vehicles):

- |                        |                    |
|------------------------|--------------------|
| 1. U.S.A. (143.8)      | 6. U.K. (16.7)     |
| 2. Japan (32.0)        | 7. U.S.S.R. (13.0) |
| 3. West Germany (21.7) | 8. Canada (12.3)   |
| 4. France (19.3)       | 9. Brazil (8.8)    |
| 5. Italy (17.7)        | 10. Spain (7.1)    |

VEHICLE PRODUCERS

The top vehicle producing countries, according to 1978 statistics (with figures in brackets representing millions of vehicles produced that year) are:

- |                        |                    |
|------------------------|--------------------|
| 1. U.S.A. (12.83)      | 6. Italy (1.67)    |
| 2. Japan (9.27)        | 7. U.K. (1.61)     |
| 3. West Germany (4.19) | 8. Canada (1.29)   |
| 4. France (3.51)       | 9. Spain (1.14)    |
| 5. U.S.S.R. (2.15)     | 10. Belgium (1.09) |

PERSONS PER CAR

The countries with the highest levels of car ownership per head of population (based on figures published in *World Automotive Market*) are:

1. Canada, U.S.A. - both with two persons for every car.
2. Belgium, France, West Germany, Iceland, Italy, Luxembourg, Sweden, Switzerland, Australia, New Zealand, Virgin Islands, United Arab Emirates - each with three persons per car.
3. Austria, Denmark, Finland, Netherlands, Norway, U.K., Bermuda, Kuwait, Qatar, France - each with four persons per car.



Surprisingly, Japan - the second-biggest manufacturer of motor vehicles - is relatively low on the list among industrialised countries, with 6 persons for every car.

### FEWEST CARS

The countries with the most people per car (based on 1978 figures) are:

- |                       |                      |
|-----------------------|----------------------|
| 1. China (18,400)     | 6. Ethiopia (660)    |
| 2. Bangladesh (3,100) | 7. Upper Volta (580) |
| 3. Burma (930)        | 8. Chad (570)        |
| 4. India (880)        | 9. Afghanistan (570) |
| 5. Burundi (780)      | 10. Niger (440)      |

### COAL RESERVES

World coal resources are vast. economically recoverable coal reserves represent more than five times as much in energy terms as proven oil reserves. According to the World Energy Conference, total resources of all grades of coal are ranked as follows (figures in brackets representing billions of tons hard coal equivalent):

- |                       |                       |
|-----------------------|-----------------------|
| 1. U.S.S.R. (4,860)   | 6. U.K. (164)         |
| 2. U.S.A. (2,570)     | 7. Poland (124)       |
| 3. China (1,438)      | 8. Canada (115)       |
| 4. Australia (262)    | 9. Botswana (100)     |
| 5. West Germany (247) | 10. South Africa (58) |

As far as economically recoverable reserves of coal are concerned, the order (in billions of tons) is:

- |                      |                      |
|----------------------|----------------------|
| 1. U.S.A. (178)      | 6. India (34)        |
| 2. U.S.S.R. (110)    | 7. Australia (27)    |
| 3. China (99)        | 8. South Africa (27) |
| 4. U.K. (45)         | 9. Poland (22)       |
| 5. West Germany (34) | 10. Canada (9)       |

### COAL CONSUMERS

The top ten coal non-communist consuming countries, based on 1978 figures, are (figures in brackets representing millions of tons of hard coal consumed that year):

- |                      |                     |
|----------------------|---------------------|
| 1. U.S.A. (541.8)    | 6. Australia (32.4) |
| 2. U.K. (120.7)      | 7. Canada (18.6)    |
| 3. West Germany (80) | 8. Belgium (13.8)   |
| 4. Japan (70.7)      | 9. Spain (13.2)     |
| 5. France (44.8)     | 10. Italy (12.5)    |

\* Source: Survey of Energy Resources, World Energy Conference

### COAL PRODUCERS

The ten biggest producers of hard coal in 1979 were (figures in brackets representing millions of tons):

- |                   |                       |
|-------------------|-----------------------|
| 1. U.S.A. (704)   | 6. South Africa (103) |
| 2. China (663)    | 7. India (103)        |
| 3. U.S.S.R. (495) | 8. West Germany (93)  |
| 4. Poland (201)   | 9. Australia (83)     |
| 5. U.K. (121)     | 10. North Korea (35)  |

COAL EXPORTERS

The top coal exporting countries, based on 1978 figures, are (figures in brackets representing millions of tons):

- |                   |                      |
|-------------------|----------------------|
| 1. Australia (37) | 5. South Africa (16) |
| 2. U.S.A. (36)    | 6. Canada (14)       |
| 3. Poland (36)    | 7. West Germany (14) |
| 4. U.S.S.R. (26)  |                      |

NUCLEAR CAPACITY

The top ten non-communist countries in terms of nuclear capacity as of May 1980, are ranked as follows (with figures in brackets representing thousands of megawatts):

- |                     |                    |
|---------------------|--------------------|
| 1. U.S.A. (63)      | 6. Canada (6)      |
| 2. Japan (15)       | 7. Sweden (4)      |
| 3. France (11)      | 8. Switzerland (2) |
| 4. U.K. (9)         | 9. Belgium (2)     |
| 5. West Germany (9) | 10. Taiwan (1)     |

Present plans for nuclear expansion (according to the Uranium Information Centre, 1981) will change this by the year 1990 to:

- |                      |                |
|----------------------|----------------|
| 1. U.S.A. (1983)     | 6. Spain (15)  |
| 2. France (42)       | 7. U.K. (14)   |
| 3. West Germany (29) | 8. Sweden (10) |
| 4. Japan (27)        | 9. Belgium (5) |
| 5. Canada (15)       | 10. Italy (5)  |

URANIUM RESERVES

The top five non-communist countries in terms of economically recoverable reserves of uranium, according to data available at the beginning of 1980, are (with figures in brackets representing thousands of tonnes of uranium):

1. U.S.A. (708)
2. South Africa (391)
3. Sweden (301)
4. Australia (299)
5. Canada (235)

*Source: Uranium Resources Production and Demand OECD/NEA-IAEA*

HYDRO POWER

The principal countries using hydro-electricity are (with figures in brackets representing thousands of megawatts of capacity at the end of 1978):

- |                  |                        |
|------------------|------------------------|
| 1. U.S.A. (71)   | 6. Norway (18)         |
| 2. Canada (42.4) | 7. Italy (15.4)        |
| 3. Japan (26.6)  | 8. Sweden (13.8)       |
| 4. Brazil (20.9) | 9. Spain (13.5)        |
| 5. France (18.6) | 10. Switzerland (10.9) |

The countries which are most active in developing hydro power (with figures in brackets representing thousands of megawatts of capacity that will be provided by new schemes between 1978 and 1985) are:

- |                  |                  |
|------------------|------------------|
| 1. Brazil (22)   | 6. India (6)     |
| 2. U.S.A. (21)   | 7. Norway (6)    |
| 3. Canada (15)   | 8. Paraguay (6)  |
| 4. Japan (10)    | 9. Argentina (5) |
| 5. Venezuela (7) | 10. Italy (5)    |

So by 1985, on the basis of present plans, the countries with the greatest hydro-electric capacity will be (figures in thousands of megawatts):

- |                |                 |
|----------------|-----------------|
| 1. U.S.A. (92) | 6. France (22)  |
| 2. Canada (57) | 7. Italy (20)   |
| 3. Brazil (43) | 8. Spain (18)   |
| 4. Japan (37)  | 9. India (17)   |
| 5. Norway (24) | 10. Sweden (16) |

#### GEOHERMAL ENERGY

The countries making significant use of geothermal energy are as follows (with figures in brackets representing millions of kilowatt hours generated in 1978):

- |                        |                      |
|------------------------|----------------------|
| 1. U.S.A. (3,750)      | 5. Japan (625)       |
| 2. Italy (2,500)       | 6. El Salvador (400) |
| 3. New Zealand (1,276) | 7. Iceland (16)      |
| 4. Mexico (650)        |                      |

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### PENYUSUNAN BUKU MENGENAI GEOLOGI INDONESIA - EDARAN PERTAMA

Sebagaimana telah kita ketahui bersama, penelitian mengenai geologi di Indonesia telah dimulai sejak kira-kira 130 tahun yang lalu. Hasil hasil penelitian tersebut telah diterbitkan dalam berbagai bentuk baik berupa laporan khusus, seri peta bersistem dan atau buku. Puncak dari semua ini kita telah mengenal dengan adanya buku "The Geology of Indonesia" yang disusun oleh van Bemmelen pada tahun 1949, dan sampai saat ini buku tersebut masih dijadikan referensi utama oleh setiap ahli geologi yang menulis tentang geologi Indonesia.

Sejak tahun 1949 sampai sekarang, setelah Indonesia merdeka, telah banyak penelitian geologi yang dilakukan baik oleh ahli geologi dari Indonesia sendiri maupun dari luar Indonesia, dan hasil-hasil penelitiannya telah ditulis dan diterbitkan dalam berbagai bentuk, yang sifatnya fragmental dan terpencar-pencar.

Ikatan Ahli Geologi Indonesia (IAGI), sebagai satu wadah organisasi para ahli geologi, bermaksud akan mengumpulkan dan menerbitkannya dalam satu wadah tulisan-tulisan mengenai geologi Indonesia, terutama yang mencerminkan penambahan informasi dan pengetahuan sejak tahun 1949 hingga sekarang.

Untuk mewujudkan rencana penyusunan buku mengenai Geologi Indonesia ini, IAGI mengundang dan sangat mengharapkan partisipasi dari para ahli geologi untuk menyumbangkan karya tulisnya guna mengisi buku tersebut, dengan ketentuan sebagai berikut:

1. Tujuan penyusunan buku: Mengumpulkan dan menerbitkan dalam satu wadah tulisan-tulisan mengenai geologi Indonesia, terutama yang mencerminkan penambahan informasi dan pengetahuan sejak tahun 1949 hingga sekarang.
2. Judul Buku: Judul utama: GEOLOGI INDONESIA dan akan ditambah dengan sub judul yang akan ditentukan kemudian.
3. Isi buku: (a) Buku akan terdiri dari beberapa bagian berdasarkan cabang ilmu geologi, seperti petrologi, paleontologi, geofisika,

vulkanologi, geologi tatalingkungan, geologi ekonomi, dsb.

(b) Setiap bagian akan terdiri dari sejumlah bab/judul tulisan.

(c) Buku akan terdiri dari k.l. 1.000 halaman, dicetak offset ukuran A-4 (20,5 x 28,7 cm) dan disertai peta-peta lampiran, dll.

4. Penulis: Terbuka bagi semua ahli geologi atau yang setaraf yang dapat menyumbangkan tulisannya, dengan terlebih dahulu menyatakan/mendaftarkan kesediaannya melalui Sekretariat IAGI atau Panitia Redaksi
5. Bahasa: Sejauh mungkin dalam bahasa Indonesia dan disertai dengan "extended abstract" dalam bahasa Inggris. Bagi penulis yang tidak berbahasa Indonesia dapat menggunakan bahasa Inggris
6. Jenis tulisan:
  - a) Review paper
  - b) Pemerian regional/daerah
  - c) Tulisan tematik
  - d) Lain-lain.

Penjelasan yang lebih terperinci dapat diminta baik secara lisan atau tertulis kepada Ketua Panitia Redaksi.

7. Jadwal penyelenggaraan:
  - a. Maret 1981 - September 1981:
    - Pemberitahuan melalui edaran kepada para ahli geologi
    - Penelaahan naskah-naskah yang sudah terbit oleh panitia redaksi
    - Komunikasi antara panitia redaksi dengan para calon penulis mengenai materi yang akan ditulis.
  - b. September 1981 - Maret 1982:
    - Review naskah-naskah yang sudah masuk
    - Persiapan penyelenggaraan Simposium Khusus Penyusunan Buku mengenai Geologi Indonesia.
  - c. April 1982:
    - Batas waktu terakhir penyerahan naskah
    - Penyelenggaraan Simposium Khusus Penyusunan Buku Mengenai Geologi Indonesia.
  - d. Mei 1982 - Agustus 1982
 

Pembacaan, penilaian dan peredaksian seluruh naskah.
  - e. September 1982:
 

Buku sudah siap untuk dicetak.
  - f. Desember 1982:
 

Buku sudah terbit.
8. Imbalan bagi para penulis: Selain pengakuan dan pengabdian nama penulis dalam buku tersebut, kepada setiap penulis akan diberi satu buku lengkap ditambah dengan 25 eksemplar offprint (reprint) untuk setiap judul.
9. Panitia Redaksi:
 

Adjat Sudradjat - Geomorfologi, Fotogeologi, Penginderaan Jauh  
Kama Kusumadinata - Vulkanologi  
R.P. Koesoemadinata - Sedimentologi, Stratigrafi  
Soejono Martodjojo - Paleontologi  
G.A.S. Nayoan - Geologi petroleum dan sumber-sumber tenaga lain  
M.M. Purbo-Hadiwidjoyo - Geologi teknik, geologi tatalingkungan  
Ong Han Ling - Geologi ekonomi, geokimia, geokronologi  
R. Soeria Atmadja - Petrologi  
H.D. Tjia (Ketua Panitia Redaksi) - Geologi struktur, tektonik,  
lain-lain.

M. Untung - Geofisika

Im sail Usna - Geologi lautan, geologi kuarter.

10. Alamat untuk komunikasi: Untuk berkomunikasi, para peminat dapat berhubungan langsung secara lisan kepada para anggota Panitia Redaksi sesuai dengan bidangnya masing-masing, atau secara tertulis disampaikan kepada:

- a. Prof. H.D. Tjia, Universiti Kebangsaan, Peti Surat 1124, Kuala Lumpur, Malaysia
- b. Sekretariat IAGI, Jl. Diponegoro No. 57, Bandung - Indonesia. Telepon: 73205 - 73208.

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## CIRCUM-PACIFIC ENERGY AND MINERAL RESOURCES CONFERENCE

Aug. 22-28, 1982

The third Circum-Pacific Conference will again be held in Honolulu, Hawaii, August 22-28 1982, with additional educational courses and geological field trips scheduled both pre and post-Conference. The entire program of activities will emphasize the newly identified and significant energy and mineral resources of the Pacific and new developments in methodology and technology that may impact their development in the coming decade.

The Conference is being organized under the direction of the Circum-Pacific Council for Energy and Mineral Resources which has applied for affiliation as the Circum-Pacific Section of the American Association of Petroleum Geologists.

### Technical Program

"Resources for the 80s", theme for the Conference programs, will feature approximately 90 papers presented by outstanding international scientists and statesmen from countries bordering the Pacific. Sessions cover the following topics:

- |  |   |               |                     |
|--|---|---------------|---------------------|
| Hydrocarbons                                       | - | Geothermal    | -                   |
| - Energy Minerals (Coal, Uranium, Oil Shale, etc.) | - | Hard Minerals | - Renewable Energy. |

General sessions will be held the first two days of the program, with concurrent sessions the remaining three days. Papers will be scheduled from 8.30 a.m. to 1.00 p.m. each day with the afternoons free.

Abstracts of the papers will be published in the summer of 1982 in the AAPG Bulletin and full papers will be published in a Transactions Volume shortly following the Conference.

### Poster Sessions and Exhibits

To complement the technical program, poster sessions covering many of the same topics listed above will be held in the adjoining Exhibit Hall where a variety of educational exhibits will be displayed. Also featured in this area will be the massive Circum-Pacific Map Project which shows the relationship of mineral resources to the tectonics and geologic framework of the Pacific.

### Special Courses and Workshops

The International Union of Geological Sciences will hold a pre-Conference symposium Friday, August 20 and Saturday on "Petroleum Resources Assessment". The symposium will appraise scientists of the strengths, weaknesses, and limitations of various estimation techniques and to show how the various techniques can be integrated subjectively, with minimal bias, to produce an assessment.

All-day workshops on August 21 and 22 will include "Plate Tectonics and Sedimentary Basins" to be organized by AAPG's Education Department, and a course on Geothermal Energy organized by the Geothermal Resources Council.

### Geological Field Trips

Geology, alternate energy, and sightseeing field trips will be conducted on the Island of Oahu immediately before and after the Conference, and on the Island of Hawaii (the Big Island) following the Conference.

The geology tours will concentrate on volcanic rocks and landscapes on Oahu, and on the active volcano Kilauea on Hawaii. The alternate energy tours will visit solar, geothermal, biomass, wind power, and ocean thermal energy projects that are under research and development in Hawaii. These trips will be led by Hawaii scientists from the University of Hawaii, the U.S. Geological Survey and the Hawaii County Research and Development Office.

Sightseeing tours will be just that, but they will be accompanied by University of Hawaii students who can answer questions on the natural history and energy prospects of the islands.

### Evening Public Lectures

A special educational feature for the delegates and their families attending the Conference as well as the public will be public lectures Monday and Thursday evenings in the hotel's session halls. Monday's lecture will feature the 1980 eruption and continuing activity of Mount St. Helens. Thursday evening will be "Earthquakes and the Ring of Fire," covering principle earthquakes in the Pacific, the volcanism that rings the Pacific basin and advances in earthquake prediction.

### Contact

Members who have suggestions for technical papers or desire to present papers or have any queries, please contact:

J.F. Mack, Jr.,  
General Manager

or

A. Mabra  
Chairman, Technical Programme  
AAPG, P.O. Box 979  
Tulsa, Oklahoma 74101, USA.

G.H. Teh

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# FIFTH 'INDUSTRIAL MINERALS' INTERNATIONAL CONGRESS

Melia Castilla Hotel, Madrid, Spain - April 25-28 1982

## Advance Programme

The provisional programme of papers to be presented at the Fifth 'Industrial Minerals' International Congress has been selected to combine commercial and technical aspects concerning a wide range of industrial minerals. Appropriately enough, papers discussing the international implications of Spanish industrial minerals are well in evidence. Among the minerals covered specifically are pyrites, sepiolite, dolomite, fluorspar, barytes, celestite, potash, phosphates, sulphur, soda ash; nepheline syenite, feldspar, quartz, and ceramic/refractory raw materials. Other papers look at aspects of mineral development in the Middle East; electron microscopy as a commercial tool; fine particle inorganic chemicals and minerals; mineral-reinforced plastics; and factors such as energy, risk assessment, and project financing which appertain to the whole field of industrial minerals.

- \* The industrial minerals of Spain by M.R. Echevarria, Instituto Geologico y Minero de Espana, Madrid, Spain
- \* The international outlook for Spanish pyrites by Dr. G.K. Strauss and K.G. Gray, Cia Espanola de Minas de Tharsis, Madrid, Spain
- \* Outlook for Spanish absorbent clays (provisional title) by Tolsa SA, Madrid, Spain
- \* Spanish dolomite for the glass industry by A. Reynolds. Tilcon Ltd., Knaresborough, UK
- \* Technology and uses of barium and strontium compounds by Dr. Massonne, Kali-Chemie, Hanover, West Germany
- \* Industrial minerals for the fertiliser industry - trends in supply and demand by K. Gilbert, The British Sulphur Corporation Ltd., London, UK.
- \* The natural-synthetic soda ash rivalry intensifies by R. Aitala and F. Henrickson, Isonex Inc., Houston, Texas, USA
- \* The Canaan nepheline syenite venture by A. de Ferran, Austral Mineracao & Servicos Ltda., Rio de Janeiro, Brazil.
- \* Portuguese feldspar and quartz developments by Sr. Nunes de Almeida, Unimil Minerals Lda., Oporto, Portugal
- \* Deposits of quartz raw materials in Yugoslavia and their utilisation in industry by Dr. R. Vasiljevic, Institute for Technology of Nuclear and Other Mineral Raw Materials, Belgrade, Yugoslavia
- \* The practical application of electron beam devices in the industrial minerals industry by A.C. Dunham and P.W. Scott, University of Hull, UK
- \* The ceramic raw materials of southern Africa by Prof. R.O. Heckrodt, University of Cape Town, South Africa
- \* Refractory raw materials - present and future by L.R. Duncan and W.H. McCracken, Harbison-Walker International, Pittsburgh, USA
- \* Industrial minerals and building materials developments in Saudi Arabia by M.R. Dehlawi and D. Laurent, BRGM, Jeddah, Saudi Arabia
- \* Mineral development in the Arab World by Dr. M.R. Khawlie, American University of Beirut, Lebanon
- \* Current status of the diamond exploration effort in Australia by H.J. Garlick, Mackay & Schnellmann, Perth, Australia
- \* When is a mineral a chemical? by J.J. Fallon, Fallon Research Associates, New Providence, NJ, USA
- \* Mineral/Plastic alloys: the economics and outlook by C.H. Eckert, Charles H. Kline & Co. Inc., Fairfield, NJ, USA



- \* Energy and industrial minerals by M.A. Cavanillas, Promotora de Recursos Naturales, Madrid, Spain
- \* Assessing risks in raw materials supplies for the specialty glass industry by D.W. Anderson and G.H. Edwards, Corning Glass Works, Corning, NY, USA
- \* Industrial minerals sales contracts from a banker's perspective by C.R. Tinsley, Continental Bank, Chicago, USA.

#### Mini-sessions

It is also planned to arrange two mini-sessions comprised of 4-5 papers on a single mineral or theme. At present the likely topics for these two sessions will be Mineral sands and Soda ash.

#### Field excursions

A number of field excursions to Spanish industrial minerals producing and consuming operations are being arranged.

- Contact
- a) Metal Bulletin Congresses Ltd., Park House, Park Terrace, Worcester Park, Surrey, KT4 7HY, England
  - b) Peter Harben, Industrial Minerals, 708 3rd Avenue, New York, NY 10017, USA.

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## 1982 MAC SHORT COURSE - GRANITIC PEGMATITES

May 14-16 1982

The course is specifically designed to cover all aspects of pegmatites and is oriented towards geologists from industry and academia who wish an up-to-date overview of the subject. Consequently, a wide variety of topics will be covered, including:

- Anatomy and classification (P. Cerny)
- Silicate minerals (D.M. Burt, P. Cerny, F.C. Hawthorne, D. London, R.F. Martin)
- Oxide minerals (B. Chakoumakos, R.C. Ewing, E.E. Foord)
- Phosphate and borate minerals (P.B. Moore)
- Petrology and petrogenesis (D.M. Burt, P. Cerny, R.H. Jahns)
- Geochemistry (G.S. Clark, E.W. Heinrich, F.J. Longstaffe)
- Exploration (P. Cerny, E.W. Heinrich, D.L. Trueman)
- Ore Processing: Tanco mine (R.O. Burt)  
Foote mine (I.A. Kunasz)  
Greenbushes mine (M.I. Hatcher, B. Bolitho)

There will be 2 days of lectures and a one-day field trip to the Tanco mine and mill and the local geology.

An introductory party will be held the evening of May 13th. Participants will receive a set of lecture notes prepared by the lecturers presenting the course. The registration fee has not yet been fixed but will be in the neighbourhood of \$350 for professionals and \$200 for students, to include lecture notes, accommodation and field trip expenses.

Further information is available from:

Dr. P. Cerny/Dr. F.C. Hawthorne  
 Department of Earth Sciences  
 University of Manitoba  
 Winnipeg, Manitoba, Canada R3T 2N2.

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## UNDERGROUND WORKS AND SPECIAL FOUNDATIONS SYMPOSIUM - SINGAPORE 8-10 MARCH 1982

### Introduction

In the context of the present economic development of countries in Asia and Oceania, there has had to be a considerable increase in the utilization of subsurface to meet the needs of hydro-electric power, irrigation, transport (roads, rapid transit...), water supply and drainage. The storage of petroleum products, the construction of commercial centres, carparks, and defence systems also lead to an ever growing use of the subsurface.

French organizations and professions have acquired a recognized competence in the field of underground development, as much with the conception, construction and operation of tunnels in rock, soils or underwater, as with all works which require a deep understanding and experience of the soil such as special foundations for high rise buildings, or construction and operation of hydrocarbons underground storage.

It is for this reason that the Public bodies and professional organizations in France intend to realize, on the 8, 9 and 10th March 1982 at Singapore, a Regional Symposium on the use of subsurface, "Underground Works and Special Foundations" in order to establish with their counterparts in Asian and Oceanic countries a wide dialogue, to explain the latest developments and techniques in France and to proceed to an exchange of views on the respective experience and difficulties of each other, and the perspectives for the future.

### Participants

Decision makers, planners, engineers, scientists, and geologists interested and concerned with the use of the subsurface works and special foundations are invited to participate in this Regional Symposium.

### Organization

High level French experts representing the organizations and companies listed in this bulletin will give technical talks on three themes:

- 1 - Attitudes and tendencies in the use of the subsurface:  
     Interests and viability
- 2 - The importance of studies and design: project conception, optimization with respect to its purpose; the taking into account of difficulties inherent in the works, and of the essential aspects of operation and maintenance
- 3 - Construction techniques and plant: orthodox methods and new processes of construction and watertightness, specialist plant; the supervision and control of the works.

Details of these themes are explained in the preliminary programme.

All participants will be able to give their own experience and discuss particular aspects at round-tables which will allow a wide debate to be opened; at the present time it is envisaged to consider the following topics:

- a) Consideration of seismic problems and the behaviour of special foundations
- b) Soil improvement for foundations
- c) Instrumentation and measurement of large works
- d) Deep foundations
- e) Working methods in France - the division of responsibilities - the training of staff
- f) Traditional and mecanized construction techniques.

Other round-tables can be arranged at the Symposium according to the wishes of the participants.

Finally, a small exhibition will be held to allow the participants to find out about the latest french developments in this field. It will include panels with photographs, small models, samples ... and points will be illustrated with slides and film-shows.

### Preliminary Programme

#### 8th March 1982

- Afternoon                      Registration and opening ceremony
- I - PRESENTATIONS CONCERNING THEME No 1
- a) Advantages of the use of the subsurface and potential possibilities : recent progress - economic factors in underground structures - foreseeable developments and future perspectives
  - b) Underground engineering in urban areas
  - c) Underground works associated with urban transport systems
  - d) Estuary dams and dykes
  - e) Underground storage

#### 9th March 1982

- Morning                        II - PRESENTATIONS CONCERNING THEME No. 2
- a) Integrated project conception
  - b) The place of geology and construction techniques in the conception
  - c) Choice of construction techniques as a function of the site
  - d) Short and long term geotechnical roles to be taken into account at the time of project conception
  - e) Studies, calculations and measurements at different stages of operations
  - f) Taking maintenance and renovation problems into account

Afternoon                      - Round-tables -

10th March 1982

Morning

III - PRESENTATIONS CONCERNING THEME No. 3

- a) Modern methods of foundation and underground construction
- b) Diaphragm walling
- c) Application of chemical grouting techniques in underground works
- d) Mud cleaning and desanding
- e) Dynamic consolidation and vertical drains
- f) Watertightness
- g) Betting and ground anchors
- h) Mechanical precutting

Afternoon

A presentation of case histories of works suited to Asia and the Far East.

Further information

A second bulletin in January 1982 will give more details on the programme and the registration formalities. It is precised that air travel arrangements and hotel accommodations will be organized directly by participants.

All persons wishing to participate in this Regional Symposium can ensure they will receive a copy of Bulletin no. 2 as soon as it is published by ~~writing to~~

*ACTIM, 64, rue Pierre Charron, 75008 Paris (France)*

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**KALENDAR (CALENDAR)**

A bracketed date, e.g. (Mar-Apr 1979) denotes entry in that issue carried additional information.

1981

- Nov 17 : Workshop on Role of Geoscience Educational Institutes in Natural Resources Development in Southeast Asia. Organised by AGID in cooperation with Regional Network for Geosciences in Southeast Asia. Contact: Dr. B.K. Tan, Convenor AGID Geoscience Education Workshop, Dept. of Geology, University of Malaya, Kuala Lumpur, Malaysia. (May-Jun 1981).
- Nov 18 - 23 : GEOSEA IV - Geology, Mineral and Energy Resources of Southeast Asia: Philippines International Convention Center, Manila, Philippines. The Secretary, Geological Society of the Philippines, Bureau of Mines Bldg., Pedro Gil St., Malate, Manila, Philippines. (Jul-Aug 1980 & Jan-Feb 1981).

- Sep - Oct : International Conference on Industrial Minerals and Rocks and the role they play in a developing country, Kingston. Contact: Neville McFarlane, Head, Mineral Resources Division, Science Research Council, P.O. Box 350, Kingston, 6, Jamaica.
- Nov 23 - 26 : Asian Mining '81, Singapore. The Secretary, IMM, 44 Portland Place, London W1N 4BR, England. (May-Jun 1980).
- Dec 7 - 11 : Ore deposits, ann. workshop, Toronto. (E.T.C. Spooner, Dept. of Geology, University of Toronto, M5S 1A1).
- Dec 14 - 18 : Short Course and Symposium on geotechnical aspects of offshore structures, Bangkok. Guest Lectures, Country Reports, and short presentations. Contact: Prof. A.S. Balasubramaniam, Div. of Geotechnical & Transportation Engineering, AIT, P.O. Box 2754, Bangkok, Thailand. (May-Jun 1981).
- Dec 18 - 19 : Ophiolites & Actualism. A meeting held by the Working Group on Mediterranean Ophiolites, Florence, 18-19 December. Contact: Travel Agency CTU VIAGGI, via S. Gallo, 12/v., 50100 Florence. ('ay-Jun 1981).

#### 1982

- Feb 2 - 12 : Offshore Southeast Asia (OSEA) Conference & Exhibition, Singapore. Contact: Dr. Glenn L. Shepherd, OSEA Program Chairman, P.O. Box 423, Tanglin Post Office, Singapore 9124.
- Mar 1 - 5 : Workshop on Palaeomagnetic Research in Southeast and East Asia. University of Malaya, Kuala Lumpur. Abstracts by 1 August. Full papers by 15 December. Contact A. Johannas. Project Manager, Coordinator CCOP, Bangkok, Thailand. (Jul-Aug 1981).
- Mar 8 - 10 : Underground Works and Special Foundations Regional Symposium, Singapore. Contact: ACTIM, 64 rue Pierre Charron, 75008 Paris, France. (Sep-Oct 1981).
- Apr 1 - 3 : First international symposium on Soil, Geology and Landforms - impact on land use planning in developing countries, Bangkok. Contact: Dr. Prinya Nutalaya, Symposium Secretary, LANDPLAN 1, Div. of Geotechnical & Transportation Eng., AIT., P.O. Box 2754, Bangkok, Thailand. (Jul-Aug 1981).
- Apr 19 - 23 : 17th Annual International Symposium on Computer Applications in the Minerals Industry, Colorado. Details from Colorado School of Mines, Golden, Colorado 80401, USA.
- Apr 25 - 28 : Fifth "Industrial Minerals" International Congress, Melia Castilla Hotel, Madrid, Spain. Contact: Peter Harben, Industrial Minerals, 708 3rd Avenue, New York, N.Y. 10017, USA. (Sep-Oct 1981).
- May 12 - 14 : 9th International Geochemical Exploration Symposium, Saskatoon, Canada. (L.A. Clark, Saskatchewan Mining Development Corp., 122 3rd Ave. North, Saskatoon, Sask., Canada S7K 2HG).

- May 14 - 16 : MAC Short Course - Granitic Pegmatites. Contact: Dr. P. Cerny, Department of Earth Sciences, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2. (Sep-Oct 1981).
- May 22 - 28 : Gold '82 Symposium, University of Zimbabwe. Dr. R.P. Foster, Organising Secretary, GOLD 82, Institute of Mining Research, P.O. Box MP 167, Mount Pleasant, Salisbury, Zimbabwe.
- Jun 1 - 5 : 2nd International Tungsten Symposium, San Francisco. Details from M. Maby, Peat Marwick Mitchell & Co., 7 Ludgate Broadway, London EC4 V6DX, U.K.
- Jun 7 - 11 : Tunnelling '82 - 3rd International Symposium and Exhibition, Metropole Hotel, Brighton, U.K. Secretary, the Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, U.K.
- Aug 20 - 23 : IV International Symposium on the Ordovician System, Oslo, Norway. One pre-meeting excursion in Norway and three post-meeting excursions in Sweden. (D.L. Bruton, Paleontologisk Museum, Sars gate 1, Oslo, 5, Norway).
- Aug 22 - 28 : Circum Pacific Energy and Mineral Resources Conference, Honolulu, Hawaii, USA. (M.T. Halbouty, 5100 Westheimer Road, Houston, Texas 77056, USA).
- Aug 22 - 28 : Eleventh International Congress on Sedimentology, Hamilton, Ontario, Canada, IAS Congress 1982, Dept. of Geology, McMaster University, Hamilton, Ontario L8S 4M1, Canada. (Nov-Dec 1980).
- Sep 6 - 12 : VI IAGOD Symposium. Tbilisi. Contact: A.C. Tvacchrelidze, Caucasian Institute of Mineral Resources, 85 Paliashvili St., 380030 Tbilisi, USSR.
- Oct 17 - 23 : XIV International Mineral Processing Congress, Toronto, Canada. L.J. Vincze, Publicity Chairman XIV IMPC, c/o CE Lummus - Minerals Division, 25 Consumers Road, Willowdale, Ontario M2V 4H4, Canada.
- Dec 1 - 6 : 4th International Congress of Engineering Geology, New Delhi. Contact: G. Pant, Geological Survey of India, 47-48 Pragati Bhawan. Nehru Place, New Delhi 110019, India.

### 1983

- Mar 6 - 10 : 3rd International Symposium on Hydrometallurgy, Atlanta, Georgia, USA. K. Osseo-Asare, Dept. of Materials, Science and Engineering, 202A Steidle Building, the Pennsylvania State University, University Park, Pennsylvania 16802, USA.

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# GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

- Bulletin 1 (1968)**, 79 p. *Studies in Malaysian Geology*, edited by P.H. Stauffer. A collection of papers presented at a meeting of the Geological Society of Malaysia on 31st January 1967. M\$3.00 (US\$1.50).
- Bulletin 2 (1968)**, 152 p. *Bibliography and Index of the Geology of West Malaysia and Singapore* by D.J. Gobbett. Price: M\$10.00 (US\$5.00)—softcover; M\$15.00 (US\$7.50)—hardcover.
- Bulletin 3 (1970)**, 146 p. *Papers in Gemorphology and Stratigraphy (with Bibliography supplement)*, edited by P.H. Stauffer. Price: M\$10.00 (US\$5.00).
- Bulletin 4 (1971)**, 100p. *Papers in Petrology, Structure and Economic Geology*, edited by P.H. Stauffer. Price: M\$10.00 (US\$5.00).
- Bulletin 5 (1973)**, 70 p. *The Search for Tungsten Deposits* by K.F.G. Hosking. Price: M\$10.00 (US\$5.00).
- Bulletin 6 (1973)**, 334p. *Proceedings, Regional Conference on the Geology of Southeast Asia, Kuala Lumpur, March 1972*. Edited by B.K. Tan. Price: M\$22.00 (US\$11.00)—hardcover only.
- Bulletin 7 (1974)**, 138 p. Edited by B.K. Tan. Price: M\$12.00 (US\$6.00).
- Bulletin 8 (1977)**, 158 p. Edited by T.T. Khoo. Price: M\$12.00 (US\$6.00).
- Bulletin 9 (1977)**, 277 p. *The relations between granitoids and associated ore deposits of the Circum-Pacific region. A collection of papers presented at the IGCP Circum-Pacific Plutonism Project Fifth Meeting, 12-13 November 1975, Kuala Lumpur*, edited by J.A. Roddick & T.T. Khoo. Price: M\$25.00 (US\$12.50).
- Bulletin 10 (1978)**, 95 p. *A collection of papers on the geology of the Asean region*. Edited by C.H. Yeap. Price: M\$10.00 (US\$5.00).
- Bulletin 11 (1979)**, 393 p. *Geology of Tin Deposits. A collection of papers presented at the International Symposium on 'Geology of Tin Deposits', 23-25 March 1978, Kuala Lumpur*. Edited by C.H. Yeap. Price: M\$50.00 (US\$25.00).
- Bulletin 12 (1980)**, 86p. *Papers on Petroleum Geology, Engineering Geology, Structure, Palaeomagnetism & Petrology*, edited by G.H. Teh. Price: M\$20.00 (US\$10.00).
- Geological Map of the Malay Peninsula (1:1,000,000 coloured)** compiled by D.J. Gobbett. 1972. Price: M\$4.00 (US\$2.00)—folded flat.
- Field Guide for a 7-day, one thousand mile, geological excursion in Central and South Malaya (West Malaysia and Singapore (1973))**, 40 p. by C.S. Hutchison. Price: M\$5.00 (US\$2.50).
- Abstracts of papers, Regional Conference on the Geology of Southeast Asia, Kuala Lumpur (1972)**, 64 p. 8 figs., 3 tables, many extended abstracts. Edited by N.S. Haile. Price: M\$6.00 (US\$3.00).
- Warta Geologi (Newsletter of the Geological Society of Malaysia)**. Price: M\$2.00 (US\$1.00) (for non-members) per bimonthly issue from July 1966.

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