

PERSATUAN GEOLOGI MALAYSIA

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CATATAN GEOLOGI

Geological Notes

Gravity base stations in Sabah, East Malaysia

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INTRODUCTION

Because gravity meters measure only gravity differences, and not absolute gravity values, base stations are needed through which local surveys can be linked to the international absolute network (currently denoted by the acronym IGSN71). The locations and gravity values of all base stations need to be publicised, and clear descriptions must be available. This note describes base stations established in Sabah in 1995 as part of a programme of co-operation between the Geological Survey of Malaysia and the University of London.

PREVIOUS BASE STATIONS IN EAST MALAYSIA

Ironically, East Malaysia in the early post-war years was more securely linked to the international gravity network than was West Malaysia, largely because the role of Singapore airport as the regional airline 'hub' led to a concentration of stations on what is now the Republic of Singapore. International base stations on the Potsdam system in Sabah and Sarawak were listed by Woollard and Rose (1963) as in (Table 1).

These were presumably the base stations

Table 1. International base stations in Sabah and Sarawak (Woollard and Rose, 1963).

Kuching	WA2065	1	29.0	110	20.5	24.5	978076.3
<i>Air terminal, immediately inside folding door to "Immigration" waiting room, 3' above tarmac level</i>							
Sibu	WA2066	2	18.0	111	49.9	6.0	978079
<i>Control tower building outside door to building near step to tower on building apron.</i>							
Jesselton	WA2054	5	57.0	116	03.5	2.0	978127.9
<i>Airport. Inside meteorological enclosure on field side of terminal on north train-catcher base, 1" above ground level.</i>							
Labuan	WA2055	5	18.2	115	15.2	29.9	978096
<i>Airport. To right of steps leading to customs and immigration from field, 6" below field level.</i>							
Sandakan	WA2056	5	54.1	118	04.0	11.6	978091.4
<i>Air terminal, at base of wash bowl in "Gentlemen's" lavatory.</i>							

used when, in 1964, the US Army Map Service (Far East) established a regional gravity network of some 300 new stations in northern and western Sabah. The link to the then current international system was strengthened in 1966 when the West Pacific Calibration Line (WPCL) linked Fairbanks in Alaska to Hobart in Tasmania via Vladivostok, Tokyo and Canberra. In Malaysia, WPCL stations were established at the University of Malaya in Kuala Lumpur (WPCL value 978 048.96 mGal) and in Kuching. Additional loops in 1970 and 1971 produced an adjusted value of 978 075.32 mGal for Kuching and a new value of 978 095.02 mGal for Labuan. The absolute gravity values listed in most international data bases for the USAMS(FE) survey are thought to have been referenced to this value for the Kuching base. The University of Malaya base was subsequently incorporated into the current IGSN71 network with a value of 978 034.41 mGal. This is 14.55 mGal less than the WPCL value and implies the need for a similar adjustment to the linked stations in East Malaysia. The shift is slightly greater than the 14 mGal correction usually applied to convert Potsdam to IGSN71 values and was therefore presumably obtained as a result of additional measurements.

A serious drawback to the WPCL was that virtually all stations were at international airports, often 'airside' of Customs and Immigration. Increased security precautions introduced since 1966 have made access to such stations difficult, and it is also rare to find airports which have changed so little that the WPCL stations can still be identified. These problems are common to virtually all airport stations, including Woollard and Rose WA2054 at the original Kota Kinabalu (then Jesselton) airport. StJohn (1981) re-occupied this latter station (at what is now known as 'Lapangan Terbang Lama') and backed it up with a 'landside' excentre a short distance away, with the recommendation (unfortunately apparently ignored) that additional excentres be established in more secure locations. When the airport was visited in 1995, StJohn's excentre was found to lie within a partially excavated building site. Although the original airside station could not be precisely located, an approximate tie was made by reading the gravity meter at a

point some ten metres away and at what must have been a very similar elevation. Comparison with the value obtained in 1995, based on the new link between Kota Kinabalu and the University of Malaya base in Kuala Lumpur suggested that the adjustment to the USAMS(FE) values should be 13.7 mGal, rather than 14.55 mGal. The average discrepancy between 1995 and USAMS(FE) gravity stations in approximately the same locations was also found to be close to 13.7 mGal, and this value has therefore been used in integrating the older data with the 1995 results.

THE MALAYSIA NATIONAL GRAVITY BASE

The Malaysian National Gravity Base is in the Makmal Fizik (Physics Building) of the Universiti Malaya in the suburbs of Kuala Lumpur. The building is situated behind and to the left of the main Fakulti Sains block and opposite the building housing the Geology Department. A printed station description sheet is available but the sketch map no longer corresponds very closely to the situation on the ground. Modifications to the laboratories have resulted in a new doorway being opened up immediately next to the station site, and the concrete benches and darkroom mentioned in the original description have been removed. A sign by the new door indicates that this area is now the 'Makmal Plasma'. There were in 1995 still staff in the Physics Department who could guide visitors to the gravity station, but this situation may not last much longer. Moreover, further modifications could destroy the site, thus removing the only direct Malaysian link to the IGSN71 network. It is therefore desirable that an excentre be established by repeated ties to the existing base and that new description sheets be prepared for both stations. The nearby Geology Department would seem an ideal location for the excentre.

The precise reading point in the Makmal Plasma is indicated by a brass plaque on the floor, inscribed:

GRAVITY STATION UNIVERSITY OF MALAYA PHYSICS LAB
REF JPNM G4/76

whereas on the data sheet the station is designated 'Kuala Lumpur 02631 B IGSN 71'.

This discrepancy, taken together with the differences between the station description and the site marked by the brass plaque, raise some doubts as to whether the two sites actually are the same. These doubts are reinforced by the discrepancy between the expected IGSN71 value, based on the standard Potsdam/IGSN71 conversion factor of 14.0 mGal, and the 14.55 mGal value quoted by StJohn (1981). It is clearly desirable that the Kuala Lumpur base be linked much more securely to the international system.

1995 SABAH GRAVITY TIES

The 1995 regional gravity survey employed the low drift LaCoste-Romberg geodetic gravity meter G90, owned by Imperial College, London. This meter was read at the University of Malaya base on 5 July and again, following completion of the survey work in Sabah, on 7 August. Total drift during this period of 33 days was less than 2 mGal and was monitored at a base in the Sungei Wang Hotel in central Kuala Lumpur and a number of bases in Sabah..

The most important of the Sabah bases is the station at the Geological Survey building in Kota Kinabalu, and it is recommended that this be adopted as the primary gravity base for Sabah. Other described and reoccupiable bases were established in Telupid, Lahad Datu, the Danum Valley Field Centre, Tawau, Luasong and Tambunan (Figs. 2a and 2b). The currently accepted Principal facts for these bases are listed in Table 2. The network (Fig. 1) was created using a system of forward looping. Thus, a new station was established at Telupid en route from Kota Kinabalu to Lahad Datu, where a second new station served as a base for a number of days. Side loops from Lahad Datu allowed bases to be established at the Danum Valley Field Centre. From Lahad Datu a loop included a temporary site at the Semporna-Tawau road junction which was reoccupied from Tawau after the base had been moved there. A loop from Tawau then reached to the forestry base at Luasong, which was in turn used as a base for three loops, one of which included a temporary site at the forestry centre at Tongood. From Tongood the survey was tied back to Telupid and thence to Kota Kinabalu. An

additional loop from Kota Kinabalu allowed a base to be established at Tambunan.

The weakest section of the network is the direct link from Telupid to Lahad Datu, since this road was used once only, in one direction only, with closure back to Telupid 17 days later. The link between the western and eastern sides of Sabah was therefore reinforced by a direct tie between Lahad Datu and Kota Kinabalu using the scheduled air service. Although the main loop extended over a period of 19 days, the absence of tares, the use of multiple repeat readings throughout the survey and the existence of the air tie has allowed gravity values relative to Kota Kinabalu to be estimated at all loop bases with estimated uncertainties of no more than 0.04 mGal. This estimate is believed to be valid even though completion of the main loop had to be delayed for 16 hours because the first attempt at reoccupation in Kota Kinabalu, at 1423 on 31 July, was affected by long period ground vibrations associated with the Antofagasta earthquake which occurred about a quarter of an hour earlier. Since various phases and modes of this shock wave were expected to arrive over a considerable period, the loop was not finally closed until early the following day.

In 1996, during the Geological Society of Malaysia annual meeting in Kota Kinabalu, the base at the Geological Survey Office was tied to the current Kuching base by U.W.A. Sirisena, using a LaCoste-Romberg model G gravity meter belonging to the Geological Survey of Malaysia.

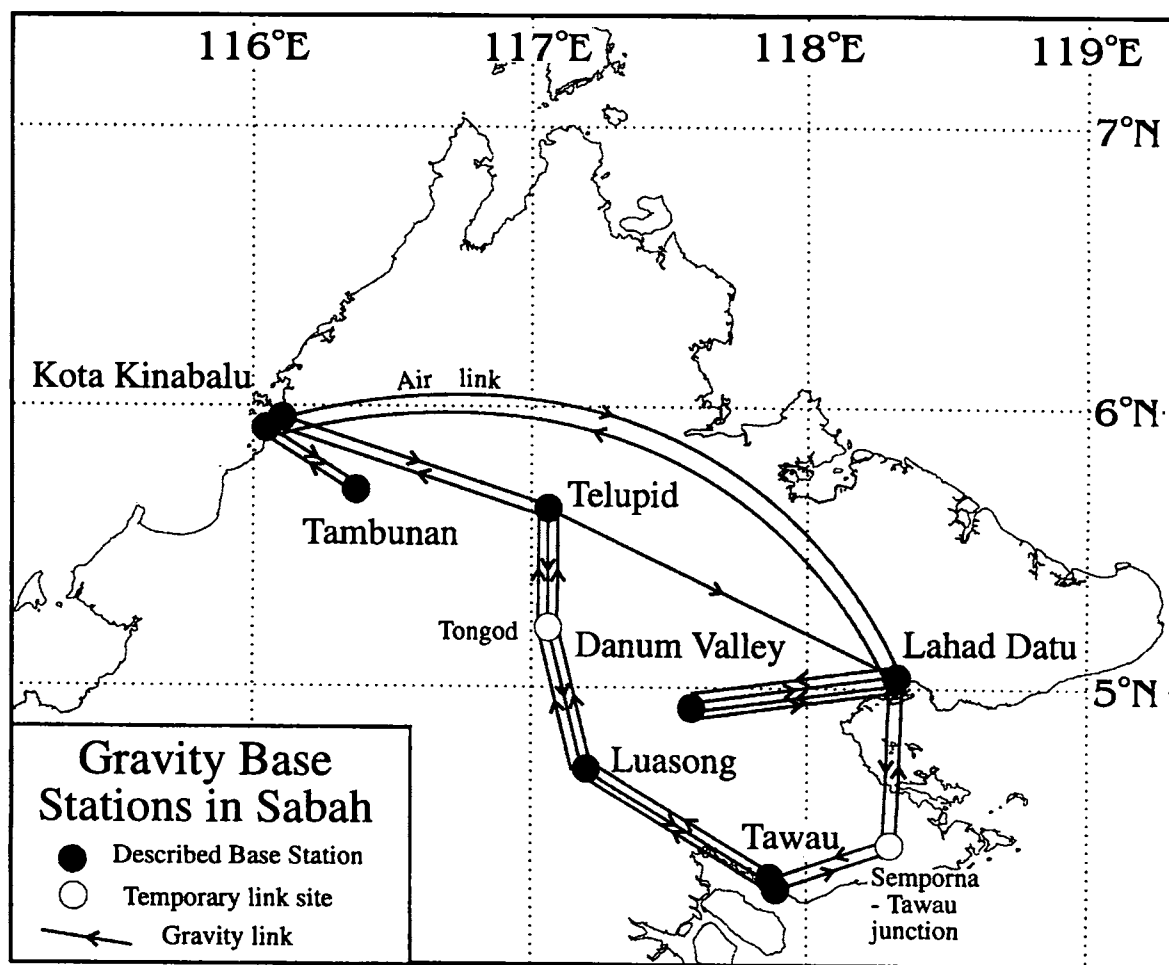
RECOMMENDATIONS

A start has been made on developing a gravity base network for Sabah. However, the network does not yet reach international standards, because of the small numbers of links supporting the network, and also because of uncertainties associated with the Malaysian National Base in Kuala Lumpur. The following recommendations are therefore made.

1. An inscribed brass marker plaque should be positioned on the site of the main Sabah base in the Geological Survey offices in Kota Kinabalu.

Table 2. Principal facts for Sabah gravity bases.

Station No.	Location	Latitude	Longitude	Height (m)	Observed g
9502.9002	Kota Kinabalu	5°07.53	116°04.43	3.4	978112.19
9502.9028	Telupid	5°37.68	117°07.86	100.7	978151.66
9502.9029	Lahad Datu	5°01.58	118°20.01	6.1	978156.53
9502.9059	Danum Valley	4°57.83	117°48.17	154.5	978064.12
9502.9060	Danum Valley	4°57.83	117°48.16	162.9	978062.75
9502.9169	Tawau	4°14.80	117°52.93	1.9	978112.93
9502.9170	Tawau	4°15.72	117°53.04	14.3	978110.89
9502.9185	Luasong	4°36.60	117°23.71	134.1	978042.45
9502.9243	Luasong	4°36.60	117°23.68	134.1	978042.48
9502.9301	Tambunan	5°40.17	116°21.93	575.3	977939.97

**Figure 1.** Gravity base stations in Sabah.

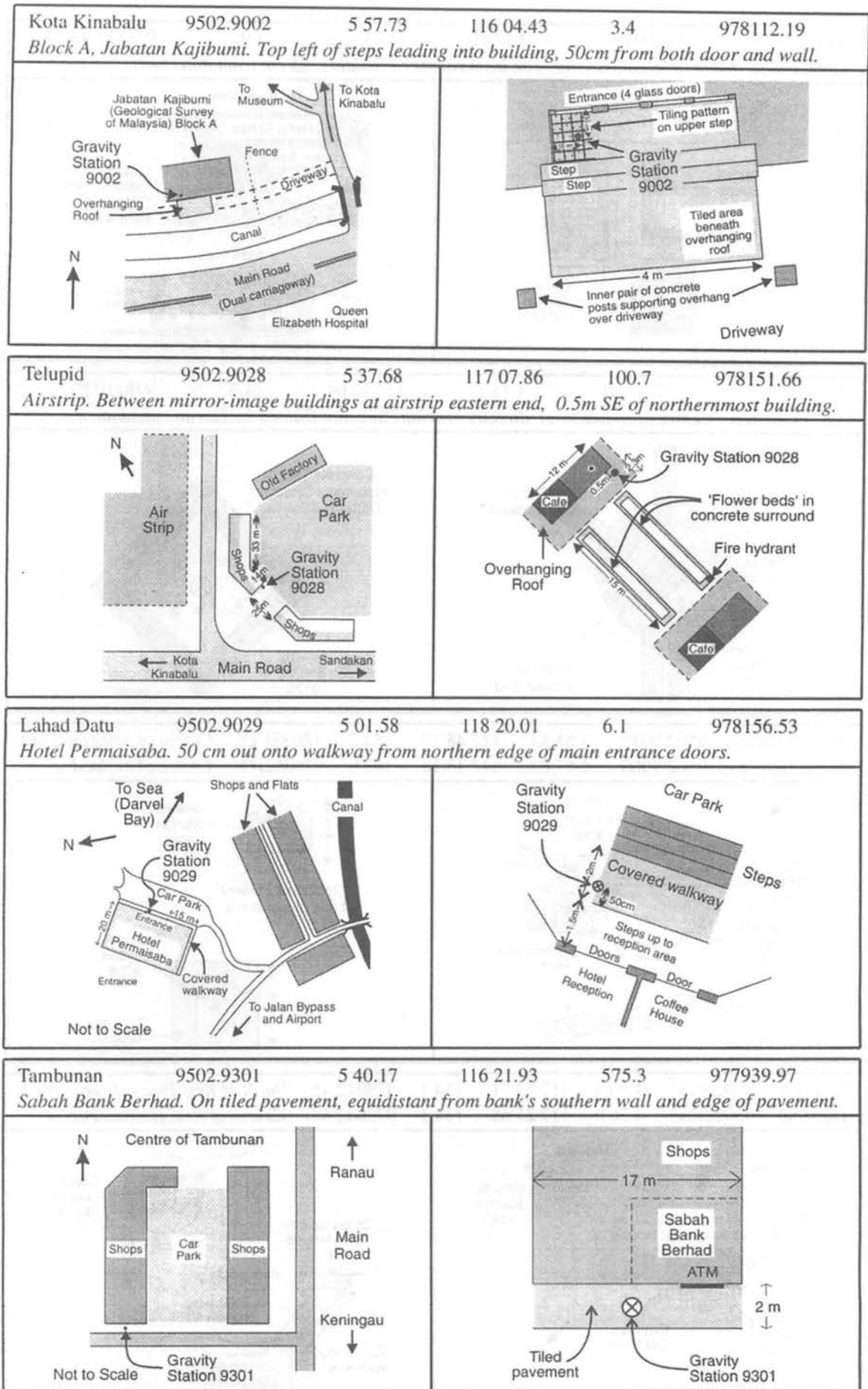


Figure 2a. Locations of the gravity base stations.

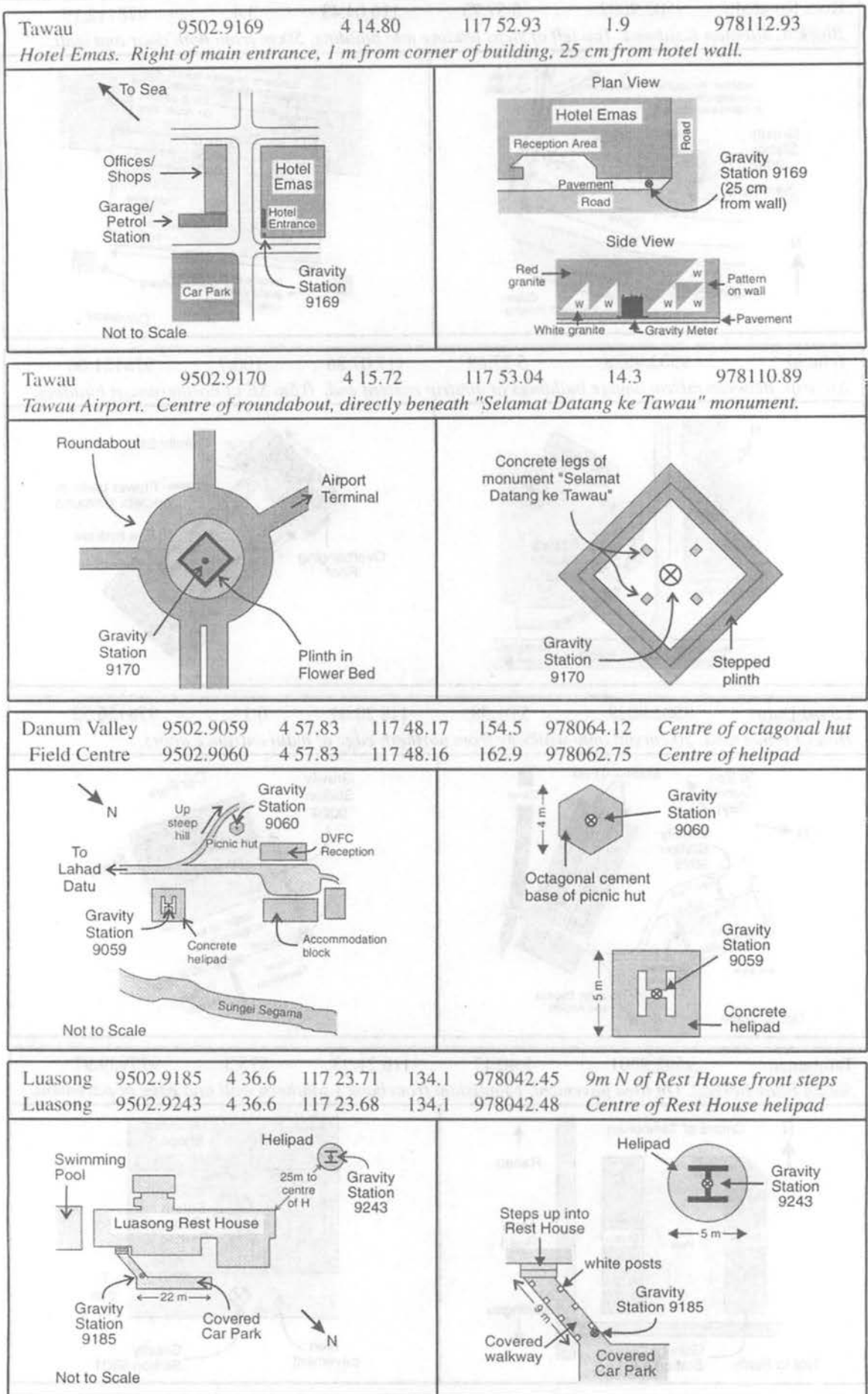


Figure 2b. Locations of the gravity base stations.

2. This station, and the other stations described in this report, should in future be used as the base stations for all gravity work in Sabah.
3. Advantage should be taken of every opportunity provided by gravity meters in transit to strengthen the gravity ties between East and West Malaysia, and between sites in East Malaysia.
4. Advantage should be taken of any opportunities that arise to link bases in Malaysia to bases in Singapore and adjacent parts of Indonesia.
5. The history of the University of Malaya base station in Kuala Lumpur should be investigated and a new station description sheet should be prepared.
6. A new gravity excentre should be established in the Geology Department at the university.

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CATATAN GEOLOGI

Geological Notes

More on the leaching column test

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Abstract: The usefulness of the leaching column test in helping to assess the suitability of a candidate clay soil for use in a landfill liner is again illustrated with a recent case study from South Wales, U.K. Two candidate clay soils were tested, one a weathered mudrocks while the other a glacial till. Results of the leaching column tests clearly show that the weathered mudrocks show poor retention capabilities with respect to heavy metals and low buffering capacity towards change in pH. On the other hand, the glacial till exhibits high retentions of heavy metals and high buffering capacity towards pH changes. The glacial till is thus the preferred soil for use as clay liner in sanitary landfills.

INTRODUCTION

The leaching column test has been introduced previously, and its usefulness in helping to assess the suitability of a candidate clay soil for use in a landfill liner was shown in the previous article, Tan (1993). This short note presents yet another recent case study involving two candidate clay soils from South Wales, namely a weathered mudrocks soil and a glacial till. For simplicity, this short note concentrates only on some results from the leaching column tests. Details of other tests and additional test results can be referred to in the following report or publication: Tan (1997), Yong *et al.* (1997).

RESULTS AND DISCUSSIONS

Some leaching column test results from the recent study in South Wales are depicted in Figures 1–3, and discussed below.

Retentions of Heavy Metals

Figures 1 and 2 show the breakthrough curves for the heavy metals Pb^{2+} , Cu^{2+} and Zn^{2+} for the mudrocks soils (MR1) and the glacial till (GT1) respectively.

As observed from Figure 1, breakthrough of the Zn^{2+} cation occurred at leaching of about

2.3 pore volumes (p.v.) of leachate/permeant solution. Breakthrough of a particular ion occurs when its relative concentration, $C_e/C_o = 0.5$ (Bowders *et al.*, 1986). Though Pb^{2+} and Cu^{2+} did not reach breakthrough up to the maximum 5 p.v. of leaching conducted, it can be extrapolated/predicted that breakthrough of Pb^{2+} and Cu^{2+} is imminent and will occur at about 7–10 p.v. of leaching, i.e. at < 10 p.v. Figure 1 therefore shows that the mudrocks soil has poor retention capabilities with respect to heavy metals.

On the other hand, Figure 2 for the glacial till (GT1) shows the y-axis (relative concentration = C_e/C_o , where C_e = effluent concentration and C_o = original or influent concentration) having values of the order of 10^{-3} to 10^{-4} , i.e. very low values indicating no breakthrough or no imminent breakthrough. In other words, the glacial till possesses high attenuation capacity with respect to heavy metals.

Comparing the mudrocks and the glacial till, the glacial till is preferred for use in a landfill liner as far as retention/adsorption of heavy metals is concerned.

Buffering Capacity Against pH Changes

Figure 3 shows the variations of effluent pH and conductivity with progressive leaching

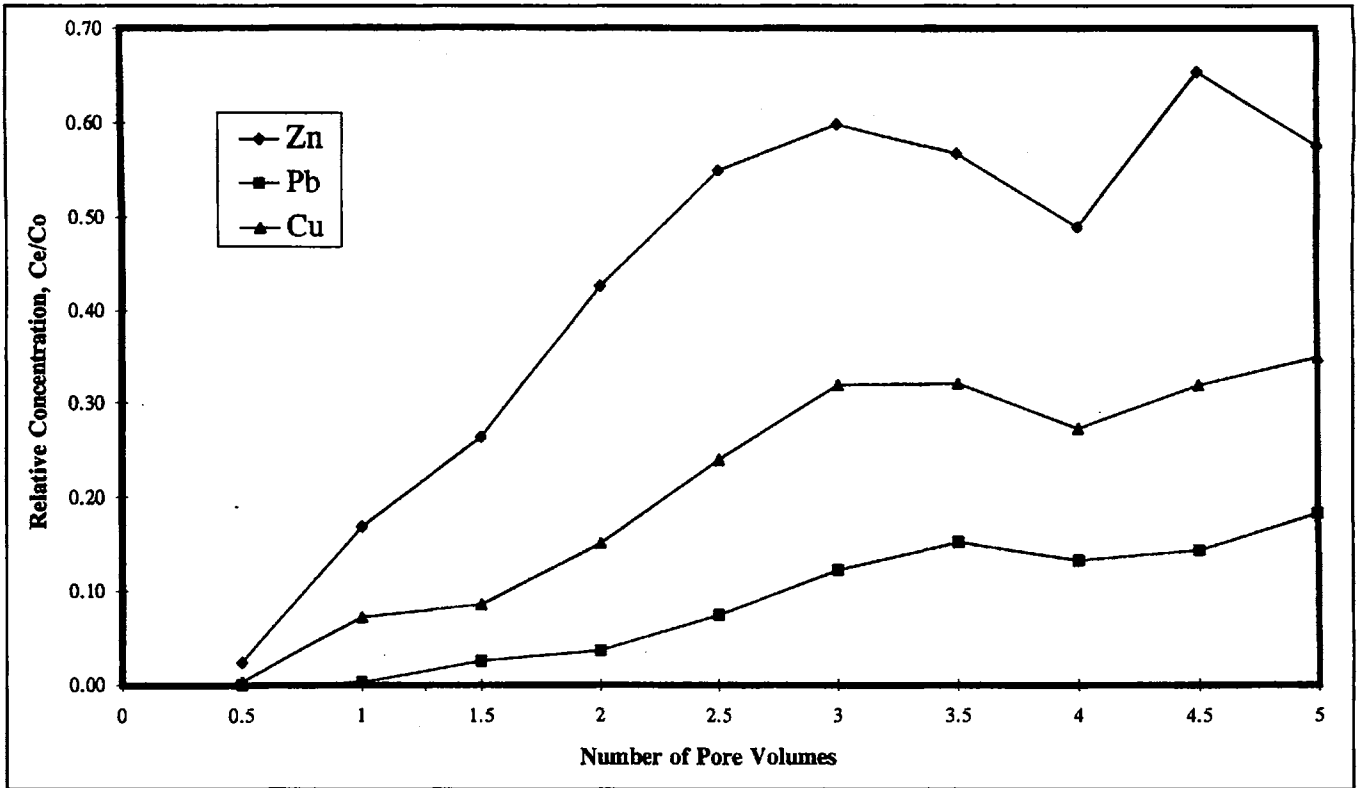


Figure 1. Breakthrough curves, Zn, Pb, Cu - MR1.

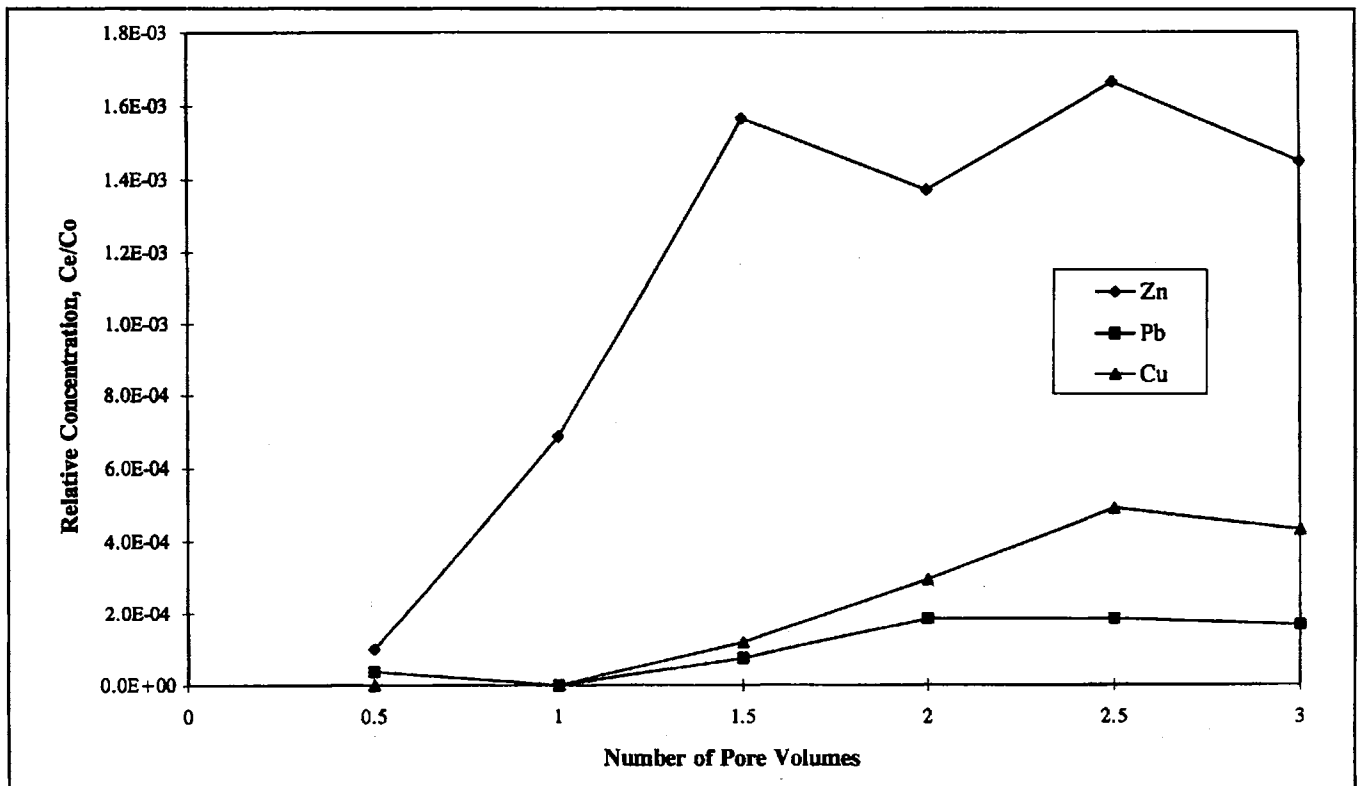


Figure 2. Breakthrough curves, Zn, Pb, Cu - GT1.

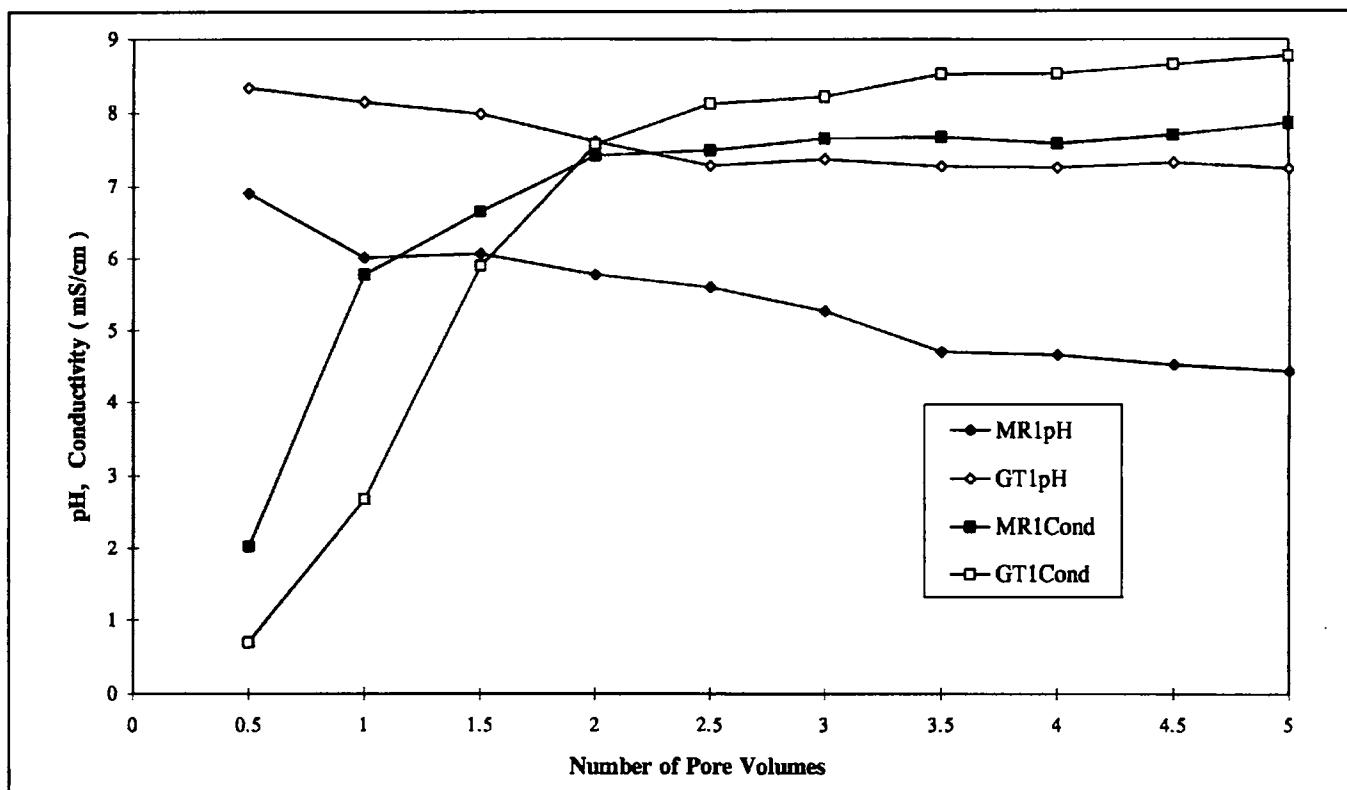


Figure 3. Effluent pH, conductivity — MR1, GT1.

of the MR1 and GT1 soils.

pH is a major factor in controlling the dissolution or precipitation of heavy metals with most heavy metals precipitating from solutions when the pH exceeds 5–5.5. Thus, when a soil is under attack or permeated by an acidic leachate or permeant solution (say initial pH of 1–2), the ability of the soil to counter and maintain a high pH (say pH = 6–8) is advantageous in so far as precipitation/retention of heavy metals is concerned.

Comparing the curves for pH variations in the MR1 and GT1 soils, it can be seen that the glacial till exhibits higher buffering capacity against change in pH. pH values for the GT1 soil are maintained at > 7 throughout the leaching process. On the other hand, with progressive leaching (acidic leachate), the pH values for the MR1 soil gradually drops to < 5, i.e. poor buffering capacity by MR1.

Figure 3 also shows companion plots of effluent conductivities. Conductivity is a

measure of the total cations (including heavy metals) in the solution. Note the inverse correlation between pH and conductivity, i.e. decrease in pH causes an increase in conductivity brought about by increased dissolution of heavy metals at lower pH's.

The results on pH variations/buffering capacities would again indicate the superiority of the glacial till compared to mudrocks as candidate soil for landfill liners.

CONCLUSIONS

This short note illustrates, once again, the usefulness of the leaching column test in assessing the suitability of candidate clay soils for use in landfill liners, this time with a recent case study from South Wales, U.K. Of the two soil types examined, it is demonstrated that the glacial till is the preferred soil over the weathered mudrocks, since it exhibits high retention of heavy metals and higher buffering capacity against change in pH.

ACKNOWLEDGEMENTS

The results reported herein form part of the author's recent sabbatical leave study at the Geoenvironmental Engineering Research Centre, University of Wales, Cardiff (UWC). The author acknowledges Universiti Kebangsaan Malaysia for granting the sabbatical leave, and special thanks to Prof. R.N. Yong and his colleagues at UWC for providing the opportunity to undertake this study at UWC.

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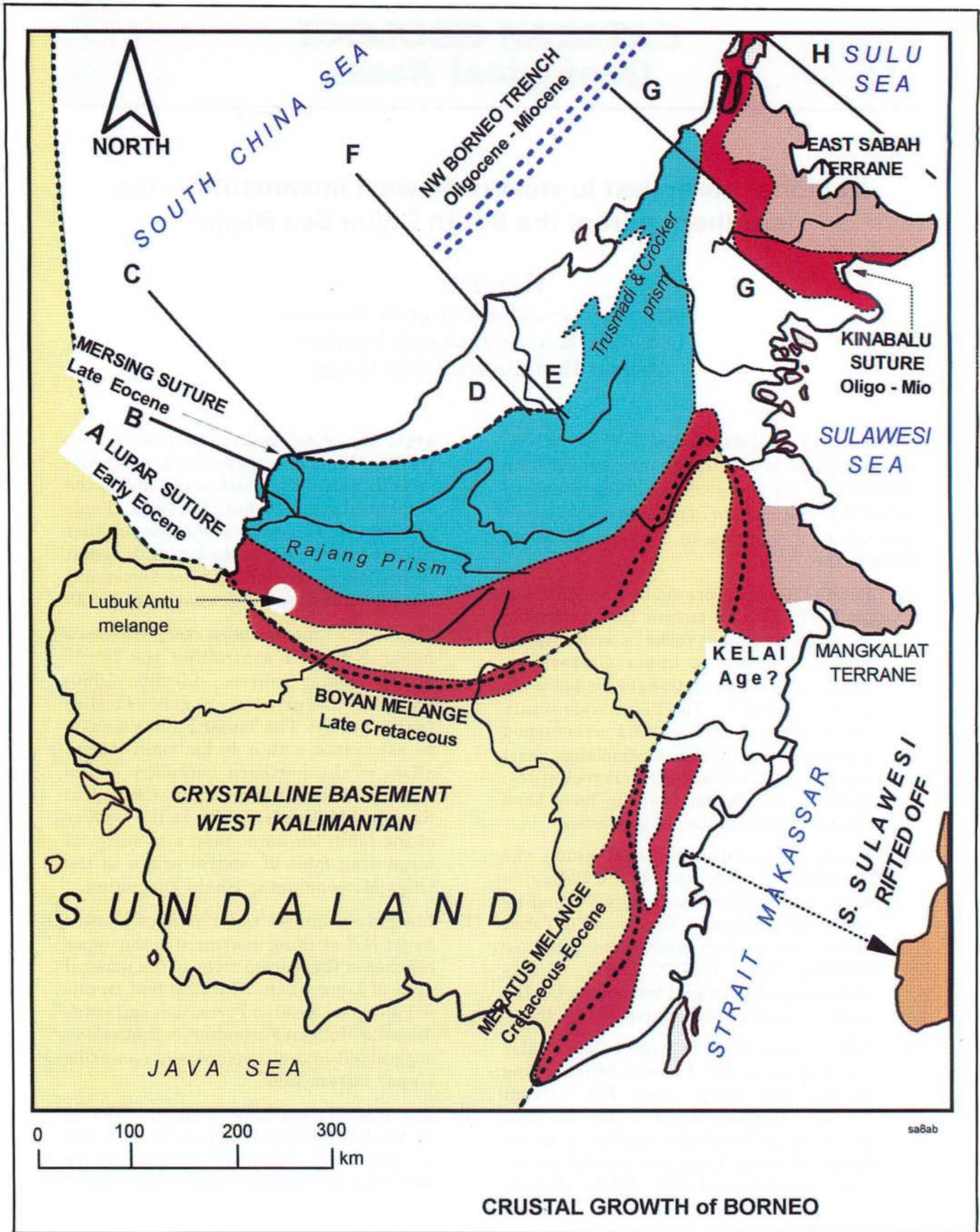
Regional northwest to west-northwest lineaments in the southern part of the South China Sea Basin

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Several well-developed NW to WNW-striking regional lineaments are known from publications on the geology of the southern part of the South China Sea Basin and adjacent land area. Beginning in western Sarawak, there is the

- (A) Lupar Line, interpreted by Tan (1982) as an Early Eocene suture that separates Mesozoic basement rocks in westernmost Sarawak from the upper Cretaceous-Eocene Rajang accretionary wedge to its northeast (Fig. 1). The 15-km wide suture comprises subvertical and overturned assemblages of olistostrome/mélange, chert and mafic-ultramafic igneous rock slices. Reverse and thrust faulting have been the main deformational processes.
- (B) Farther towards northeast along the Sarawak coastline and off the Balingian coast is a 130-km wide WNW-trending belt of normal faults, known as the Tatau Horst-and-Graben petroleum province (James, 1984; CCOP, 1991), clearly indicating extensional tectonics. On the east, it is obliquely intersected by the
- (C) NW-striking West Balingian Line or also referred to as SW Luconia-Mukah Line in Tan and Lamy (1990; Fig. 1) that onshore appears to curve into an ESE direction and probably continues as the Bukit Mersing Line (see *Liechti et al.*, 1960; Hutchison, 1989). In the offshore area, the West Balingian Line is the western limit of a region with northeast structural trends, which is parallel to the structural grain onshore Sarawak. Folds consisting of Paleogene sediments on either side strike obliquely to the line and suggest right-lateral wrenching (see Geological Survey of Malaysia regional map, 1992).
- (D) The Tinjar Line has been recognised as a major NW-fault controlling the linear middle Tinjar course. Liechti (1960) pointed to the presence of igneous bodies in that valley. The Tinjar Fault seems to be associated with a 40-km right-lateral offset of the northern boundary of the Rajang Accretionary Prism (Geological Survey of Malaysia, 1992). In the vicinity of the fault, the same map also suggests large drag folds of dextral origin in the Oligo-Miocene Setap Shale Formation.
- (E) Recently acquired radar images show a major NW-striking lineament in the upper reaches of the Baram river in the general area of Long Akah. Curving fold trends of Paleogene Kelalan Formation and lower Miocene Meligan Formation in that region suggest left-lateral displacement along this Upper Baram Line.
- (F) The West Baram Line forms the SW end of the NW Borneo-Palawan Trench and is a major facies boundary, trending toward NW from the shoreline just west of Miri.



CRUSTAL GROWTH of BORNEO

Figure 1. Crustal accretion of Borneo onto the pre-Upper Cretaceous crystalline core of West Kalimantan and western-most Sarawak. Regional NW-WNW lineaments: A. Lupar Suture; B. Tatau Horst and Graben; C. West Balingian or SW Luconia-Mukah Line; D. Tinjar Line; E. Upper Baram Line; F. West Baram Line; G. Kinabalu Fault; H. Balabac fault.

The Tinjar Line has often been considered as its onshore extension although a lateral gap of about 40 km exists between the two lineaments (Fig. 1). The Upper Baram Line, whose existence is for the first time proposed in this note, lies in a straight-line continuation of the West Baram Line (Fig. 1) and is a likely candidate. However, their lateral displacement sense are opposed. The West Baram-Upper Baram lineament separates arenaceous Nyalau beds on its SW side while Setap Shale occurs on its NE side. Right-lateral wrenching has also been interpreted for the West Baram Line in addition to general downthrowing toward northeast (James, 1984).

- (G) Tokuyama and Yoshida (1974) and Lee (1979) interpreted from satellite images a trans-Sabah, NW-striking strike-slip fault. Regional radar images of Sabah show about half a dozen, long WNW-trending lineaments (Fig. 2). One particular WNW lineament is traceable, with offsets by other, mainly N to NNW-trending lineaments, from Semporna to the west coast near Tuaran. The lineament is named as the Kinabalu lineament. Another major WNW lineament runs about 250 km from Teluk Brunei via Sapulut to the Sabah-Kalimantan border in the vicinity of Silimponon. Indistinct fold-strike deviations near the WNW lineaments suggest left-lateral slip.
- (H) The Balabac fault was interpreted by Brondijk (1964) on the basis of a linear magnetic anomaly trending NW offshore northern Sabah between Banggi-Balambangan islands and the Philippine island of Balabac. A wide zone of *mélange* consisting of chert, fine-grained deep-sea clastics associated with spilite and mafic-ultramafic rocks (so called Chert-Spilite stratigraphic unit in Sabah) appears sinistrally offset by the Balabac fault (or Sabah Shear in publications related to the petroleum industry) over a distance of about 50 km (Fig. 2).

Schlueter *et al.* (1996) compiled results of their extensive investigations in this region and those produced by the Ocean Drilling Program into a tectono-stratigraphic terrane

map (Fig. 2). About ten major NW to NNW-striking wrench-fault zones extend a hundred or more kilometres across the interpreted continental margin — collisional fold belt assemblage forming the upper crustal interval in the southeastern South China Sea. The longest wrench fault, the Ulugan Fault that divides Palawan island into two, is about 250 km long and extends into the Sulu Sea ocean crust. Its Sulu-Sea segment suggests at least 50-km left-lateral offset of magnetic anomalies (Early Miocene and older). These wrench faults do not extend into the oceanic crust of the South China Sea Basin, where fracture zones trend north-south. Schlueter *et al.* (p. 61) note that left as well as right-lateral offsets are displayed by these wrench faults. Figure 2 shows that the WNW Sabah lineaments and the NW-NNW “Palawan” lineaments differ in orientation by 15 to 30 degrees. The “Palawan” lineaments are mainly perpendicular to the NW Sabah-Palawan Trough. The WNW-striking Sabah lineaments may represent secondary fractures (mega-Riedel fractures) produced by left-lateral slip on the NW to NNW “Palawan” wrench faults.

In continental Southeast Asia, regional NW faults are the Red River Suture (between the South China block and Indochina block), the Mae Ping (or Tonle Sap, or Wang Chao) fault zone, and the Three Pagodas fault zone (Fig. 3). These regional faults are believed to have facilitated extrusion of continental Southeast Asia resulting from the collision of the Indian subplate with the Eurasian plate (Tapponnier *et al.*, 1982). It has now been demonstrated that lateral displacements along these fault zones took place differentially; displacement sense reversed during their Tertiary evolution (Tjia and Liew, 1996). In their general SE-ward extrusion, the fault-bounded crustal slabs proceeded at different rates, especially after rearrangements of plate motions in the Upper Eocene to Oligocene and Lower–Middle Miocene.

This note is written to highlight the occurrence of NW-WNW regional lineaments in the SE Asian part of the South China Sea and to interest fellow geologists in seeking explanations about their significance.

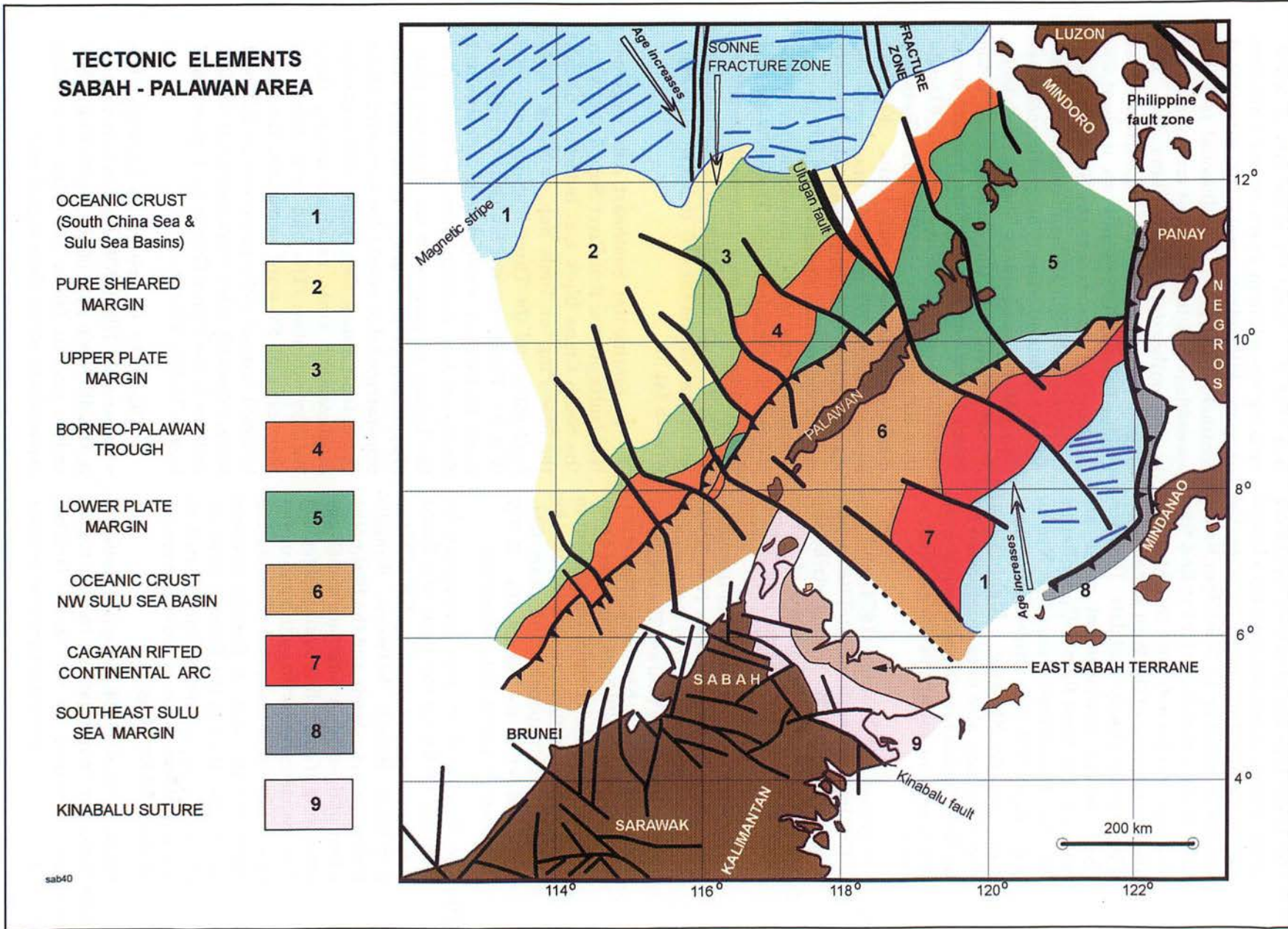


Figure 2. Tectonic terranes of Sabah-Palawan area. The offshore portion is simplified from Schlueter *et al.* (1996) with some additions; the Sabah portion is based on interpretation of radar images and various reports by the Geological Survey of Malaysia.

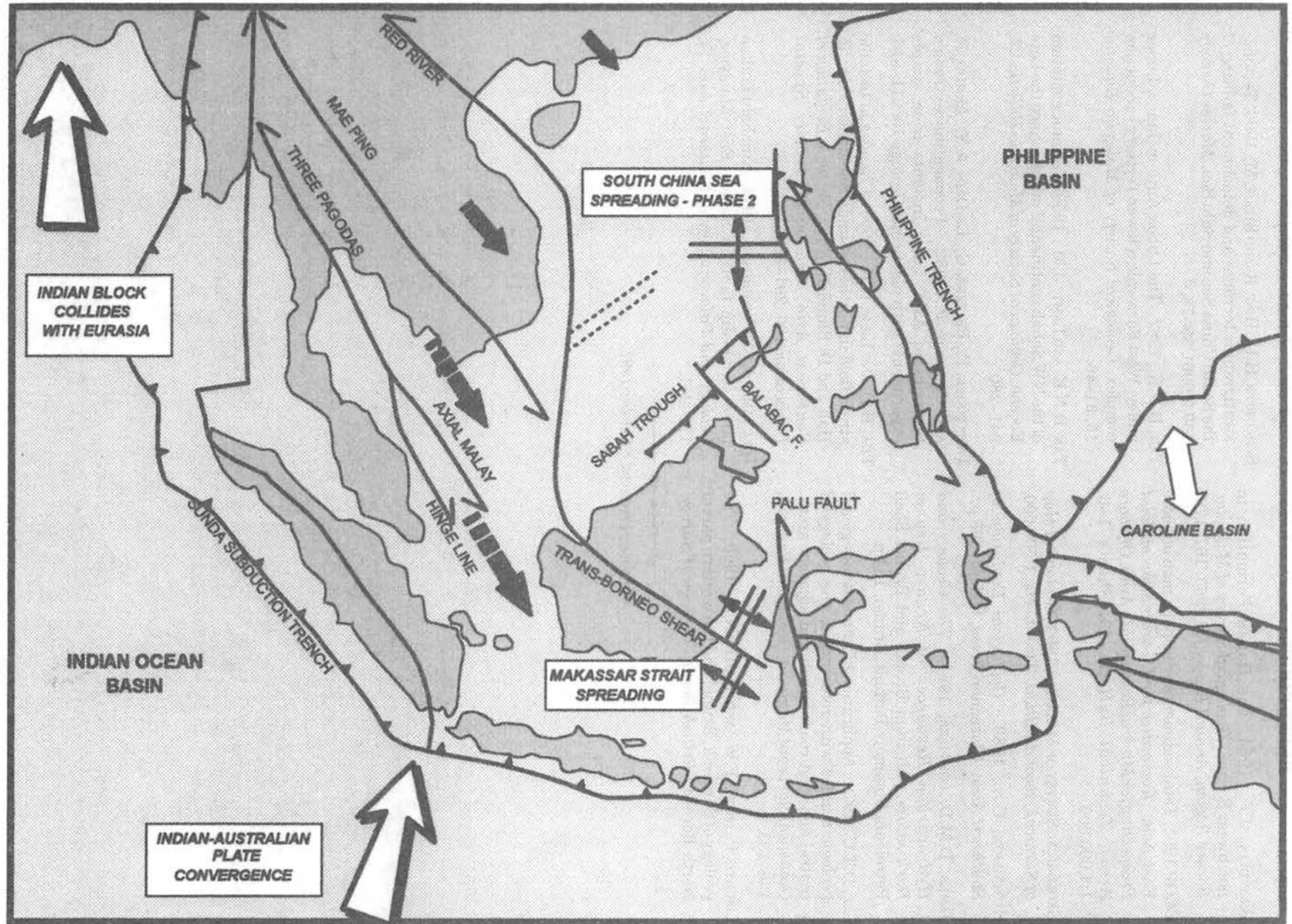


Figure 3. Major faults in Southeast Asia. During the Tertiary tectonic evolution, lateral displacements reversed on some of the faults.

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Manuscript received 6 October 1997

PERTEMUAN PERSATUAN Meetings of the Society

Ceramah Teknik (Technical Talk)

Marine debris — A global problem: pelagic plastics, pollution and environmental impacts, biogeographic and other implications

MURRAY R. GREGORY

Laporan (Report)

Dr. Murray R. Gregory, who is an Associate Professor of Geology, at the Faculty of Science, University of Auckland, New Zealand, gave the above talk to about 30 participants on 8 September 1997 at the Geology Department, University of Malaya at 5.00 pm.

Dr. Gregory who considers himself a traditional sedimentologist has research interests in organism-sediment-substrate relationships and trace fossils and have lately been involved in multi- and inter-disciplinary environmental programmes.

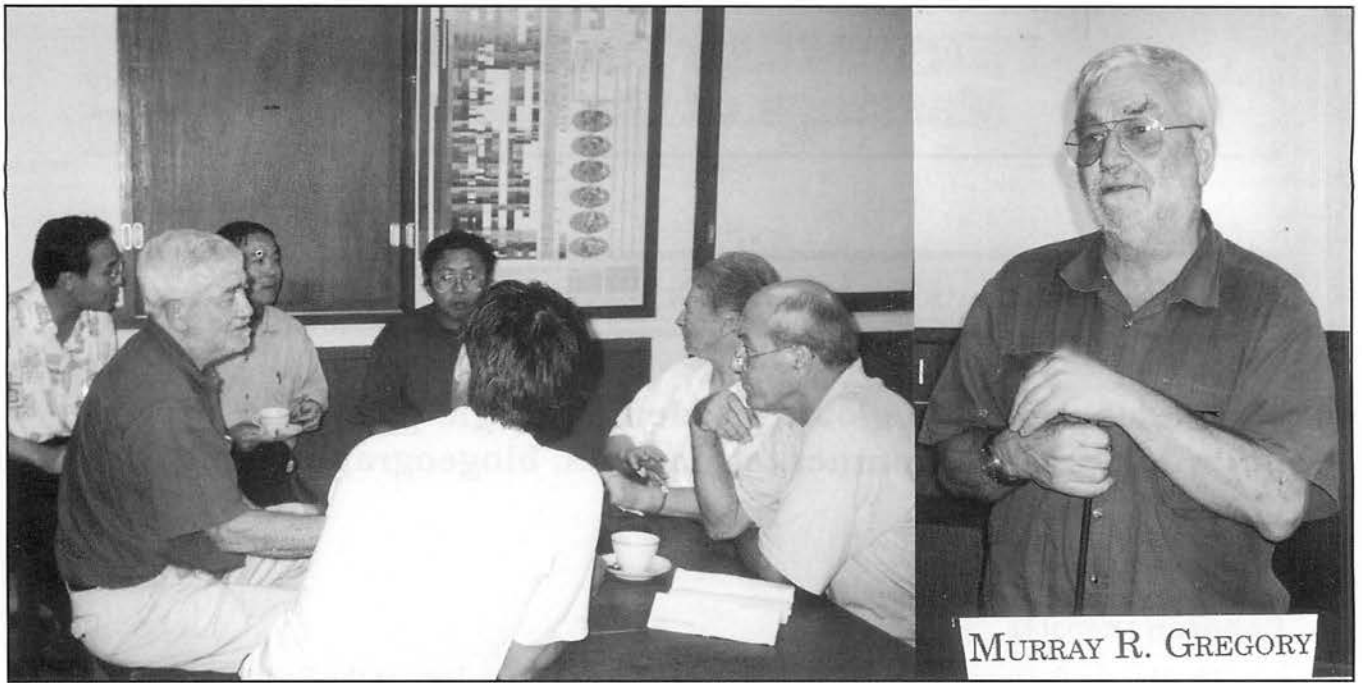
Abstrak (Abstract)

Plastic litter and debris of all kinds is conspicuous on shorelines around the world. It is most frequently encountered near metropolitan centres but is also to be seen on remote and even unpopulated islands. Pollution by plastics is aesthetically distasteful and also creates a number of environmental problems that have become global in magnitude. These include entanglement and death of marine wild life, blockages to the intestinal tract through ingestion reducing quality of life and perhaps reproductive performance. Larger items may hazard shipping and there is a growing awareness that litter stranded on beaches may be detrimental to tourism. An encrusting pseudoplanktic biota has been recognised on drift plastics. This material could be a vector for the local, regional and trans-oceanic dispersal of aggressive alien taxa which could endanger the biota of sensitive island ecosystems.

There is need to educate the public about the environmental problems arising from the indiscriminate disposal of plastics into the oceans and seas of the world. Alleviation of some of the problems may come from Annex V of MARPOL and the London Dumping Convention but the real solutions will lie in changing long ingrained habits.

G.H. Teh

GSM



Technical Talks by Prof. Dr. Gero Hillmer

Laporan (Report)

Prof. Dr. Gero Hillmer is from the Institute of Geology and Paleontology, University of Hamburg, Germany and is presently Visiting Research Associate to the Institute of Postgraduate Studies and Research (IPSR), University of Malaya until the middle of October 1997.

We are indeed fortunate to have Prof. Hillmer impart his knowledge to members and students of local universities in the form of 5 talks listed below:

1. A method of conserving geological, paleontological and archeological objects and profiles (with Poster) (*17 September 1997*)
2. The famous paleontological locality Messel, Germany — An insight into the history of life (Tertiary/Eocene; ca. 55 million years) (*18 September 1997*)
3. An introduction to Bryozoans and Bryozoans in glacial erratic boulders (ice-age impressions) (with Poster) (*23 September 1997*)
4. Amber from the Miocene of Borneo (with Poster) (*7 October 1997*)
5. Tidal flats of the German bay, North Sea — some impressions (*13 October 1997*)

All the talks were well received. Prof. Hillmer has set a new record for the most technical talks to date by a single speaker. The last record was also held by a German, Prof. G.H. Moh.

Besides the talks, Prof. Hillmer also had posters for 3 of his talks and these really helped in disseminating the information.

At the end of his first talk on the method of conserving geological, paleontological and archeological objects and profiles, he presented the Society and the Geology Department with 2 framed profiles made following the method. We are indeed grateful to Dr. Hillmer for his kind gesture.

G.H. Teh

A method of conserving geological, paleontological and archeological objects and profiles

The so called lacquer-film sedimentary peel method, since a long time employed by earth scientists, is discussed in terms of its unique potential usefulness to geologists, paleontologists, archaeologists and soil scientists in expanding and documenting the range of observable data within deposits. The result is an innate image of geological fabrics and colouring of the deposits. Cellulose nitrate is the basic component of the durable, waterproof, non-thermoplastic earth-section peels collected in the field for preservation and study under controlled laboratory conditions.

The famous paleontological locality Messel, Germany — An insight into the history of life (Tertiary/Eocene; ca. 55 million years)

An introduction to the Eocene oil shales of Messel, near Frankfurt (Germany) was given. This locality gives a remarkable unusually complete and detailed picture of life some fifty million years ago. The animals and plants represent a complete ecosystem, in an exceptional state of preservation. Not only the skeletons and other hard parts of the organisms are preserved but also the soft tissues and stomach contents. These are both animals and plants: insects, fish, amphibians, tortoises, turtles, crocodiles, lizards, birds, marsupials, insectivores, bats, anteaters, rodents, ungulates, and primates; ferns, conifers, and palms. All these fossils were illustrated by slides and their ecology and biogeography and evolutionary significance were discussed.

An introduction to Bryozoans and Bryozoans in glacial erratic boulders (ice-age impressions)

A general introduction to the phylum Bryozoa, a definition, the relationships with other phyla and an outline of the classification was given.

Glacial erratic boulders of Middle and Late Ordovician age found at different localities on the coast of the North Sea and Baltic Sea of Northern Germany and Sweden contain abundant bryozoan faunas which were extracted by a special method. Excellent preserved bryozoans from different orders show very delicate structures. Much of the material represents new species and new genera. The Bryozoan Fauna shows a very close relationship to the middle and late Ordovician Bryozoans from north America.

Amber from the Miocene of Borneo

A first time occurrence of amber in a Tertiary lignite-bed in the coal mines of Merit-Pila (Lower to Middle Miocene) was described from Borneo/Sarawak. It is prominent by its dimensions, the special kind of bedding and the unusual nature of the resin producing flora. The search for inclusions has already led to the description of the first amber fossils of this region of the world, mainly insects, millipedes and arachnoids. According to preliminary palynological and chemical analyses the main resin producing plants belong to the group of Dipterocarpaceae.

Tidal flats of the German bay, North Sea — some impressions

The talk will focus on the present day tidal flats of north Germany. Various sedimentary responses to the present day tidal regime were observed. These include both the physical structures, their directional relationships with the changing flow pattern and directions of the currents as well as the biological activities and their traces in the sediments.

Next a Jurassic sequence in Central interior of Germany will be discussed. In the more shaly sequence, thick packages of sandbeds exhibit similar sedimentological and paleontological features to the modern tidal flat deposit. Similarities are drawn and by applying the dictum of "the Present is the Key to the Past", it can be concluded that part of the Jurassic sequence was deposited under similar conditions as the present day tidal flat environment.

Technical Talks by Prof. Dr. Gero Hillmer



Captions to photos

- | | | | |
|------|---|----|---|
| 1-2. | The participants at one of the talks. | 5. | Prof. Hilmer presenting a masterpiece to C.P. Lee for the Society and Department. |
| 3. | Prof. Hilmer showing a product of the lacquer-film technique. | 6. | Interesting discussions on the poster display. |
| 4. | A group photo of the enthusiastic participants. | | |

BERITA-BERITA PERSATUAN

News of the Society

KEAHLIAN (Membership)

The following applications for membership were approved:

Full Members

- | | |
|--|--|
| <p>1. Mohd Johary Kamaruddin
2-12, Wisma Ranhill, Jalan Setiawangsa
10, Taman Setia Wangsa, 54200 Kuala Lumpur.</p> <p>2. Saim Suratman
Jabatan Penyiasatan Kajibumi Malaysia,
P.O. Box 11110, 50736 Kuala Lumpur.</p> | <p>3. Ted G. Zacharakis
Murphy Exploration & Production Co., 131
S. Robertson St., New Orleans, LA 70161-
1780, USA.</p> |
|--|--|

Student Members

- | | |
|---|--|
| <p>1. Mohd Yuzlan Yusoff
Jabatan Geologi, Universiti Malaya, 50603
Kuala Lumpur.</p> <p>2. Tang Woei Jye
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>3. Tham Choong Min
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>4. Wan Chee Kheong
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>5. Wan Nor Akmal Wan Sulaiman
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>6. Yan Wai Hong
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>7. Yang Yong Chai
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> | <p>8. Yee Guan Cheng
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>9. Ker Leon Kok
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>10. Shutesh A/L Krishnan
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>11. Lee Eng Hou
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>12. Liew Kiat Shing
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>13. Lim Bee Jik
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> <p>14. Murugesan Rajasegaran A/L Saminathan
School of Physics, Universiti Sains
Malaysia, Pulau Pinang.</p> |
|---|--|

PETUKARAN ALAMAT (Change of Address)

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

- | | |
|---|---|
| <p>1. Ismail Che Mat Zin
Dept. of Earth Science & Environmental Studies, Institute of Technology Petronas Sdn. Bhd., Bandar Seri Iskandar, 31750 Tronoh, Perak.</p> <p>2. Teoh Lay Hock
Megamin Ventures Sdn. Bhd., 3 Jalan Lasam, 30450 Ipoh.</p> <p>3. Karl Hiller
Thönser Str. 5A, 30938 Burgwedel, Germany.</p> <p>4. Liew Kit Kong
8-10-7 Prisma Cheras Condo, Jalan Midah 8A, Tmn. Midah, 56000 Kuala Lumpur.</p> | <p>5. Helmut W. Ziemand
P.O. Box 665, Hanna, Wyoming 82327, U.S.A.</p> <p>6. Jamain Bojei
14 Jalan Saga, Taman Kebun Teh, 80250 J.B.</p> <p>7. James Bujang Sabah
Ekran Berhad, Wisma Ting Pek Khiing, No. 1, Jalan Padungan, 93100 Kuching.</p> <p>8. Bang Tien Hai
ADV Geophysical Services, 25 Jalan Bukit Permai, Taman Bukit Permai, Cheras, 56100 Kuala Lumpur.</p> |
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PERTAMBAHAN BAHARU PERPUSTAKAAN (New Library Additions)

The Society has received the following publications:

- | | |
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| <p>1. AAPG Bulletin, vol. 81/7 & 81/8, 1997.</p> <p>2. Centres de Recherches Exploration-Production Bulletin, vol. 20, no. 2, 1996.</p> <p>3. AAPG Explorer, July, Aug, Oct, Nov 1997.</p> <p>4. American Museum Novitates, no. 3204, 1997.</p> <p>5. Tin International, vol. 70, nos. 7/8 & 9/10, 1997.</p> | <p>6. Memoirs of the Geological Survey of Belgium, no. 42, 1997.</p> <p>7. American Museum Novitates, nos. 3205, 3203, 3201, 1997.</p> <p>8. Episodes, vol. 20, nos. 1 & 2, 1997.</p> <p>9. Inverell metallogenic map 1:250,000, 1997.</p> <p>10. Booligal geological sheet 1:250,000, 1997.</p> <p>11. SOPAC News, vol. 14, nos. 1, 2 & 3, 1997.</p> |
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BERITA-BERITA LAIN Other News

Local News

Government to delay several mega projects

Datuk Seri Dr. Mahathir Mohamad said the Government will have to delay several mega projects to relieve pressure on the depreciated ringgit and reduce the country's current account deficit.

The Prime Minister said among the projects that would be affected would be the RM13.6 bil Bakun hydroelectric dam while the North Regional International Airport in Kedah and the Kuala Lumpur Linear City project may also

be slowed down.

"The KL International Airport will not be delayed. It will be on time but some of the projects which had been launched lately will take a little bit longer because when you stretch the time, the amount of money you spend is much less," he told reporters after chairing the Umno supreme council meeting here last night.

Dr. Mahathir stressed that the Bakun dam would not be scrapped but delayed.

Star, 5.9.1997

Eye on non-mineral water production

The Health Ministry is moving towards regulating the free-flowing bottled drinking non-mineral water production, many of which are found to be backyard operations.

It is learnt that the Ministry is drafting legislation towards this end like that imposed on mineral water production.

A spokesman said checks with local authorities revealed many producers are backyard operations. He said their filtration methods are also suspect.

"In view of this, we will be taking over and may issue licences to the producers so that we can monitor their production," he said.

On reversed osmosis water production, he said the producers will be required to change the name to 'packed drinking water'

"No matter what you call them, they are filtered tap water and should not be named other than packed drinking water," he said.

He said some of the fancy names being used are 'mineral enriched drinking water' and 'super natural water'.

"How super can normal drinking water be? The public should not fall prey to such tactics," he said.

A reversed osmosis water producer recently appealed to the Ministry to allow those having proper equipment to retain the name.

Bigcorp-A Bhd. group managing director M.A. Vijey said the authorities should also study the reversed osmosis system so that manufacturers using it could have their water differentiated from other bottled drinking water.

He was responding to a *Sunday Mail* front-page report on Aug 24 in which a Ministry official had said that all drinking water bottlers must use the word 'packed drinking water' on their labels.

The Ministry issues operating licences and makes regular checks on mineral water producers who are required to pay a one-off fee of RM6,000 for every source of water.

As for producers of mineral water, the water must be sourced below at least 100 metres in the ground and must be located away from any

factory.

State health departments conduct regular checks, as frequent as once a month, on the water at source to ensure that is not

contaminated.

Any contamination means the factory will be closed immediately.

Malay Mail, 15.9.1997

Petronas raises oil production to help boost foreign earnings

Petroleum Nasional Bhd. (Petronas) has raised its oil production by 20,000 barrels per day (bpd) to 650,000 bpd to boost foreign earnings.

The national oil company's president and chief executive officer, Tan Sri Mohamad Hassan Marican, said further increases were being planned in the wake of a directive from Prime Minister Datuk Seri Dr. Mahathir Mohamad to raise production to boost foreign earnings and help stabilise the ringgit.

"We have the capacity to increase production but there are issues like price and markets to be looked into," Hassan added.

Speaking to reporters after opening the fall 1997 conference of the Association of International Petroleum Negotiators in Kuala Lumpur yesterday, he said Petronas was also actively negotiating with refineries to increase their output so that more oil could be produced.

"Crude runs are planned by refineries which plan their schedules three months ahead," he said.

Petronas also produces four billion standard cubic feet of gas daily.

Hassan said the depreciation of the ringgit against the US dollar had led to cost increases for its east coast petrochemical corridor project. The project was, however, proceeding as planned as it would benefit the nation in the long run.

"Implementation of the project is in progress and has attracted a lot of foreign investments."

"These investments will generate export earnings and reduce imports of raw materials,"

Hassan said.

He added that Petronas would look into using more local elements and materials to reduce the overall cost of the petrochemical corridor.

On the company's acquisition of a 29.3% stake in Malaysian International Shipping Corp. Bhd. (MISC), Hassan said the move was in part to rationalise the transport of liquefied natural gas (LNG).

He noted that MISC had five LNG tankers and said these could be better utilised together with another five LNG tankers operated by Petronas on charter.

He did not disclose the amount Petronas paid for the MISC stake.

In his speech earlier, Hassan said there was a need for production sharing contracts to be structured and reviewed according to changes in the petroleum industry.

"The changing environment poses new challenges to host nations in attracting investors visa-vis new low oil prices, rising costs and maturing acreages," he said.

Hassan added that to encourage further investments in the region's relatively mature acreages, the Government had to understand the oil companies' concern for their bottom line.

"The degree of flexibility is, however, dependent on various factors, including the importance of the industry to the nation, its stage of economic development as well as technology," he said.

Star, 16.9.1997

Ten gas fields found in Malaysia-Thailand area

Ten gas fields have been discovered in the Malaysia-Thailand Joint Development Area (JDA) after the drilling of 20 exploration wells, Malaysia Thailand Joint Authority (MTJA)

deputy chief executive officer Dr. Songpope Polachan said.

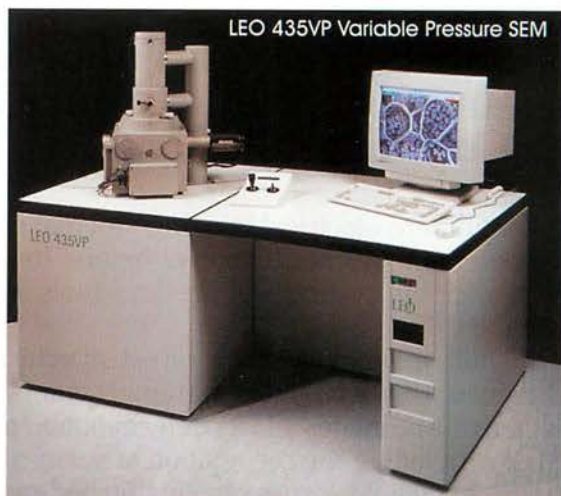
The new fields are Cakerawala, Suriya, Bumi, Bumi East and Senja fields in Block A-18,

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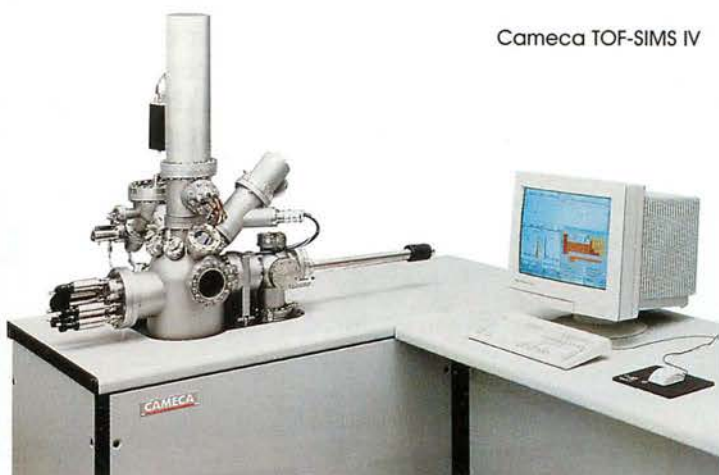
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● Transmission Electron Microscopy (TEM)

● Electron Probe Microanalysis (EPMA)

● Infrared Microscopy

● X-Ray Microanalysis System (EDX, WDX)

● Vacuum Technology (Pumps, Leak Detectors, Components)

● XYZ Measurement Microscopy

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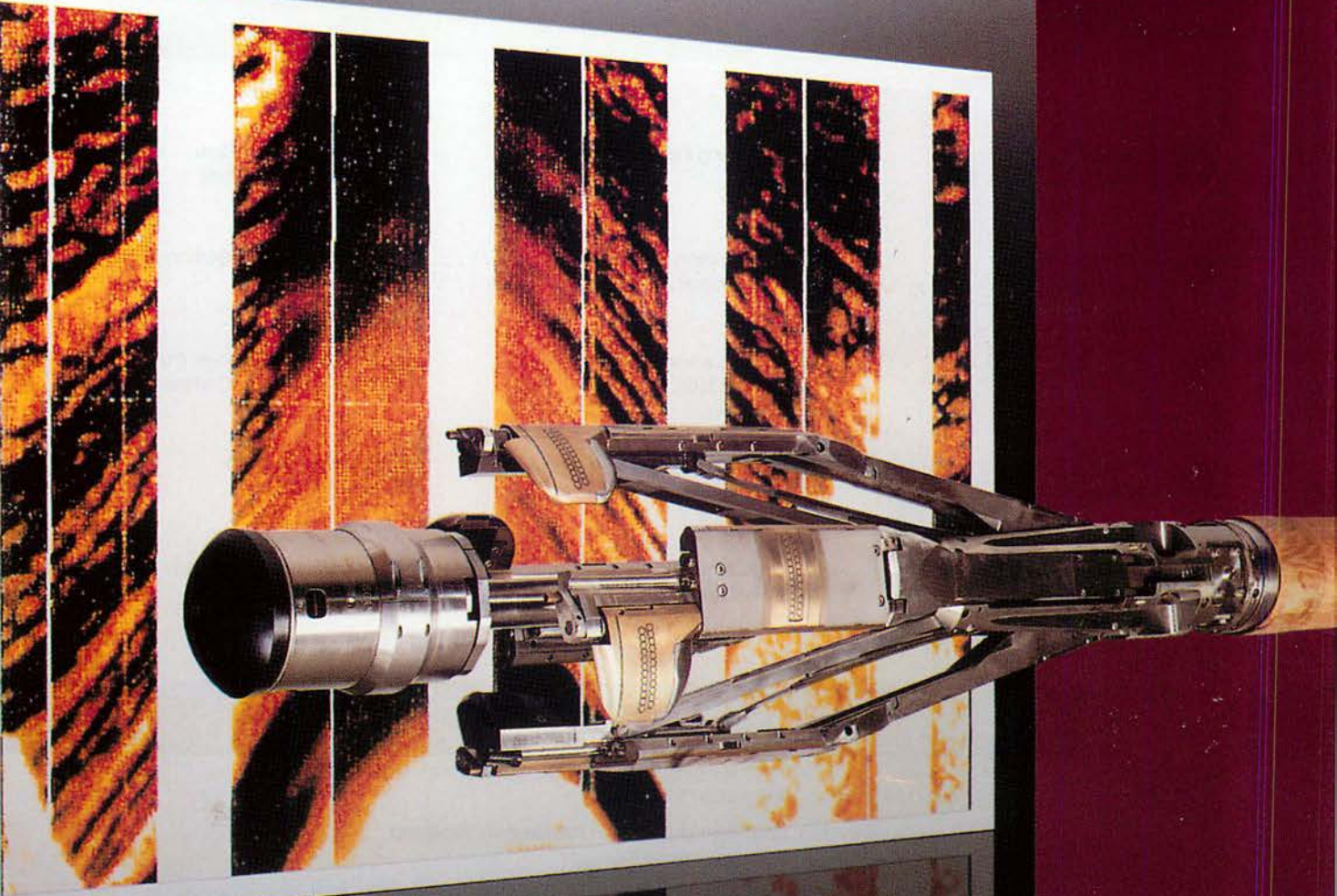
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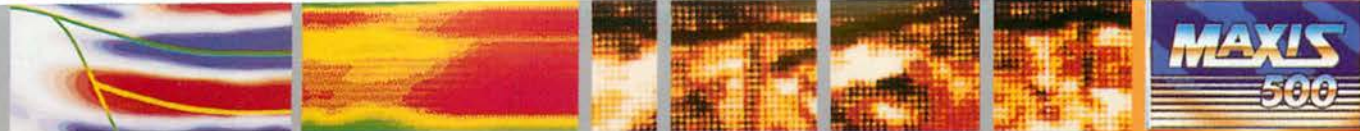
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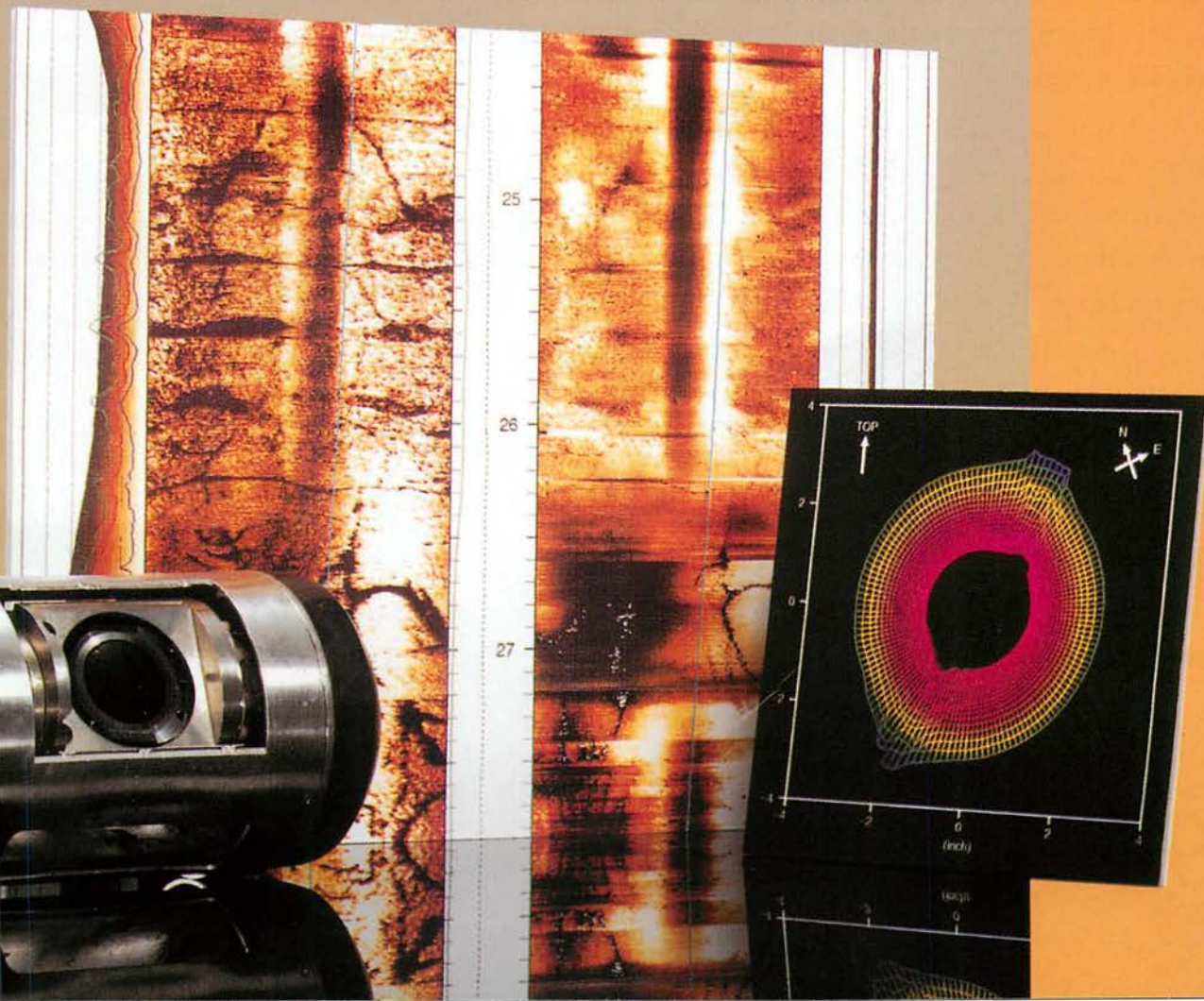
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ANNOUNCEMENT

Ninth Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia

Kuala Lumpur, Malaysia • 17–19 August 1998

The Geological Society of Malaysia is organising the GEOSEA '98 in Kuala Lumpur from 17 to 19 August 1998. The GEOSEA Congress is held triennially in Southeast Asia and it offers an excellent opportunity to exchange scientific and technical information and advancement in geology, mineral and energy resources among geoscientists from within and outside the region. The GEOSEA Congress is a premier geoscientific event in the region and has been well attended by the geoscientific community world-wide.

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Look out for the First Circular
due to be out in January 1997

and the Muda, Tapi, Jengka and Amarit fields in Blocks B-17 and C-19.

Exploration work on the JDA has revealed reserves of more than 10 trillion standard cubic feet of gas in both contract areas of the JDA.

In a paper presented at the Association of International Petroleum Negotiators 1997 Fall Conference in Kuala Lumpur yesterday, Polachan said the contractors of Block A-18 had

submitted a plan to develop the Cakerawala gas field and targeted production in the year 2000.

"MTJA and the contractors have initiated gas sale marketing discussions with potential buyers," he added.

The Petroleum Authority of Thailand and Petronas have signed a memorandum of intent to jointly buy the gas from JDA.

Star, 16.9.1997

Three new cement plants next year

Malaysia's production of grey portland cement is expected to exceed demand by 2.34 million tonnes next year when three new projects are operational.

These projects are undertaken by Hume Precast Concrete (Perak), Negeri Sembilan Cement Industries and Hongkew Holdings (Kelantan).

Malaysian Industrial Development Authority (Mida) mineral and paper industries division director Mardziah Abdul Aziz said four other companies — Straits Cement (Perlis), Bintang Tower (Pahang), Nusantara Cement and Kiara Permai (Kelantan) — would begin commercial production by 1999.

"By the year 2000, a total of 29.88 million tonnes cement (against local demand of 23.05 million tonnes) will be produced yearly," she said in a paper on *Specific opportunities for investment in non-metallic mineral products* presented during a domestic investment seminar in Kuching yesterday.

The projected excess in local cement supply for 1999 is 7.76 million tonnes.

She said local production was about 14.7 million tonnes against demand of 17.01 million tonnes this year, giving a shortfall of 2.31 million tonnes.

There was a shortfall of 2.48 million tonnes last year.

Mardziah said there were currently nine grey portland cement plants in the country, five of which are operating as integrated projects, producing both clinker and cement.

The five are Associated Pan Malaysia Cement, Tasek Cement, Cement Industries of Malaysia, Kedah Cement and Perak-Hanjoong Simen.

The other four companies — Cement

Manufacturers Sarawak, Cement Industries (Sabah), Tenggara Cement Manufacturing and Kedah Cement — are only grinding local and imported clinker into cement.

She said last year's production of cement totalled 12.75 million tonnes while the clinker production capacity was 9.29 million tonnes.

The country imported 2.35 million tonnes cement worth RM425 mil mostly from China, Japan and Taiwan and 2.55 million tonnes of clinker worth RM325.7 mil last year.

Mardziah said Rock Chemical Industries was the sole company manufacturing white portland cement with an annual capacity of 68,000 tonnes.

On concrete products, she said from 1990–1996, 73 companies were licensed to manufacture various types of cement and concrete products — 43 are operational.

"Local companies have been able to meet demand from the rapid growth in the construction sector."

"Manufacturers may identify project opportunities in manufacturing new products, such as lightweight concrete blocks, panels and structural products," she added.

She said about 300 brick factories were operational, with the modern ones using the tunnel kilns for the firing process and producing more quality products, like facing bricks, clay blocks and pavers.

Malaysia exported RM80.2 million worth of ceramic tableware, kitchenware and other ceramic household and toilet articles to the US, Britain, Japan and Canada last year, she said.

It exported RM147.4 million worth of tiles to Asean countries and RM62.8 million of sanitaryware primarily to Singapore, Japan and Hong Kong.

Last year's exports of glassware products totalled RM157 million.

On the other hand, the country imported

RM56 million worth of polished granite and marble tiles and slabs in 1996 while export value for similar products was barely RM13.3 million.

Star, 17.9.1997

Kedah coastal EIA ready in October

The macro Environmental Impact Assessment (EIA) report on Kedah's RM30 bil coastal land reclamation project will be completed in the first week of October.

National Hydraulics Research Institute of Malaysia (Nahrim), which began the task in July, had expected the report to be ready this month.

Its director-general Prof. Abdul Aziz Ibrahim said the report took into account details of the proposed reclamation of the 110 km coastal stretch spreading 10 km towards the sea.

"Since this is a big project, it needs careful examination of the working elements," he said in an interview here on Saturday.

Nahrim had deployed hydrographics teams at several strategic sites along the coast.

Nahrim also sent officers to study socio-economic problems, marine life and mangrove swamps, he said.

Prof. Aziz said the report would be forwarded to the state government for public scrutiny and as "term of reference".

Nahrim was engaged by the state to conduct the report after the state had approved the start of reclamation works on the first three packages.

One of the packages involves the location for the Northern Region International Airport which has been put on hold.

Star, 22.9.1997

Work goes on for highland's other road

The Federal Government's decision to delay several road projects will not affect the RM282 mil plan to link Pos Slim and Kampung Raja in Cameron Highlands.

State Infrastructure and Public Utilities committee chairman Datuk Ong Ka Chuan said there was an urgency to complete the project which was the only alternative road to the highlands.

"The road, to be completed by 2000, will make travelling safer and reduce the incidence of landslips," he told reporters after launching a basketball competition yesterday.

He was commenting on a statement by Works Minister Datuk Seri S. Samy Vellu that all proposed road projects should be put on hold to ease the burden on the economy.

Ong said work on the road had begun and once it was completed, motorists would take an

hour to reach the highlands.

The first phase linking Simpang Pulai near here and Pos Slim, an orang asli settlement, was completed a few years ago.

Ong, however, said two privatised expressway projects approved by the Government might be shelved.

He said they were the RM600 mil 70 km Simpang Pulai-Lumut highway and the RM1 bil 240 km coastal highway from Banting, Selangor to Taiping, Perak.

"If there is a directive to defer the projects, we will do so," he said.

Ong said apart from the Pos Slim-Cameron Highlands project the RM300 mil Kuala Kangsar-Grik highway and the RM80 mil for road maintenance in the rural areas would proceed.

Star, 22.9.1997

Petronas buys stake in Myanmar gas project

Petroleum Nasional Bhd. (Petronas) has formalised several agreements with British-based Premier Oil Plc to pave the way for its participation in Myanmar's Yetagun gas project and further collaborations in other upstream and downstream activities in that country.

The national oil company announced in a statement yesterday that its wholly-owned subsidiary, Petronas Carigali Sdn. Bhd., had signed conditional agreements with Premier Petroleum Myanmar Ltd. to acquire 36.6% interest in the Yetagun project comprising Blocks M-12, M-13 and M-14 as well as an associated pipeline which would deliver the gas to Thailand.

The pipeline is owned and operated by Tenanthayi Pipeline Company LLC.

The statement said Petronas Carigali would also take up 42.4% interest in Block M-10, an exploration block with promising geological prospects, from Premier Oil's wholly-owned subsidiary, Premier Petroleum Myanmar.

Under its agreement with Petronas, Premier Petroleum would acquire Texaco Inc's entire interest in the Yetagun gas project and Block M-10, as well as assume operational of the project.

Petronas said Premier Petroleum would in turn offer to Petronas Carigali 36.4% in the Yetagun project and 42.4% in Block M-10 that would be acquired from Texaco.

The interests of other consortium members — Nippon Oil Exploration (Myanmar) Ltd. and PTTEP International Ltd. in the Yetagun gas project, and Nippon Oil and Amerada Hess (Martaban) Ltd. in Block M-10 — remain unchanged.

Discovered in 1991, the Yetagun gas fields in the Gulf of Martaban have current and probable reserves of 1.8 trillion cu ft of gas and 46 million barrels of condensate.

Production, at an initial rate of 200 million std cu ft per day, is scheduled to start in late 1999.

Star, 23.9.1997

Builders agree to conduct joint EIA study

Twelve developers with various projects in Hulu Kelang have agreed to conduct a single collective environmental impact assessment (EIA) study covering all the projects.

State executive councillor (Science, Technology, Environment) Ch'ng Toh Eng said the companies had agreed to conduct this because their projects were situated in "environmentally sensitive" terrain of Hulu Kelang.

Speaking to reporters after chairing a meeting involving the developers, the DOE and the local authority, Ch'ng said under the Environmental Quality Act 1974, companies with projects below 50 hectares of land need not prepare an EIA report.

"But in view of fragile and environmentally sensitive area in Hulu Kelang area, the EIA study is needed, regardless of whether the project is big or small."

"The cost of undertaking the study and preparing the report will be borne by these developers who will pay according to the size of their projects," he added.

The developers involved in the collective study (called a Makro EIA) include Ikatana Rapi Sdn. Bhd., Brem Holdings, PKNS, Weldra Sdn. Bhd. and Metacorp.

The total area of land involved in the Makro EIA study is 648 hectares (1,600 acres). The study is expected to be completed in eight months.

Star, 24.9.1997

Rain in Sabah found to have high acid content

Rain in the State capital, Tuaran and Penampang yesterday evening and last night has been found to be high in acid content.

Samples of rain collected last night showed a pH of 3.85 compared to pH 5.2 before the State was enveloped by the haze.

Universiti Malaysia Sabah School of Science and Technology lecturer, Associate Professor Dr. Marcus Jopony, said acid in rain could affect the health of people exposed to the rain.

"Early studies indicate that yesterday's rain contained high levels of organic acid caused by bio-mass burning, which can be found in haze," he told reporters at the Tuaran Road UMS campus, about 20 kilometres from here.

He said acidic rain could affect the health of rural folk who depended on rain for their water supply.

Jopony said acidic water could also bring about a negative effect on those who had sensitive skin.

"However, the inhaling of dangerous gases from water particles after rain stops is more hazardous to health," he said.

Jopony added that the acidic rain problem in the State was probably not serious because it

was produced by bio-mass burning alone.

"It is more dangerous in the industrial areas in the peninsula and safety measures should be taken."

"A mixture of haze particles which contain organic acid from forest fires in Indonesia and toxic gases from industrial areas could effect health in the long run," he said.

Jopony was responding to Sarawak Health department director Dr. Mohd Taha Arif's call warning residents to stay indoors in case of rain.

Jopony said Kota Kinabalu and Tuaran recorded a high particulate matter level on Tuesday.

"But heavy rains yesterday and last night have helped reduce particulate matter in the air and visibility now is better," he said.

Meanwhile, the Air Pollutant Index here decreased from 109 at 6 am to 82 at noon today.

NST, 26.9.1997

US-based oil firm looking for right project

US-based Unocal Corporation, the world's largest independent oil exploration and project development company, will not hesitate to invest in Malaysia if it manages to secure a suitable project locally, said its chairman and chief executive officer Roger Beach.

"We have been in this region the past 30 years and are a big investor in Thailand, Indonesia and Philippines."

"We have always been looking at investing in Malaysia but have not found a project yet. We will be happy to do so if the right project came along," Beach told reporters in Kuala Lumpur yesterday after paying a courtesy call on Deputy Prime Minister Datuk Seri Anwar Ibrahim.

Beach and other directors of Unocal were en

route to Jakarta for a board meeting.

Unocal has invested a total of US\$3 bil (RM9.39 bil) in Thailand over the past 16 years and US\$2 bil in Indonesia over the past 20 years.

Even though Unocal has yet to invest in Malaysia, it has teamed up with national oil company Petronas and another local company to bid for projects outside the country.

"We are happy to partner these companies for projects outside Malaysia, especially in Bangladesh, Pakistan and Khazakistan. We are looking into some drilling work for an exploration concession in Pakistan," he said.

"Our strategic direction for the corporation is to grow in South-East Asia and Central Asia," Beach said.

Star, 27.9.1997

Dam to end salty water woes

Salty drinking water will be a thing of the past when a rock-filled dam being built across the Sarawak Kiri river is completed.

The temporary RM800,000 dam, at the intake point of Batu Kitang reservoir, is expected to be ready in the next few days with more than

30 trucks, seven bulldozers and excavators working round the clock to finish the project.

Yesterday, Deputy Prime Minister Datuk Seri Anwar Ibrahim visited two of the villages on both sides of the river where the temporary dam is being built.

Some 400,000 households in the city have been receiving salty tap water because of the haze, and the prolonged dry spell reduced the level of Sarawak River, allowing seawater to flow upstream to the intake point.

Ninety-five per cent of Kuching's water supply is from the Batu Kitang reservoir while the remainder is from the Matang reservoir.

Deputy chief ministers Datuk George Chan and Tan Sri Alfred Jabu, who accompanied Anwar and Information Minister Datuk Mohamed Rahmat to the site, have given an

assurance that the water will not be salty when the dam is completed.

Kg. Batu Kintang chief Salleh Sulai Told reporters the 10 villages of about 5,000 people living along the river did not mind the construction of the temporary dam which will link his area to Kg. Lidah Tanah across the river.

However, Salleh said the villagers hoped the dam would not be too high or it may cause flooding to upriver villages.

Star, 29.9.1997

Environmental management given priority in project

Environmental management takes precedence in the construction of the second package of the Simpang Pulai-Lojing-Gua Musang-Kuala Berang Highway project.

Preventive measures have been taken to ensure that construction, the clearing of land and earthworks will not cause environmental degradation, particularly in areas where hill cutting is being done.

MTD Construction Sdn. Bhd., the turnkey contractor for the project, has allocated RM30 million out of the RM282 million cost of the project for environment protection works.

This includes rehabilitating the surrounding jungle area by planting trees, taking soil conservation measures and planting grass at hillslopes to check erosion during the progress of the highway construction.

Work on the project commenced late last year and is expected to be completed by April 2000.

Works Ministry Parliamentary Secretary

Yong Khoon Seng said MTD Construction had so far done a commendable job on environmental protection during construction of the highway.

He said rock excavation and levelling of embankment had been done according to environmental protection procedures.

To ensure that water from the hills would have an outlet to flow through, Yong said MTD Construction had built drains and culverts totalling 237 km.

He added that silt traps had also been built to allow water to flow freely.

Yong said despite the difficult terrain encountered by MTD Construction, efforts in preserving the environment was beginning to take shape.

"In places where the hillslopes have been cut, one will notice that cutting has been minimised and to further ensure the stability of the slopes, vetiver grass has been planted to check erosion," he told reporters after a visit to the project site some 36 km from here today.

NST, 30.9.1997

Output of petroleum products rises 10.2 pc

During the first seven months of this year, the output of petroleum products rose by 10.2 per cent, compared to 11.7 per cent during the previous corresponding period.

The increase is attributed to the expansion of crude oil throughput from 357,400 barrels per day last year to 372,600 barrels this year with five refineries operating.

The major products produced by the refineries are kerosene, fuel oil, diesel, liquefied petroleum gas, and gasoline.

Output of kerosene, fuel oil, diesel and gasoline rose by 3.6 per cent, 11 per cent, 9 per cent and 5 per cent respectively compared with the increases of 17.4 per cent, 28.6 per cent, 7.2 per cent and 7.3 per cent recorded for the previous

corresponding period.

Production of liquefied petroleum gas fell by five per cent during the period under review against the previous increase of 13.8 per cent.

The net production of natural gas is projected to have increased by 14.3 per cent to 3.89 million standard cubic feet per day this year, compared to an increase of 22 per cent last year.

The demand for natural gas as a viable alternative fuel has been growing especially in the power generation sector.

Malaysia's gas reserves is estimated at over 79.8 trillion standard cubic feet, mainly located in the Central Luconia province of offshore Sarawak, offshore Sabah and offshore east coast of the peninsula.

Production of liquefied natural gas is expected to increase by 16.3 per cent to 16.1

million tonnes for this year.

With the commissioning of the fifth and sixth gas processing plants by the end of next year, the combined gas processing capacity will increase from 200 to 2,000 million standard cubic feet per day.

The Peninsular Gas Utilisation Project which boasts 1,260 km of pipelines has made it possible for sales gas to be used as an alternative fuel for power generation, commercial as well as residential purposes.

About 74 per cent of the sale of gas is channelled to Tenaga Nasional Bhd. and the Independent Power Producers, while another 12 per cent is for other commercial uses such as the steel and petrochemical plants in Kertih as well as for residential uses.

NST, 18.10.1997

Mining industry seen easing

Growth in the mining sector is expected to decelerate from 4.5 per cent in 1996 to 2.8 per cent in 1997 due to a slowdown in the output growth of quarrying activities and crude petroleum.

With a slower growth expected in value-added, the share of the mining sector to real Gross Domestic Product will decline to 6.8 per cent this year.

Crude petroleum production (including condensates) is expected to increase by 0.5 per cent to average 720,000 barrels per day in 1997, compared to the increase of 1.7 per cent in 1996.

Of the anticipated production, the output of condensates is expected to contribute an estimated 84,000 barrels per day.

Of the total output, 59.5 per cent came from the peninsula with 14 oil fields, 8.3 per cent from Sabah with seven oil fields, and 32.2 per cent from Sarawak with 13 oil fields.

In the first seven months of 1997, production of crude oil declined by 4.2 per cent to 699,700 barrels per day compared to 730,109 barrels in the previous corresponding period.

The Report says a total of 50,422 km of seismic data were acquired for five exploration

fields and 92,843 km for 11 fields of the production and development to be drilled this year.

A total of seven Production Sharing Contracts were signed last year and the first half of this year.

The output of natural gas expanded by 15.7 per cent to 3,836 million standard cubic feet per day compared to 3,316 million.

Production of tin-in-concentrate is expected to decline by 5.3 per cent to 4,900 tonnes in 1997. It declined 19.2 per cent in 1996.

During the period under review, tin output declined by 9.4 per cent to 2,579 tonnes. Tin mines currently in operation number 35 and produce 2,100 tonnes.

Copper, bauxite and iron ore production are expected to show a mixed performance.

Copper is expected to decline 14 per cent in output this year compared to the 2.3 per cent decline in 1996 due to depleting copper ore reserves.

Iron ore materials output will decline by 32.3 per cent from 325,114 tonnes in 1996 to 220,000 tonnes in 1997 while bauxite output will increase by 14.3 per cent to 250,000 tonnes in 1997.

NST, 18.10.1997

Petronas chief: Pita reduction timely

The reduction in petroleum income tax (Pita) will not only help sustain the development of the petroleum industry but encourage development of new oil reserves, according to Petroliaam Nasional Bhd. (Petronas) president and chief executive officer Tan Sri Mohamad Hassan Marican.

"It is a very welcome benefit for the industry. Given the present scenario of high development cost and low crude oil prices, the reduction is very timely for the industry's development," Hassan told *Star Business* yesterday.

"The reduction in Pita will help spur economic activities and opportunities to support industries of the petroleum sector," he said.

"Petronas and its production sharing partners (Shell Malaysia Ltd. and Esso Production Malaysia Inc.) will benefit from the reduction of taxes and export duty," Hassan added.

Shell Malaysia direct taxation manager Lim Beng Lui also agreed, and added that the government was "listening" to the business community and was willing to reduce income and export duties.

"We at Shell do not export crude oil as it is used for refining purposes, but for those companies with large volumes of exports, such as Petronas, it will certainly be beneficial," Lim said.

She said the 2% savings from income tax, which could run into millions of ringgit, could now be used for reinvestment purposes.

This will ease the financial burden for companies planning exploration of new or marginal fields.

Hassan said Petronas would continue its efforts to explore new fields and existing ones together with its partners.

Cost of exploration have also increased as oil fields are no longer at the shoreline and oil reserves are found deeper in the sea.

Deep-sea exploration is costlier and the technology used is more sophisticated.

In presenting the budget, Deputy Prime Minister and Finance Minister Datuk Seri Anwar Ibrahim said the Pita rate would be reduced

from 40% to 38% from the year of assessment 1998 and the export duty on crude oil and condensate from 20% to 10% effective Jan 1, 1998.

The incentive was necessary since oil and gas exploration and production activities in Malaysia had been declining.

Meanwhile, demand for petroleum production is on the increase over the years.

Upstream companies such as Petronas, Esso and Shell had to develop the marginal fields while at the same time, intensify their exploration activities for new fields, Anwar said.

This is to reduce further dependence on foreign crude oil, which is necessary for output of petroleum products especially beyond the year 2000.

The industry experienced its last reduction in Pita during the 1993 budget from 45% to 40%. Meanwhile, export duty was reduced from 25% to 20% during the 1995 budget.

Although some players in the oil sector were happy with the 2% reduction in Pita, others felt that the government should have lowered it to the same level as corporate taxes, that is 28%.

However it is argued that oil exploration works offer higher returns and it involves national reserves; hence the higher Pita taxes compared to corporate taxes.

The petroleum sector is considered an important sector to the country and had contributed as much as 20% to the country's total revenue in the early to mid-1980s.

Last year, it contributed tax revenues of only RM3.24 bil, which represented 1.4% of gross national product (GNP) or just 5.7% of total revenue. Malaysia's GNP was RM235.3 bil in 1996 while government tax totalled RM45.94 bil.

For this year, tax revenue from petroleum sector is expected to be slightly higher at RM3.443 bil, which would represent 1.3% of GNP or 5.7% of total reserves and GNP is projected at RM263.7 bil with total government tax revenue at RM49.8 bil.

Star, 22.10.1997

Mineral water pricing: Group to study impact

The pro tem committee of the Malaysian chapter of the International Bottled Water Association will study the impact of the Government's move to fix the distributors' price for bottled mineral water.

The committee said it was seeking a meeting with Domestic Trade and Consumer Affairs Minister Datuk Seri Megat Junid Megat Ayob to seek clarification and to put its case across.

"A concern of the group is that any move by the authorities should not have an adverse impact on the development of the local industry," it said.

Yesterday, Megat Junid announced that the distribution price of mineral water was fixed at 70 sen for 0.5 litre and RM1.20 for 1.5 litres. The price for drinking water was also fixed at 50 sen

for 0.5 litre and 80 sen for 1.5 litres.

The committee said the pricing system based on a limited number of producers might not provide a fair representative of the industry.

"It would also be detrimental to the development of a viable, high quality local bottled water industry," it said.

The committee said substantial investments had to be made if the industry takes steps to develop the local industry to international standard and to compete with international brands overseas.

"All these will entail higher costs," it added.

The Malaysian chapter of the IBWA has 27 members who are bottlers and distributors that represent 70 per cent of the industry.

NST, 26.10.1997

Three new highways for Johor

Three new highways costing over RM1 bil are being planned in Johor to speed up the state's economic growth, Menteri Besar Datuk Abdul Ghani Othman said.

Speaking at a gathering in Bukit Gambir on Saturday, he said the highways were from here to Segamat, from Segamat to Pasir Gudang and from Johor Baru to Endau in Mersing.

He said these projects had been approved by the Federal Government and the state had directed route studies to be done to ensure minimal interference to public property.

"I have asked for all routes to avoid cutting across villages, but, if it is unavoidable then we will compensate property owners accordingly."

"We expect the study to be completed by next year," he said, adding that work was expected to

begin the end of next year.

Ghani said the Muar-Segamat highway would pass through Tangkak and the Segamat-Pasir Gudang road through Kluang.

The Johor Baru-Endau highway would cut through Kong Kong and Desaru.

Ghani said that besides improving the road networks and cutting travelling time from one end of Johor to another by about an hour, the projects would also enhance the state's growth.

He said that since the cost of the projects was substantial, the state had decided to privatise the 4 km-long bridge across Sungai Johor which would cost about RM400 mil.

"The Sungai Johor bridge will cut travelling time from Johor Baru to Desaru by half," he said.

Star, 27.10.1997

Why coal was chosen for power plant

Various measures to address environmental impacts will be adopted in the operation of the Manjung power plant, the country's largest coal-fired one.

The operation would take into consideration combustion emission, solid and liquid discharges and fugitive coal dust, TNB Janamanjung Sdn.

Bhd.'s managing director Abdul Razak Abdul Majid said.

He said the design concept of the power plant was based on clean coal combustion technology.

"The coal used will be of a low sulphur grade," he told newsmen on a tour of the site

where reclamation works are in progress, yesterday.

TNB Janamanjung, a wholly owned subsidiary of Tenaga Nasional Berhad, will undertake development of the estimated RM6 billion 2,000 MW Manjung plant on a reclaimed island in Teluk Penchalang, near here.

Abdul Razak said coal as a fuel option enjoyed certain advantages including less price volatility and well-distributed reserves throughout the world.

"An estimated six million tonnes of coal a year will be imported mainly from Indonesia and Australia," he said.

At the moment, the only other Tenaga coal-fuelled power plant is located in Kapar, Selangor.

The Manjung area was chosen for its proximity to deep water which was a primary requirement for coal-fired power plants, said Abdul Razak.

He said environmental concerns were top on the agenda and to this end, the combustion technology selected was the state-of-the art Pulversied Fuel Firing system.

"In PFF technology, burnout of over 99 per cent of the carbon is completed in a couple of seconds. PFF technology also produces fly ash in the range of 80 to 95 per cent and bottom ash in the region of 5 per cent to 20 per cent."

"It must be noted that the Manjung plant will incorporate Electrostatic Precipitators which can trap fly ash up to 99.9 per cent," he added.

Abdul Razak said the Environment Impact Assessment report on the plant was submitted about three months ago and the company was awaiting the approval of the final report some time next month.

"Several measures including installing sprinkling systems and using hooded conveyor belts will maximise dust control. It must be noted that all concentration of dispersion is well within the Department of Environment limits."

For example, he said, the plant was adopting World Bank emission standards which had set the level for particulates at 50 mg/Nm³ compared to DOE Malaysia which had a permitted level of 400 mg/Nm³.

(A typical asean country's permitted level is 400 mg/Nm³, a typical North American country 40 mg/Nm³, while a typical European country 100 mg/Nm³.)

Abdul Razak said waste-water from the plant would be collected in a setting pond and treated before it was released into the sea.

"Several stations would also be set up within a radius of 5 to 10 km from the plant to monitor emissions, drainage, sewage and ambient air quality," he said, adding that one such station was located in Kampung Datuk Haji Kamarruddin.

Since the reclaimed 326 ha "island" on which the plant will be sited will be created in sheltered waters offshore Lekir, several proactive measures will be undertaken to minimise environmental impacts.

The company entrusted with the task of developing the island and a series of other islands, Desa Kilat Sdn. Bhd., has given the assurance that the mangroves will be retained and enrichment planting undertaken to rehabilitate degraded mangrove areas.

A 150 m to 200 m tidal waterway between the mangroves and the reclaimed areas will be built.

NST, 27.10.1997

RM2.1 b rail link between KL and KLIA ready by year 2000

Tabung Haji Technologies Sdn. Bhd. has formed a consortium with Intria Bina Sdn. Bhd., Costain (M) Sdn. Bhd., HCM Engineering Sdn. Bhd. and Pembinaan Rah Corporation Sdn. Bhd. to undertake civil works for the construction of the delayed RM2.1 billion Express Rail Link (ERL) project.

Its chairman, Datuk Ahmad Razali Mohd Ali, said the project had been delayed due to technical adjustments among shareholding

companies undertaking the 57 km rail link.

The ERL will link Kuala Lumpur Sentral, now under construction, with the Kuala Lumpur International Airport in Sepang.

Initially, the project was shared by Tabung Haji Technologies (60 per cent) and YTL Corporation Bhd. (40 per cent), but recently the shareholding was restructured with Tabung Haji Technologies and YTL holding 40 per cent each and Abrar Group 20 per cent.

The completion date has been pushed to the year 2000 from the earlier 1999, Ahmad Razali told reporters after the signing of an agreement for a joint venture company called Tabung Haji Technologies' Railworks Consortium.

Tabung Haji Technologies has a 51 per cent stake in the consortium, Intria Bina, Costain and HCM Engineering 15 per cent each and Pembinaan Rah the balance.

Ahmad Razali said Tabung Haji Technologies' consortium partners will provide

experts in engineering and construction to speed up the project.

Civil works to be undertaken by the consortium include the construction of 57 bridges, rail tracks and roads.

Construction work has begun and the consortium is trying its best to utilise local sources to avoid heavy import costs, said Ahmad Razali, adding there may be changes in development costs.

NST, 28.10.1997

Don: Landfills will pollute water sources

Universiti Teknologi Malaysia (UTM) has warned of dire environmental consequences if waste disposal methods are not changed from the current practice of using landfills.

UTM's Institute of Environmental Studies (IES) director Prof. Dr. Alias Mohd Yusof said the continued use of landfills would eventually lead to the contamination of the country's drinking water sources.

He said because most landfills were not properly maintained, processes such as leaching and anaerobic fermentation were causing all sorts of environmental problems.

"This is the process whereby leachates seep into the soil and reach the water table carrying with it a variety of germs and bacteria."

"The underground water carries all the contaminants for kilometres from the landfills

and into drinking water sources such as is happening to Sungai Langat because of the huge landfill area in Ulu Langat," he said.

On Tuesday, *The Star* had reported that 23 of Selangor's 27 drinking water sources were polluted, with the Langat, Klang, Bernam, Tenggi and Buloh rivers being heavily polluted.

Prof. Alias said such landfill areas had to be properly controlled to avoid detrimental effects on the environment.

"A waterproof membrane must be laid over the entire area of the landfill excavation, drainage must be installed and there should be proper management of methane gas generated by the anaerobic process," he said.

However, he said such measures were costly and it was more cost-effective and safe to turn to other disposal methods such as composting.

Star, 31.10.1997

REVIEW

Gondwana Master Basin of Peninsular India: Between Tethys and the Interior of the Gondwanaland Province of Pangea

by

J.J. Veevers and R.C. Tewari.

Geological Society of America Memoir 187 (1995), 72 pages, hardcover

This highly informative book has resulted from a collaborative research project between the two authors from 1989 to 1994. It is abundantly illustrated by line diagrams, black-and-white maps, and various charts and tables. Surprisingly however, there is a total absence of outcrop illustrations, except for a single photograph in colour on the dust jacket.

The Gondwana master basin is shown to be part of a 7,500 km-wide alluvial fan sourced from an upland in east Antarctica and subsequently disrupted during stages of Pangean rifting and sea-floor spreading. Deposition in the master basin started in the latest Carboniferous with glaciogenic sediments and continued through the Permian with important coal deposits. After a Middle Triassic lacuna, deposition resumed in the Late Triassic and terminated in the Early Jurassic to be followed by the Late Jurassic-Early Cretaceous breakup of India from the rest of Gondwanaland.

The stratigraphic succession of the Gondwana basins is summarized by time-correlation diagrams, columnar sections, facies diagrams, cross sections, a time-space fence diagram, thickness variation diagram and a cumulative-subsidence diagram. Palaeocurrent measurements have also been summarized.

Of particular interest to Southeast Asian readers are the descriptions of the Late Carboniferous to Early Permian Talchir Formation and its extreme depositional variability from the southern glacial valleys to a delta plain crossed by tidal channels in the north. The wholly marine successions of Southeast Asia are represented by the Phuket Group of Thailand, the Singa Formation of Peninsular Malaysia and the Bohorok Formation of Sumatra.

The palaeogeography of the master basin is illustrated by a series of black-and-white line maps beginning with the Talchir Formation and ending at the Cretaceous/Tertiary boundary. Finally a comparison is given between the Gondwana master basin and others of Gondwanaland, including South Africa, Australia and Antarctica. The reference list is fairly comprehensive and occupies 9 pages of text and an adequate index is provided.

This is not a book to retire with in the evening for it does not make easy reading, neither is it for the undergraduate student. Its greatest value would be to research workers whose career development has now brought them to require a knowledge of the Gondwanas of India. To such geologists the book would make an excellent introduction to the subject and would open the way to the wider literature.

Gondwana Master Basin of Peninsular India Between Tethys and the Interior of the Gondwanaland Province of Pangea, by J.J. Veevers, R.C. Tewari, 1996. GSA Memoir 187, indexed, hardbound, 78 p., ISBN 0-8137-1187-8. List price \$42.00, postpaid by surface mail. The Geological Society of America, P.O. Box 9140, Boulder, Colorado 80301-9140 U.S.A.

C.S. Hutchison
28 October 1997

ASIA-PACIFIC MINING '98

The 6th International mining and Mineral Resources of Conference 1998

“Minerals — The Key to Sustainable Industrial Development”

Conference : October 22–24, 1998

Exhibition : October 22–25, 1998

**Putra World Trade Centre (PWTC)
Kuala Lumpur, Malaysia**

Hosted by:

ASEAN Federation of Mining Associations (AFMA)

Malaysian Chamber of Mines

Indonesian Mining Association (IMA)

Chamber of Mines of the Philippines

Mining Industry Council of Thailand

About AFMA and the Event

The **ASEAN Federation of Mining Associations (AFMA)** is a non-profit making body comprising the Indonesian Mining Association, the Chamber of Mines of the Philippines, the Mining Industry Council of Thailand and the Malaysian Chamber of Mines. They represent the national mining associations of their respective countries. Because of its links with other national and international mining bodies, **AFMA** has contacts and access to leading professionals in mining, metallurgy, geology and mineral economics in and outside the region. **AFMA** has also established close working relationships with major mining associations in the Asia-Pacific region and has involved them in its activities. **AFMA** has a long-range programme in facilitating the promotion and development of the minerals industry of the region aimed at optimising and benefiting from its economic returns. This 6th Asia-Pacific Mining Conference and Exhibition 1998 organised by **AFMA**, in cooperation with the mining associations in the region, forms part of the programme.

Conference Profile

Around 45 papers will be presented at the 3-day Conference.

- (a) Each of the 4 constituent members of AFMA will contribute a country paper covering, in general, their respective mining policy, resources, activity, development, etc. In addition, they will contribute 3 more papers each of a technical nature.
- (b) The new ASEAN members, namely Vietnam, Myanmar and Laos will contribute a country paper each.
- (c) Countries of special interest to investors such as Mongolia, Kazakhstan, South Africa, Namibia, etc. will present a country paper each.
- (d) A developed mining country such as Australia, Canada, Germany, UK or U.S.A. is expected to present a paper on latest development in mining technology, strategy and policy.

- (e) The International Council on Metals and the Environment (ICME) based in Canada is expected to present a general paper on global mining environment, development, policies and practices.
- (f) Professional experts from Europe and Canada will present papers on global overview of mining policy and the minerals industry.
- (g) The United States Geological Survey (USGS) is expected to present a paper on global mineral resources outlook, and the United States Defence Logistics Agency (USDLA) is also expected to present a paper on US strategic stockpile, present and future policies. The Metal Mining Agency of Japan (MMAJ) will contribute a paper on their role in mineral resources development globally.
- (h) The Metal Bulletin, Platt's Metals Week, Industrial Minerals, Australian Mining Journal, CRU International or the World Gold Council (WGC) are expected to present papers covering the marketing and uses of minerals globally.
- (i) From Malaysia, the Department of Mines will contribute a paper on mine safety, operations and environment, the Geological Survey on mineral resources availability and potential, the University Sains Malaysia, Tronoh on mining and mineral processing technology and human resources training. The Secretary-General of the Ministry of Primary Industries will present a general paper on an overview of the Malaysian minerals industry. PETRONAS will contribute a paper on the status of the oil and gas industry in Malaysia. Deputy Director General of the Geology Survey will present a paper on the status of the Malaysian coal industry. The Institute of Quarrying Malaysia will contribute a paper on the development of the quarrying industry in Malaysia.

Invitation

AFMA invites those interested to present papers at this Conference to submit their name and the title of their paper for consideration of the Papers Sub-Committee at the following address:

Secretary,
Papers Sub-Committee,
ASEAN Federation of Mining Associations (AFMA),
c/o Malaysian Chamber of Mines,
P.O. Box 12560,
50782 Kuala Lumpur,
Malaysia
Tel: 03-2616171, Fax: 03-2616179
E-mail: MCOM@po.jaring.my

Running concurrently with the Conference is an Exhibition which we welcome you to participate:

The 6th International Mining and Mineral Resources Machineries and Equipment Exhibition 1998

Date : October 22–25, 1998
Venue : Putra World Trade Centre (PWTC), Kuala Lumpur, Malaysia

Please contact : Oriental-Western Promotions Ltd.
(Formerly SHK International Services Ltd.)
6/F., China Harbour Building
370 King's Road, North Point, H.K.
Tel: (852) 2807 7633, Fax: (852) 2570 5917, 2570 5903

Pre and Post Conference Tours comprising visits to various mining sites and participation in a golf tournament will be organised for participants.

Conference and Registration Fee: (*)

	Payment received on or before 30th June 1998	Payment received on or after 1st July 1998
AFMA members	US\$600 or RM equivalent (+)	US\$650 or RM equivalent (+)
Non-AFMA members	US\$650 or RM equivalent (+)	US\$700 or RM equivalent (+)
Group Discount: a) A company which have 3 persons attending will be offered 5% discount. b) A company which have 5 persons attending will be offered 10% discount. c) A company which have 10 persons attending will be offered 15% discount.		

* Conference fee is inclusive of coffee breaks, lunches, welcoming dinner, conference papers, proceedings, attendance at all sessions, and entry to exhibition.

+ Actual conversion at time of payment.

For further information

Malaysian Chamber of Mines
 8th Floor, West Block
 Wisma Selangor Dradging
 142-C, Jalan Ampang
 P.O. Box 12560
 50782 Kuala Lumpur
 Malaysia
 Tel: 03-261 6171; Fax: 03-261 6179
 E-mail: mcom@po.jaring.my

Conference Announcement
CALL FOR PAPERS

COASTAL ENVIRONMENT 98
Environmental Problems in Coastal Regions

8–10 September 1998, Cancun, Mexico
Second International Conference

Organised by
Wessex Institute of Technology, UK

Objectives

The importance of accurately modelling seas and coastal regions is emphasized by the need for a better understanding of their normal behaviour and response to extreme conditions. These areas, many times densely populated or sites of major industrial development, have become a major subject of international concern regarding environmental quality, due to pollution and other problems. It is clear that the related environmental problems need further study to design remedial actions, using efficient and reliable modelling and analysis tools. Computer models in combination with sensing equipment and experimental sampling techniques, provide adequate means for the study of the behaviour of water, ground and air systems, specially for the prevention of natural and man-made disasters. Furthermore, once a disaster occurs, computer models can determine the extent and consequences, aiding in the optimisation of available resources for remedial actions. This conference will address the subject of computer modelling of seas and coastal areas under normal and extreme conditions, with particular attention to the practical applications currently carried out around the world. The first and highly successful conference was held in Rio de Janeiro, Brazil in 1996. This Meeting will be of interest to government officials, consulting engineers, university professors and researchers involved in the important field of environmental quality.

Call for Papers

Papers are invited on the topics indicated and others falling within the scope of the conference. Three copies of an abstract of no more than 300

words, clearly stating the purpose, results and conclusion of the work to be described in the final paper, should be submitted to the Conference Secretariat as soon as possible.

Topics

- Pollution Management & Decision Analysis
- Hazard Mitigation/Risk Analysis
- Environmental Impact Assessment & Legislation
- Harbours, Ports & Marinas
- Littoral Drift
- Coastal Erosion
- Siltation & Dredging
- Oil & Spills
- Acoustic Pollution
- Pollutant Transport & Dispersion
- Remote Sensing
- Wastewater Treatment
- Sewage & Chemical Pollution
- Atmospheric Pollution & Control
- Hydrodynamic & Pollutant Transport Modelling
- Water Quality Models
- Case Studies

Further Information

Liz Kerr, Conference Secretariat,
COASTAL ENVIRONMENT 98
Wessex Institute of Technology
Ashurst Lodge, Ashurst, Southampton,
SO40 7AA, UK
Telephone: 44 (0) 1703 293223
Fax: 44 (0) 1703 292853
E-Mail: liz@wessex.ac.uk

Look for more information at <http://www.wessex.ac.uk>

KALENDAR (CALENDAR)

1997

November 3-5

TECTONICS OF EAST ASIA (International Conference & Sino-American Symposium), Chungli, Taiwan. (Dr. Ching-Hua Lo, Department of Geology, National Taiwan University, 245 Choushan Road, Taipei 106, Taiwan, ROC. Telefax: 886-2-3636095; e-mail: lo@sun03.gl.ntu.edu.tw; www: <http://sun03.gl.ntu.edu.tw/tea.html> or Dr. Jean Crespi, Department of Geology and Geophysics, University of Connecticut, Storrs, CT 06269-2045, U.S.A. Phone: 860-486-0601; telefax: 860-486-1838; e-mail: crespi@geol.uconn.edu)

November 12-14

THE 19TH NEW ZEALAND GEOTHERMAL WORKSHOP (Workshop), New Zealand. (c/o Geothermal Institute, The University of Auckland, Private Bag 92019, Auckland, New Zealand. Telefax: 64-9-373 7436; e-mail: geo.wshop@auckland.ac.nz)

November 17-19

APPLIED GEOLOGIC REMOTE SENSING (12th International Conference and Workshop), Denver, Colorado, USA. (Robert Rogers, ERIM, Box 134001, Ann Arbor, MI 48113 4001 USA. Phone: (1) 313 994 1200; telefax: (1) 313 994 5123; e-mail: raeder@erim.org)

November 17-21

DEEP FOUNDATIONS, EXCAVATIONS, GROUND IMPROVEMENT & TUNNELLING, (Symposium), Bangkok, Thailand. (Prof. A.S. Balasubramaniam, The Hon. Secretary General Southeast Asian Geotechnical Society, c/o Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani 12120, THAILAND. Phone: (66-2) 524 5519, (66-2) 524 5537; telefax: (66-2) 516 2126, (66-2) 524 5523)

November 30 - December 3

PERMIAN OF EASTERN TETHYS: BIOSTRATIGRAPHY, PALAEOGEOGRAPHY & RESOURCES (International Conference), Melbourne, Australia. (The Secretariat, Permian of Eastern Tethys Conference, School of Aquatic Science & Natural Resources

Management, Deakin University, Rusden Campus, 662 Blackburn Road, Clayton, Victoria 3168, Australia. Phone: 61-3-9244 7429; telefax: 62-3-9244 7480; e-mail: asnrm@deakin.edu.au)

1998

CANADIAN INSTITUTE OF MINING, METALLURGY AND PETROLEUM (100th annual general meeting), Quebec, Canada. (John Gaydos, Meetings Manager, Canadian Institute of Mining and Metallurgy, 1 Place Alexis Nihon, 1210-3400 de Maisonneuve Boulevard West, Montreal, Quebec H3Z 3B8, Canada. Phone: (514) 939-2710; telefax: (514) 939-2714)

10TH IAGOD SYMPOSIUM, Australia. (Professor I.R. Plimer University of Melbourne, Parkville, VIC 3052, Australia. Phone: 613 3446520; telefax: 613 3447761)

January 28-30

EXPLORATION METHODS '98: PATHWAYS TO DISCOVERY (International Meeting following annual Cordilleran Roundup), Vancouver, Canada. (BC and Yukon Chamber of Mines, Attn. Technical Chair, 840 West Hastings St., Vancouver, British Columbia, Canada V6C 1C8. Telefax: 604 681 2363)

March 23-24

ASIA PACIFIC CONFERENCE ON INTEGRATED MODELLING FOR ASSET MANAGEMENT (Conference), Kuala Lumpur, Malaysia. (SPE Kuala Lumpur Office, Lot F1/01, First Floor, Citypoint, Kompleks Dayabumi, Jalan Sultan Hishamuddin, 50050 Kuala Lumpur, Malaysia. Phone: 6-03-294-7211; telefax: 6-03-294-5158)

April 13-17

15TH INTERNATIONAL SEDIMENTOLOGICAL CONGRESS, Alicante, Spain. (15th International Sedimentological Congress, Departamento de Ciencias de la Tierra y Medio Ambiente, Facultad de Ciencias, Campus de San Vicente de Raspeig, Universidad de Alicante, Apardo 99, 03080 Alicante, Spain. Phone: 34 65903552; telefax:

34 65903552; e-mail: ctierra@vm.cpd.ua.es)

April 13-17

KIMBERLITES (5th International Conference), Cape Town, South Africa. (J.J. Gurney, 71KC, Department of Geological Sciences, University of Cape Town, Private Bag, Rondebosch 7700, South Africa. Phone: 27 21 531 3162; telefax: 27 21 650 3783; e-mail: 71KC@GEOLOGY.UCT.AC.ZA; URL: <http://www.uct.ac.za/depts/geolsci/71KC/>)

April 19-23

COMPUTER APPLICATIONS IN THE MINERALS INDUSTRY - APCOM '98 (27th International Symposium), London, UK. (Conference Office, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK. Phone: +44 (0)171 580 3802; telefax: +44 (0)171 436 5388; e-mail: 106115.233@compuserve.com)

April 20-22

GEO '98 (Middle East Geosciences Exhibition and Conference), Bahrain. (Stephen Key, Arabian Exhibition Management WLL, P.O. Box 20200, Manama, Bahrain. Phone: 973 550033; telefax: 973 553288)

April 20-23

HYDROLOGY, WATER RESOURCES AND ECOLOGY IN HEADWATERS (International Interdisciplinary Conference - Head-Water '98), Merano, Italy. (HeadWater '98, c/o European Academy, Weggensteinstrasse 12/A, 1-39100 Bozen/Bolzano, Italy. Phone: 39 471 30 61 11; telefax: 39 471 30 60 99; e-mail: HeadWater98@ms.sinfo.interbusiness.it)

June 8-12

EUROPEAN ASSOCIATION OF GEOSCIENTISTS AND ENGINEERS (EAGE) (60th Conference), Leipzig, Germany. (EAGE, E.H. Bornkamp, P.O. Box 298, NI 3700, AG Zeist, The Netherlands. Phone: 31/3069 62 655; telefax: 31/3069 62 640)29)

June 23-25

THE ROLE OF A NATIONAL GEOLOGICAL SURVEY IN SUSTAINABLE DEVELOPMENT (International Conference), Gaborone, Botswana. (The Secretariat (Attention: Mr. B.K. Paya), 50th Anniversary Conference, Department of Geological Survey, Private Bag 14, Lobatse, Botswana. Phone: (267) 331721;

telefax: (267) 332013; e-mail: 100076.1001@compuserve.com)

June 28 - July 5

GONDWANA 10, Cape Town, South Africa. (Organising Committee Gondwana 10, Department of Geological Sciences, University of Cape Town, Rondebosch, South Africa. Phone: 27 21650 3171; telefax: 27 21650 3167)

June 29 - July 2

15TH CARIBBEAN GEOLOGICAL CONFERENCE, Kingston, Jamaica. (Dr. Trevor Jackson, c/o Department of Geography and Geology, University of the West Indies, Kingston 7, Jamaica. Telefax: 809 927 1640)

June 29 - July 18

8TH INTERNATIONAL PLATINUM SYMPOSIUM (IAGOD/CODMUR), Johannesburg, South Africa. (Dr. C.A. Lee, P.O. Box 68108, Bryanston, South Africa. Phone: 1127 373 2580; telefax: 1127 836 0371; e-mail: clee@amplats.co.za)

August

10TH IAGOD SYMPOSIUM, Broken Hill, Australia. (Professor I.R. Plimer, University of Melbourne, Parkville, VIC 3052, Australia. Phone: 613 3446520; telefax: 613 3447761)

August 9-15

INTERNATIONAL MINERALOGICAL ASSOCIATION: IMA '98 (17th General Meeting), Toronto, Canada. (Professor A.J. Naldrett, Department of Geology, University of Toronto, Canada M5S 3B1. Phone: (461) 978 3030; telefax: (416) 978 3938; e-mail: ima98@quartz.geology.utoronto.ca)

August 17-19

GEOSEA '98 (Ninth Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia), Kuala Lumpur, Malaysia. (The Organising Secretary, GEOSEA '98, Geological Society of Malaysia, c/o Department of Geology, University of Malaya, 50603 Kuala Lumpur, Malaysia. Phone: +(603) 757 7036; telefax: +(603) 759 3900; e-mail: geologi@po.jaring.my)

August 17-20

THE JURASSIC SYSTEM (5th International Symposium), Vancouver, Canada. (P.L. Smith, Earth and Ocean Science, University of British Columbia, 6339 Stores Rd., Vancouver, BC,

V6T 1Z4 Canada. Phone: (604) 822-6456; telefax: (604) 822 6088; e-mail: psmith@cos.ubc.ca; WWW: <http://www.eos.ubc.ca/jurassic/announce.html>)

September 8-10

COASTAL ENVIRONMENT 98 - ENVIRONMENTAL PROBLEMS IN COASTAL REGIONS (Conference), Cancun, Mexico. (Liz Kerr, Conference Secretariat, COASTAL ENVIRONMENT 98, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, SO40 7AA, UK. Phone: 44 (0) 1703 293223; telefax: 44 (0) 1703 292853; e-mail: liz@wessex.ac.uk; <http://www.wesses.ac.uk>)

September 14-17

MODERN EXPLORATION AND IMPROVED OIL AND GAS RECOVERY METHODS (2nd International Conference), Kraków, Poland. (DEXTER Congress and Symposium Bureau, Wroclawska 37A, 30-011 Kraków, Poland. Phone: 48 12 340 808; telefax: 48 12 336313; e-mail: kongresy@dexter.krakow.pl)

October 26-29

GEOLOGICAL SOCIETY OF AMERICA ANNUAL MEETING, Toronto, Ontario, Canada. (GSA Meetings Department, P.O. Box 9140, Boulder CO, 80301 USA. Phone: 800 472 1988)

October/November

PHYSICAL, CHEMICAL AND BIOLOGICAL ASPECTS OF AQUIFER-STREAM SEDIMENT INTERRELATIONS (28th IAH Congress) (Dr. J. Rosenschein, USGS MS 414, National Center, Reston Va 22092, USA; Telefax: 703 648 5722)

November 16-20

THIRTEEN SOUTHEAST ASIAN GEOTECHNICAL CONFERENCE (Conference), Taipei, Republic of China. (Dr. John Chien-Chung Li, Secretary General/SEAGC 13, c/o Public Construction Commission, Executive Yuan, Fl. 9, No. 4, Chung Hsiao West Road, Sec. 1, Taipei, Taiwan, Republic of China. Phone: 886-2-388-4962; telefax: 886-2-388-4959; e-mail: seagc13@mail.pcc.gov.tw)

December 2-3

SEAPEX SILVER JUBILEE EXPLORATION CONFERENCE, Suntec City Exhibition Center, Singapore. (Mr. T.C. Chew, Southeast Asia Petroleum Exploration Society, P.O. Box 423 Tanglin Post Office, Singapore 812. Phone: (65) 338-9108; <http://web.singnet.com.sg/~seapex>)

1999

August 4-12

AFRICA, CRADLE OF HUMANKIND DURING THE QUATERNARY (XV INQUA Congress), Durban, South Africa. (Professor T.C. Partridge, Climatology Research Center, University of Witwatersrand, 13 Cluny Rd, Forest Town, Johannesburg 2193, South Africa. Phone: +27 11 646 3324; telefax: +27 11 486 1689; e-mail: 141tcp@cosmos.wits.ac.za)

August 14-25

CARBONIFEROUS-PERMIAN (XIV International Congress), Calgary, Alberta, Canada. (Dr. Charles Henderson, Associate Professor, Department of Geology and Geophysics, The University of Calgary, N.W. Calgary, Alberta, Canada T2N 1N4. Phone: 403 220 6170; telefax: 403 285 0074; e-mail: henderson@geo.ucalgary.ca)

Common Rocks of Malaysia

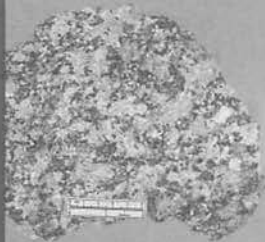
A full colour poster illustrating 28 common rocks of Malaysia. With concise description of the features and characteristics of each rock type including common textures of igneous, sedimentary and metamorphic rocks.

Laminated

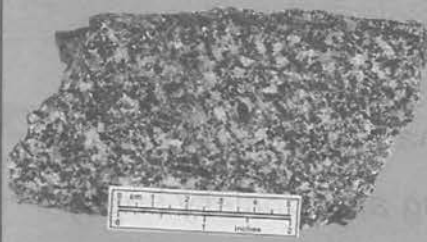
Size: 94 cm x 66 cm (42" x 26")

Price: Student members RM7.00 (one copy per member, subsequent copies RM10.00 each)
 Members RM8.00 (one copy per member, subsequent copies RM10.00 each)
 Non-members RM10.00 per copy

COMMON ROCKS



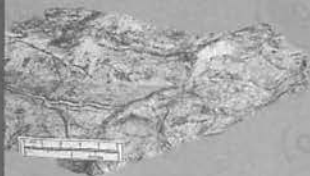
Granite (Tampin, Negri Sembilan)



5. Diorite (Kg. Kemahang, Kelantan)



6. Basalt (Segamat, Johor)



Serpentinite (Raub, Pahang)



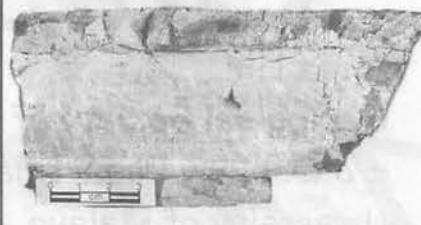
12. Pegmatite (Bukit Mor, Johor)



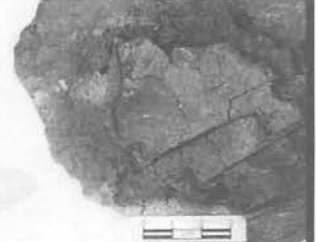
13. Conglomerate (Pulau Redang, Terengganu)



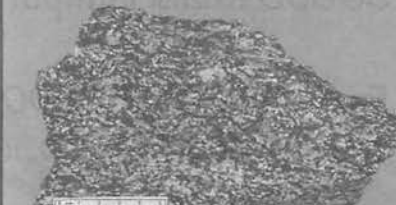
Mudstone (Kg. Laloh, Kelantan)



19. Chert (Nenering, Kedah)



20. Coal (Batu Arang, Selangor)



Cheques, Money Orders or Bank Drafts must accompany all orders. Orders will be invoiced for postage and bank charges. Orders should be addressed to:

ORDERS

The Hon. Assistant Secretary
GEOLOGICAL SOCIETY OF MALAYSIA
 c/o Dept. of Geology, University of Malaya
 50603 Kuala Lumpur, MALAYSIA

Souvenirs For Sale

In Response to requests by members, the Society has now prepared several souvenir items for sale as follows:

	Unit Price (RM)
1. Key Chain (brass with epoxy coating and Society Logo)	6.00
2. Tie Clip (with Society Logo)	7.00
3. Cap (dark blue, with Society Logo)	9.00
4. Hat (dark blue, with Society Logo)	10.00
5. Tie (dark blue with Society Logo)	30.00

Members can purchase/order these souvenir items by contacting:

Anna Lim
Geological Society of Malaysia
c/o Geology Department
University of Malaya
50603 Kuala Lumpur

Fax: (603) 7563900
Tel: (603) 7577036

BULETIN PERSATUAN GEOLOGI MALAYSIA



GEOLOGICAL
SOCIETY OF
MALAYSIA

BIBLIOGRAPHY AND INDEX PUBLICATIONS OF THE GEOLOGICAL SOCIETY OF MALAYSIA 1967 — 1993



Compiled by
NG THAM FATT

Edited by G. H. TEH

Bulletin of the GEOLOGICAL SOCIETY OF MALAYSIA

DECEMBER 1993

SPECIAL ISSUE

No. 34

Cheques, Money Orders or Bank Drafts must accompany all orders. Orders will be invoiced for postage and bank charges. Orders should be addressed to:

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The Hon. Assistant Secretary
GEOLOGICAL SOCIETY OF MALAYSIA
c/o Dept. of Geology, University of Malaya
50603 Kuala Lumpur, MALAYSIA

BULLETIN

PERSATUAN

GEOLOGI

MALAYSIA



GEOLOGICAL
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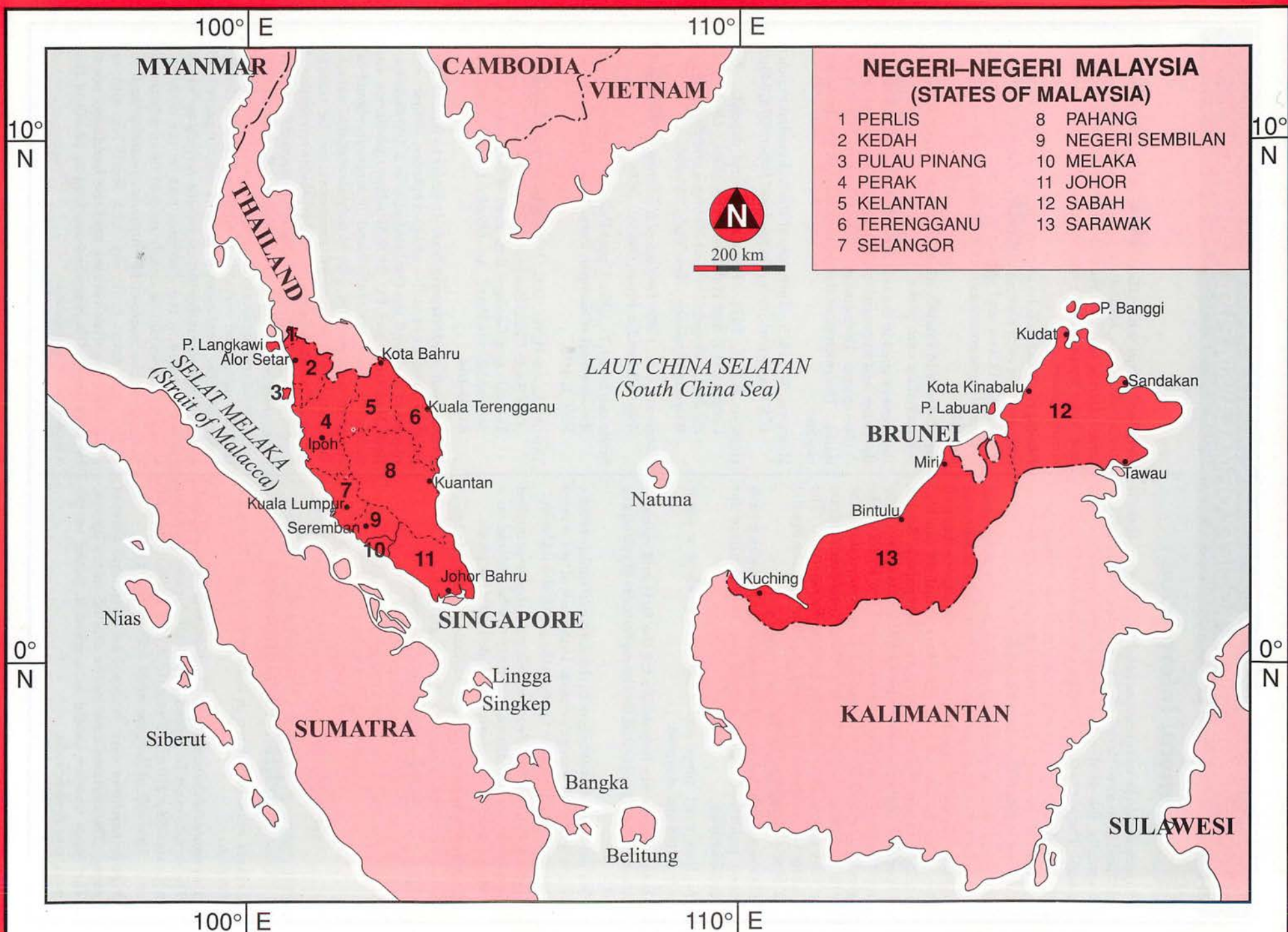
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