KDN PP 212 12 84 ISSN 0126-5539

PERSATUAN GEOLOGI MALAYSIA

WARTA GEOLOGI

NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

Jil. 11, No. 1 (Vol. 11, No. 1) Jan-Feb 1985

KANDUNGAN (CONTENTS)

DIKELUARKAN DWIBULANAN
ISSUED BIMONTHLY

PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)

Majlis (Council) 1984/85

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Published by the Geological Society of Malaysia, Department of Geology, University of Malaya, Kuala Lumpur 22-11 (Tel. 03-577036) - 15 March 1985
Printed by Art Printing Works Sdn. Bhd., 29 Jalan Riong, Kuala Lumpur.

CATATAN GEOLOGI
(GEOLOGICAL NOTES)

LOWER PERMIAN CONODONTS FROM THE TERBAT FORMATION, SARAWAK

I. Metcalfe, 6E, Lorong 16/10C, Petaling Jaya, Selangor, Malaysia.

Introduction

The Terbat Formation (Haile, 1954) of West Sarawak crops out near the Indonesian border about 85 km SSE of Kuching (Fig. 1). The Formation comprises limestones (dolomitic in places and with chert bands and nodules), chert (occurring in beds up to 2 m thick) and interbedded shales (some in excess of 1 m thickness). These sediments crop out as an elongate inlier approximately 7 km long and 2.5 km wide trending NW-SE and centred on the Dayak village of Terbat. A minimum thickness of 600 m is indicated for the Formation. Middle Carboniferous (Moscovian) and Lower Permian (Wolfcampian) fusulinid foraminifera have been described from limestone exposures at Gunong Selabor and near Terbat (Cummings, 1962; Wilford, 1965; Sanderson, 1966). Pilot samples of these limestones were collected by the author in 1982 for conodont studies with a view to their possible use in determining the age of the oldest exposed part of the Formation and to establish if a continuous sequence is present across the Carboniferous - Permian boundary in West Sarawak.

Conodont occurrence and age

Samples were collected from two localities, Gunong Selabor (Loc. 1) and Terbat (Loc. 2). Five samples (Nos. 873 - 877) were collected from Gunong Selabor (Fig. 2) and one sample (No. 879) from isolated limestone pinnacles on the northern bank of the Kedup River at Terbat Bazaar (Grid ref. 578020; map sheet 0/110/2, series T735). Three of these samples yielded conodonts as follows:

Locality 1. Gunong Selabor

Sample 876:		
	Anchignathodus sp.	1
	Gen. indet.	1
	Total	2
Sample 879:	*Streptognathodus* sp.	2
	Total	2

Locality 2. Terbat Bazaar

Sample 879:	*Anchignathodus* sp.	1
	Cypridodella sp.	1
	Streptognathodus elongatus Gunnell	1
	Gen. indet.	2
	Total	5

The samples collected from Gunong Selabor are from limestones dated as Lower Permian by fusulines (Cummings, 1962; Wilford, 1965). The conodont fauna from this locality includes the genera *Anchignathodus* (Late Lower Carboniferous - Early Triassic) and *Streptognathodus* (Late Lower Carboniferous - Early Permian) which are relatively long ranging genera consistent with a Lower Permian age. The sample from Terbat Bazaar contains the species *Streptognathodus elongatus* Gunnell which characterises the *S. elongatus* Fauna of Japan (Igo, 1981) and has a range from the uppermost Carboniferous to early Lower Permian (Ziegler, 1975). Fusulines from this locality indicate the age to be Lower Permian (Cummings, 1962; Wilford, 1965).

Discussion

The presence of conodonts in the Terbat Formation of West Sarawak constitutes the first record of conodonts from the Island of Borneo. The occurrence of identifiable age indicative conodonts suggests that with detailed sampling it should be possible to obtain a more refined biostratigraphy of this Formation than is possible with foraminifera. The Terbat Formation spans the Carboniferous - Permian boundary and future studies of the foraminifera and conodonts across this boundary will be of regional and possibly international importance. Due to low conodont yields (one or two specimens per kilo) it is suggested that future conodont samples should be of large size (at least 5 kilos). The conodonts from the Terbat Formation exhibit colours representive of a Colour Alteration Index (C.A.I.) of 4 (Epstein *et al.* 1977) indicating they have been heated to a minimum of 190°C and a maximum of 300°C.

Acknowledgement

I am most grateful to the Geological Survey of Malaysia (Sarawak) for kindly providing transport and assistance for fieldwork in the Terbat area and for shipping samples to Kuala Lumpur for laboratory studies.

References

Cummings, R.H., 1962. Limestones of the Terbat Formation, West Sarawak. *Ann. Rept. Geol. Surv. Dept., Brit. Territories Borneo.* 1961, 36-48.

Epstein, A.G., Epstein, J.B. and Harris, L.D., 1977. Conodont color alteration - an index to organic metamorphism. *U.S. Geol. Surv. Prof. Pap.* 995, 1-27.

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Sanderson, G.A., 1966. Presence of Carboniferous in West Sarawak. *Bull. Am. Assoc. Petrol. Geol.*, Vol. 50, 578-580.

Wilford, G.E., 1965. Penrissen area, West Sarawak, Malaysia. *Geol. Surv. Malaysia (Borneo region)*, Rep. 2, 195 p.

Ziegler, W., 1975. *Catalogue of conodonts* - Schweizerbart'sche Verlagsbuchhandlug, II, 404 p.

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Manuscript received 29 Nov 1984

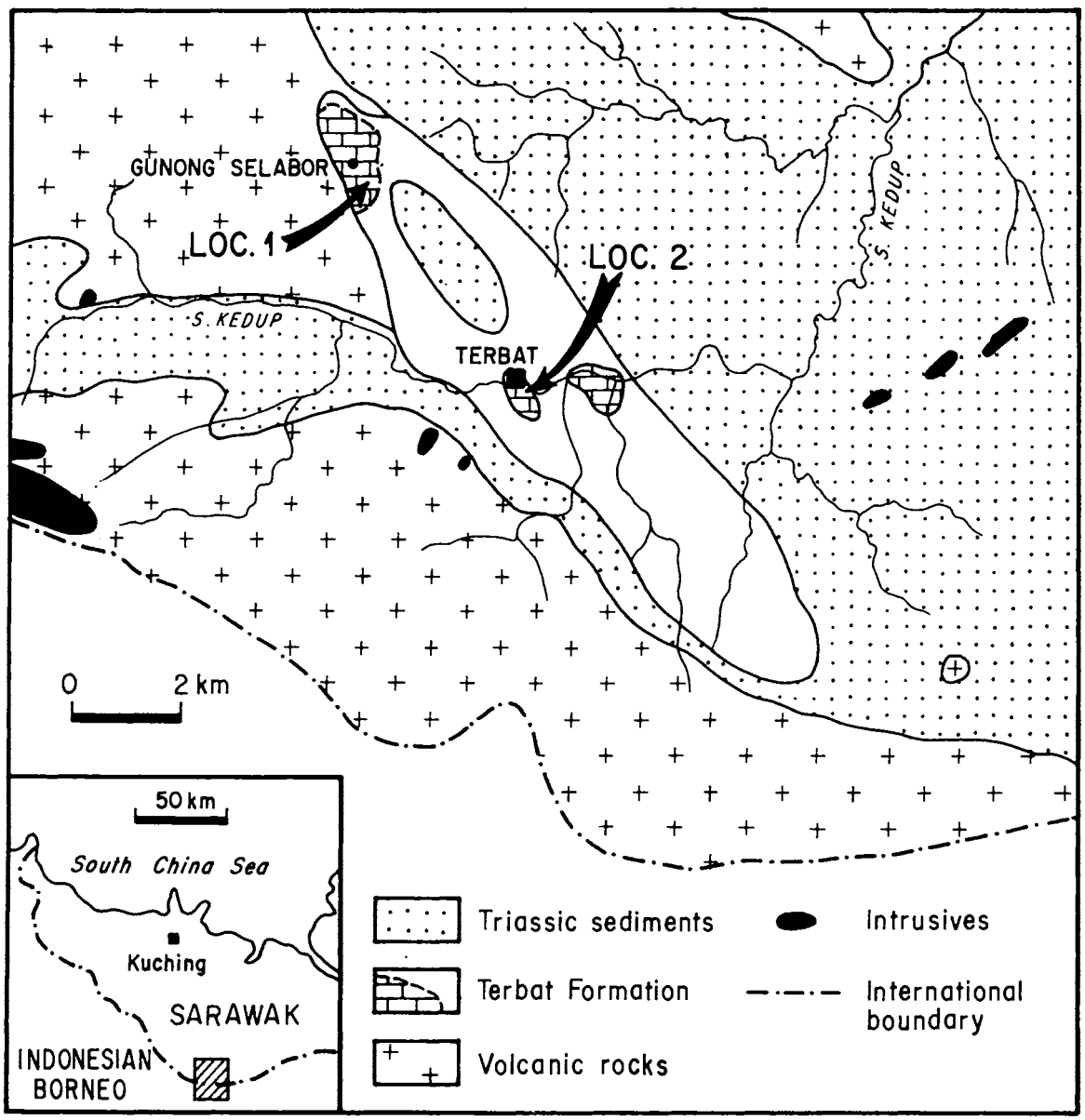

Fig. 1. Sketch map showing the distribution of the Terbat Formation, West Sarawak and conodont localities.

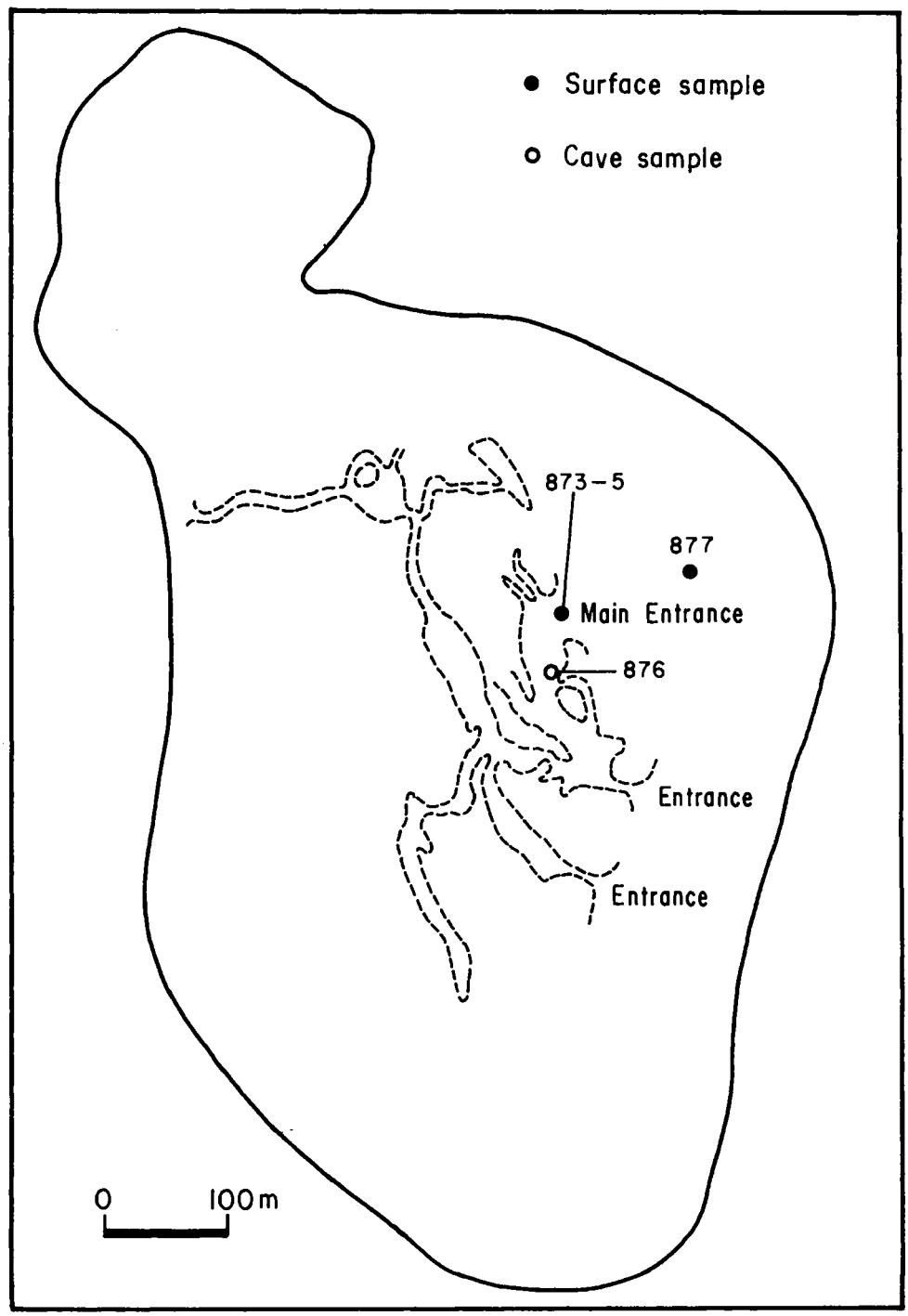

Fig. 2. Outline sketch of Gunong Selabor (Locality 1) showing cave system and location of conodont samples.

KEGAGALAN CERUN DI BUKIT MANTIN: SATU CONTOH GELONGSORAN CERUN TAMBAKAN YANG LAZIM

Ibrahim Komoo, Jabatan Geologi, Universiti Kebangsaan Malaysia, Bangi.

Pada kira-kira jam 7.00 hingga 7.30 malam, 25hb. Disember 1984, satu kegagalan cerun jalan di km 5, jalan lama Seremban - Kuala Lumpur telah terjadi. Kegagalan cerun tambakan telah memusnahkan 2 dari 3 laluan yang tersedia mengakibatkan beberapa kemalangan kecil, kesesakan lalu lintas dan gangguan kepada pengguna jalan raya tersebut untuk beberapa ketika. Laporan dari NST pada 4hb. Jan. 1985 menyatakan biaya pembaikan memerlukan sekurang-kurangnya $700,000.00 dan akan mengambil masa sekitar 6 bulan. Kegagalan cerun di jalan dan lebuh raya di Semenanjung Malaysia merupakan satu fenomenon biasa, kebanyakannya berukuran lebih kecil dan kurang menarik perhatian awam. Walaupun demikian, kegagalan cerun begini telah mengakibatkan biaya penyelenggaraan jalan dan lebuh raya menjadi tersangat mahal. Masalah kegagalan cerun di sepanjang lebuh raya tidak akan dibincang di sini, secara umum perkara ini telah disentuh dalam Ibrahim Komoo (1982, 1984).

Di km 5, jalan lama Seremban - Kuala Lumpur ini, kegagalan cerun boleh dikelaskan sebagai gelonsoran (mengikut Nilsen *et al.*, 1979), iaitu hampir keseluruhan bahan tambak yang membina jalan tersebut tergelonsor sepanjang satu satah gelinciran, dan struktur asal bahan tambakan masih berkeadaan kurang terganggu. Gelonsoran telah menyebabkan jalan selebar 25 m dan panjang melebihi 150 m tergelonsor. Penurunan maksimum muka jalan ialah 5 m, dan ketebalan bahan yang tergelonsor dianggarkan sekitar 15 m (Rajah 1). Oleh itu bahan tambakan yang tergelonsor ditafsirkan melebihi 35,000 m^3.

Faktor utama yang menyebabakan kegagalan hanya dapat dipastikan setelah satu kajian yang mendalam dijalankan. Hal ini sebagaimana yang telah dilaporkan (NST, 4hb Jan. 1985) sedang dan akan diteruskan oleh pihak JKR Negeri. Cerapan dan penyiasatan lapangan yang telah saya lakukan sehari selepas kejadian kegagalan cerun ini diharapkan dapat membantu pihak berkuasa mengupas dan menyelesaikan masalah seumpama ini. Kajian pada bahan tambak yang tersingkap menunjukkan proses tambakan dan pemadatan telah dilakukan dengan sangat baik. Bahan tambak menunjukkan sifat berlapis, sangat padat dan pada beberapa bahagian mulai membatu. Proses pemadatan yang sangat baik ini, di antara yang memyebabkan kegagalan cerun berbentuk gelonsoran berperingkat tanpa mengubah tekstur asal tanah tambak (Rajah 2 dan 3).

Pada kawasan ini batuan dasar (granit) berkedudukan cetek, pada sayap cerun potongan, bersetentangan cerun tambakan yang gagal, tersingkap batuan dasar yang terluluhawa sedikit hingga sederhana, dan sempadan dengan tanah baki di atasnya kelihatan jelas. Oleh itu, gelonsoran bahan tambakan ditafsirkan berpunca dari kehadiran satu zon yang secara relatif nipis, terdiri dari tanah baki granit, menjadi lapisan pemisah antara batuan dasar granit yang kuat dan bahan tambakan yang sangat padat. Tanah baki granit, terutamanya bahan terluluhawa gred V, mempunyai kandungan pasir yang tinggi dan keporosan yang sederhana (35 - 40%) (Ibrahim Komoo, 1985), oleh itu ia berupaya mengumpul air dengan banyak dan menjadi tepu. Melihat keadaan ini jelas faktor utama yang menyebabakan degagalan ialah ujudnya satu zon nipis lapisan tanah baki yang mampu tepu sebagai jalur satah lemah yang menyebabkan

bahan terpadat baik di atasnya tergelonsor. Fenomenon kegagalan cerun seumpama ini lazim dilaporkan, impamanya lihat Zaruba dan Mencl (1969). Walau bagaimanapun dalam kebanyakan hal ia kurang diberikan perhatian, sebab utama ialah pemindahan bahan ini umumnya memerlukan perbelanjaan yang tinggi, tambahan pula, keujudan lapisan sedemikian kurang menimbulkan masalah semasa pembinaan.

Untuk mengatasi masalah ini, pengalaman dari pembinaan empangan isian bahan bumi perlu digunakan. Umpamanya sebelum tambakan teras empangan dilakukan, telah menjadi perkara mesti, semua bahan bumi 'lemah', tanah baki, atau zon batuan terluluhawa, digali dan dipindakan, atau setidak-tidaknya satu sistem pembaikan sifat bahan bumi perlu dijalankan. Untuk pembinaan jalan atau lebuh raya, sekiranya hal ini tidak dapat dilakukan sepenuhnya, sekurang-kurangnya sifat dan keadaan geologi lapisan bawah tanah sepanjang cadangan garis penjajaran perlu disiasat. Dengan kumpulan maklumat yang baik barulah sebarang bentuk langkah keselamatan dan kawalan boleh dijalankan dengan berkesan. Hanya selepas melalui proses penyiasatan tapak yang lengkap, masalah kegagalan cerun dapat dipertanggungjawabkan.

Penghargaan

Pengaran ingin mengucapkan berbanyak terima kasih kepada Prof. H. D. Tjia yang sudi membaca dan memberikan komen yang membina untuk memperbaiki catatan ini.

Rujukan

Ibrahim Komoo, 1982. Hakisan cerun potongan pada batuan metasedimen sepanjang lebuh raya Kuala Lumpur - Seremban. *Ilmu Alam*, 11, 25-39.

Ibrahim Komoo, 1984. Masalah kestabilan cerun di Malaysia. *Proc. Symposium Fakulti Sains Fizis dan Gunaan, UKM.* (Akan terbit).

Ibrahim Komoo, 1985. Engineering properties of weathered rock profiles in Peninsular Malaysia. *Proc. 8th Southeast Asian Geotech. Conf., K.L.* (dalam persediaan).

New Straits Time, 1985. *Cause of Mantin road Collapse.* 4th Jan. 1985.

Nilsen, T.H., *et al.*, Relative slope stability and land-use planning in the San Francisco Bay Region, California. *Geol. Survey Professional Paper 944*, 96 m.s.

Zaruba, Q., & Mencl, V., 1969. *Landslides and their control.* Amsterdam, Elsevier. 214 m.s.

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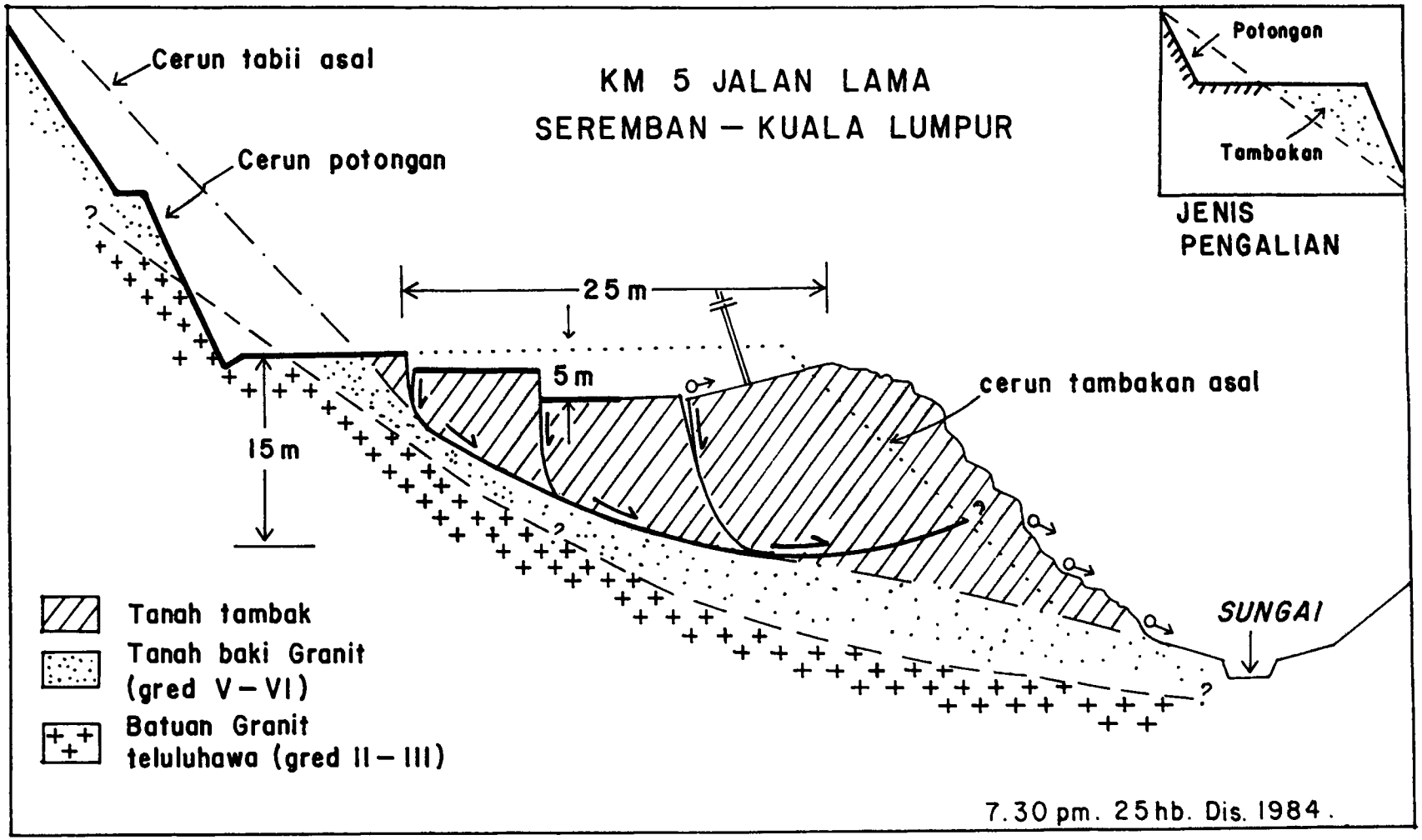
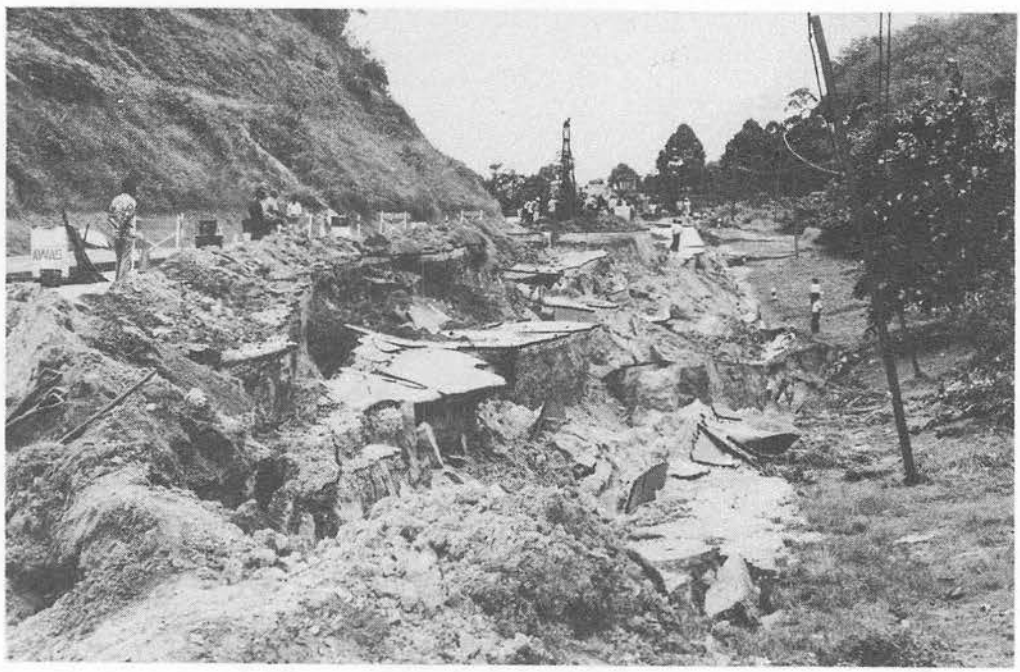
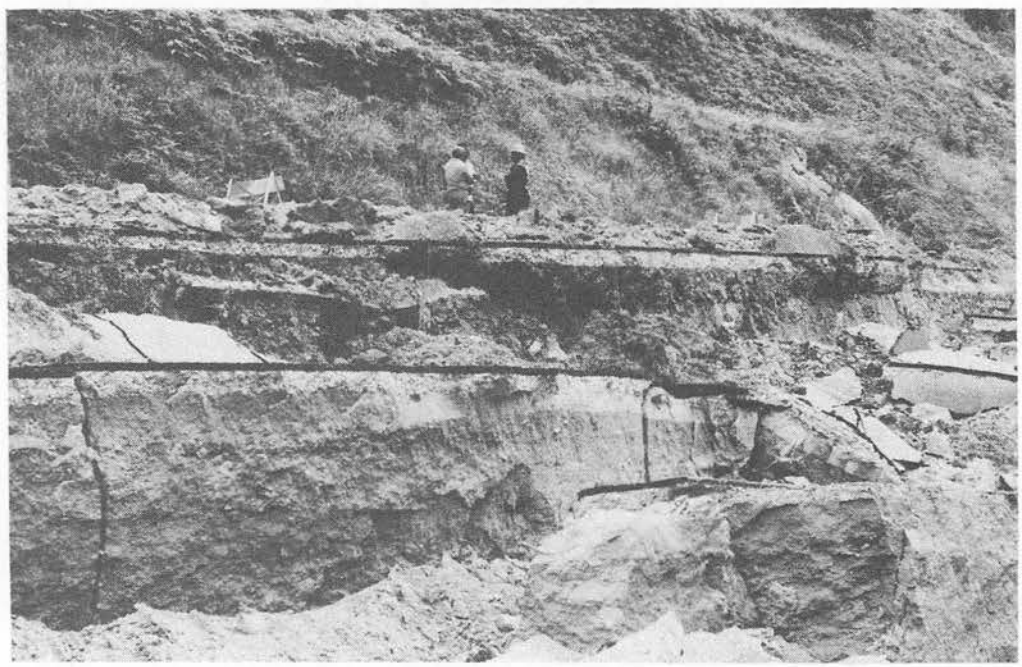
Manuscript received 23 Jan 1985.



Rajah 1. Keratan rentas dan tafsiran mekanisme kegagalan cerun di km 5 jalan lama Seremban-Kuala Lumpur.



Rajah 2. Fotograf menunjukkan gelonsoran berperingkat. Sayap kiri teranjak dan terputar ditunjukkan oleh penyondongan tiang telefon dan tumbuhan.



Rajah 3. Menunjukkan perlapisan bahan tambak yang termampat baik. Sebahagiannya telah mengeras dan membatu.

ERRATA

WARTA GEOLOGI, Vol. 10, No. 5, (Page 190)
Turquoise Found in Tras/Raub, Pahang

Paragraph 9 should read

The turquoise was identified by X-ray diffraction methods. There were two varieties:

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PERTEMUAN PERSATUAN
(MEETINGS OF THE SOCIETY)

TECHNICAL TALK

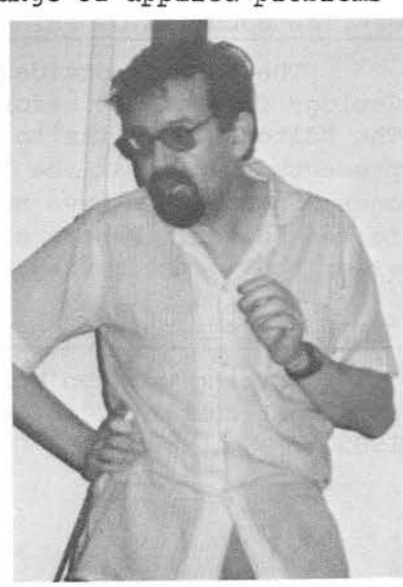
D.I. Smith: Limestone Groundwater Hydrology

Summary

The rates of groundwater movement in limestone aquifers exhibit very wide variations. Intergranular flow may be of the order of a metre or two per year in contrast to flow in solutionally enlarged fissures which have a velocity of several kilometres per day. In most carbonate terrains both flow types are present but the proportions vary. The fast fissure flow is turbulent and Darcian conditions do not apply.

Information on the pattern and velocity of fissure flow has been aided by the application of groundwater tracers. Particulate tracers, in the form of *Lycopodium* spores, provided useful results but the development of reliable field fluorimeters has led to the use of quantitative tracing with fluorescent dyes. The most successful dye is Rhodamine WT which can be detected at a concentrations of about one part in 10^{11}. Radioactive tracers are also technically efficient but the equipment and restrictions on eht use of such tracers renders them difficult for widespread use. Successful traces with fluorescent dyes over distances of tens of kilometres have aided studies of a range of applied problems in water resources in carbonate aquifers.

For most tracing work the dye is injected into a surface stream sink and detected at nearby springs. It is common for a single input to be detected at more than one spring and for flow lines 'cross' underground without mixing. Fluorometric methods can also be used to study dilution in single boreholes, the rate of dilution is proportional to the rate of groundwater movement. In favourable cases dye tracing can be combined with pulse wave hydrology to gain further hydrogeological information.



Thus tracers offer a technique with which to obtain further information on groundwater movement in carbonate aquifers -

often in circumstances where the application of techniques based upon Darcian flow are inappropriate. The techniques can also be used in non-carbonate aquifers provided that the flow rates are at the 'fast' end of the groundwater spectrum.

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BERITA PERSATUAN
(NEWS OF THE SOCIETY)

PENERBITAN PERSATUAN (PUBLICATIONS OF THE SOCIETY)

WARTA GEOLOGI

The Editor is greatly in need of more articles and geological notes. Members (an non-members) are urged to send in their notes/ articles in, so that they can be reviewed and published in the Warta. So come on all you authors get cracking and start sending your articles in.

BULLETINS

The proofs of Bulletin 17 are being read now and this voluminous bulletin should be circulated before the AGM. As many of you are aware Bulletins 18 and 19 will consist of papers presented at the GEOSEA V and both these volumes will be released by August 1985. The Editor would be glad to receive manuscripts for Bulletin 20 which will be published in 1986. Please send your manuscripts in early so that the review process can begin. This would also ensure that Bulletins are released early.

GEOSEA V PROCEEDINGS

To-date 93 papers have been received for publication, while another few are expected shortly. The initial reviews of over 70 papers is complete. The preparation for the publication of these two volumes (Bulletin nos. 18 and 19) are well on hand and we hope to have them released on schedule.

SPECIAL BULLETIN ON PETROLEUM GEOLOGY

The GSM is considering publishing a special bulletin on Petroleum Geology for release before the next Petroleum Geology Seminar in 1985. The Editor would like to appeal to authors - particularly those who have presented papers at the last Petroleum Geology Seminar in 1984 or earlier ones whose papers have not yet been published elsewhere to submit them to the Editor. Papers of course will only be accepted for publication after the normal review.

THAI-MALAYSIA BORDER CORRELATION

Editing work on Volume II consisting of Late Papers and Discussions is almost complete, and we hope to release this to members around May 1985.

S. Paramananthan

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MESYUARAT AGUNG TAHUNAN (ANNUAL GENERAL MEETING)

The Annual General Meeting of the GSM will be held at 2.30 p.m. on Saturday, 13th April 1985 at Hotel Dayang, Petaling Jaya, Selangor.

All members are requested to attend. Members who wish to have other matters included in the Agenda or to propose amendments to the Constitution are requested to write to the Hon. Secretary to reach him not later than the 4th of April 1985.

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MAJLIS MAKANAN TAHUNAN (ANNUAL DINNER)

The GSM will be holding its Annual Dinner on Saturday, 13th April 1985 at 7.30 p.m. at Hotel Dayang, Petaling Jaya. Dressing is either Batik or informal and the cost per person is M$30.00.

Please make every effort to come to this gala event and renew your friendship with other members. Bring along your wife and/or your partner. Come and enjoy a 8-course Chinese Dinner (Halal).

During this Dinner we hope to present the Honorary Membership to Mr. S.K. Chung, the former Director-General of the Geological Survey of Malaysia.

The Award for the Young Geoscientist for 1983 will also be presented during the Dinner.

The Council hopes the many members will turn-up for the Dinner. This is <u>your</u> Society and we need <u>your</u> support to make this Annual Dinner a memorable one. So see all of you there.

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KEAHLIAN (MEMBERSHIP)

The following membership applications were approved by the Council:

<u>Full Members</u>

1. Low Cheng Foo, Petronas, Exploration, P.O. Box 12444, K.L.
2. Loh Chiok Hoong, Geological Survey, P.O. Box 1015, Ipoh, Perak.
3. Wong Hin Fatt, Exploration, Petronas, P.O. Box 12444, K.L.
4. Johnny A. Kading, Sarawak Shell Bhd., ITA, Lutong, Sarawak.
5. Tengku Daud Shaifuddin b. Tengku Zainudin, Petronas-Carigali, P. O. Box 12407, K.L.
6. Terlochan Singh c/o Karnail Singh, P.O. Box 12366, K.L.
7. Md. Jamil Hj. Said, Petronas Carigali, P.O. Box 12407, K.L.
8. Abd. Kadir Ishak, Unit Tenaga Nuklear, Kompleks Puspati, Bangi.
9. James R. Jennings, Geology Dept., Southern Illinois Univ., Carbondale, Ill. 62901, USA.
10. Tony Whitbread, Phillips Petroleum Co., Goldhill Plaza, Newton Road, Singapore 1130.

<u>Student Members</u>

1. Shahrul Amar Abdullah, 501 Annie Glidden Road, Univ. Apt. B-5, Dekalb, Ill. 60115, USA.

2. Lim See Peng, 99 Jalan Merdeka, Batang Berjuntai, Selangor.
3. Mohd. Shukri Abdullah Sani, 5, Jalan 55, Selayang Baru, Batu Caves, Selangor.
4. Jasni Yaakub, Jabatan Geologi, Universiti Kebangsaan Malaysia, Bangi.
5. Ong Chu Yin, Jabatan Geologi, Universiti Kebangsaan Malaysia, Bangi.
6. Che Di Basirah, Jabatan Geologi, Universiti Kebangsaan Malaysia, Bangi.
7. Shamsudin Jirin, Jabatan Geologi, Universiti Kebangsaan Malaysia, Bangi.
8. Izman Hamid, Jabatan Geologi, Universiti Kebangsaan Malaysia, Bangi.
9. Mohamad Basir Yusoff, Jabatan Geologi, Universiti Kebangsaan Malaysia, Bangi.
10. Sriyanee De Silva, 8, Jln. 1/3, Petaling Jaya.
11. Mohd. Salleh Salehin, K1D-210, Kamsis A, Universiti Kebangsaan Malaysia, Bangi.
12. Mat Niza Abdul Rahman, K1C 108, Kamsis A, Universiti Kebangsaan Malaysia, Bangi.
13. Mohd. Mokhtar Saidin, Jabatan Geologi, Universiti Kebangsaan Malaysia, Bangi.

Institutional Member

1. Bina Running Sdn. Bhd., 24, Jln. SS2/66, Petaling Jaya. (Attn: Toh Ah See).

Associate Members

1. Ali Mohmad Ismail, MMC, 4129A, Jln. Tengku Ismail, Off Jln. Talipot, Kota Bharu, Kelantan.
2. Soh Swee Tiam, Hashim & NEH Consulting Engineers, 62 & 64, Jalan SS2/72, Petaling Jaya.

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Pertukaran Alamat (Change of Address)

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

1. Sia Hok Kiang, Osborne & Chappel International, P.O. Box 67, Ipoh, Perak.
2. Mohamad Ali Hasan, Dept. of Environmental Sciences, Hydrogeology Section, University of Lancaster, Lancaster LA1 4YQ, England.
3. Peter J. Walls, 34 Miles Road, Toronto, Obtario, Canada M8V 1V3.

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Pertambahan Baru Perpustakaan (New Library Additions)

The following publications were added to the Library:

1. Some geochemical and geophysical orientation surveys on the Island of Bangka, Indonesia by U Ko Ko. 1984.
2. Tin, vol. 12, No. 1, 1985.
3. Geophysical Research Bulletin, vol. 22, nos. 2 & 3, 1984.
4. National Library Singapore, adult reference collections, accessions list, Oct - Dec. 1984.
5. AAPG Explorer, Dec. 1984.

6. Petroleum News, vol. 15, nos 10 & 11, 1985.
7. Seatrad Library, Acquisitions list, 1984.
8. Commonwealth Science Council, Newsletter Jan-Feb 1985.
9. Chronique de la recherche miniere, no. 477, 1984.
10. Seatrad Bulletin, vol. v, no. 4, 1984.
11. The University of Kansas, Palaeontological Contribution, article 66, 1984.
12. Seatrad Library, Periodicals list, Dec. 1984.
13. AGID News, nos. 39 - 41, 1984.
14. IMM Bulletin, nos. 935 & 937, 1984 and 938, 1985.
15. Distribution of tin and associated elements in soils at Ulu Petal, Bujang Melaka, Perak, Malaysia by W.K. Fletcher, et al., 1984.
16. Comparison of decomposition with HF and HCl: HNO_3 for determination of Li in geochemical samples by W.K. Fletcher, et al., 1984.
17. Dispersion of F and Li in the Sungei Petal, Bujang Melaka: supplement to report of investigation no. 24 by W.K. Fletcher, et al., 1984.
18. Representativeness of alluvial drilling data as obtained by Bangka drilling and panning in the Gopeng area, Kinta Valley, Malaysia by H. van Wees and Boy I. Sumadiguna, 1984.
19. Preliminary synthesis of the geology of Bangka Island, Indonesia by U Ko Ko, 1984.
20. Pulp density measurement at Bayas Tudjoh Mine by Vichit Boonrasri and others, 1984.
21. Manual for analytical determination of trace elements by colorimetry and atomic absorption spectrophotometry by Lim Ngang Chuang, 1983.

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BERITA-BERITA LAIN
(OTHER NEWS)

A Code for Field Work

Recent letters to GEOTIMES have deplored instances of vandalism at classic outcrops. And last month, we commented on the desirability of more active participation by geologists in local environmental and conservation societies. Both concerns are well covered, we think, in A Code for Geological Field Work, issued by the Geologists' Association, London and called to our attention by a colleague who believes that it deserves wider circulation. The Code is reprinted here by permission of the Association (omitting only a short section referring to the British Health and safety at work act).

A geological 'code of conduct' has become essential if opportunities for field work in the future are to be preserved. The rapid increase in field studies in recent years has tended to concentrate attention upon a limited number of localities, so that sheer collecting pressure is destroying the scientific value of irreplaceable sites. At the same time the volume of field work is causing concern to many site owners. Geologists must be seen to use the countryside with responsibility; to achieve this, the following general points should be observed.

1. Obey the Country Code, and observe local byelaws. Remember to shut gates and leave no litter.
2. Always seek prior permission before entering private land.
3. Don't interfere with machinery.

4. Don't litter fields or roads with rock fragments which might cause injury to livestock, or be a hazard to pedestrians or vehicles.
5. Avoid undue disturbance to wildlife. Plants and animals may inadvertently be displaced or destroyed by carless actions.
6. On coastal sections, consult the local Coastguard Service whenever possible, to learn of local hazards such as unstable cliffs, or tides which might jeopardise excursions possible at other times.
7. When working in mountainous or remote areas, follow the advice given in the pamphlet Mountain safety, issued by the Central Council for Physical Education, and, in particular, inform someone of your intended route.
8. When exploring underground, be sure you have the proper equipment, and the necessary experience. Never go alone. Report to someone your departure, location, estimated time underground, and your actual return.
9. Don't take risks on insecure cliffs or rock faces. Take care not to dislodge rock, since other people may be below.
10. Be considerate. By your actions in collecting, do not render an exposure untidy or dangerous for those who follow you.

Collecting and field parties

1. Students should be encouraged to observe and record but not to hammer indiscriminately.
2. Keep collecting to a minimum. Avoid removing *in situ* fossils, rocks or minerals unless they are genuinely needed for serious study.
3. For teaching, the use of replicas is commended. The collecting of actual specimens should be restricted to those localities where there is a plentiful supply, or to scree, fallen blocks and waste tips.
4. Never collect from walls or buildings. Take care not to undermine fences, walls, bridges or other structures.
5. The leader of a field party is asked to ensure that the spirit of this Code is fulfilled, and to remind his party of the need for care and consideration at all times. He should remember that his supervisory role is of prime importance. He must be supported by adequate assistance in the field. This is particularly important on coastal sections, or over difficult terrain, where there might be a tendency for parties to become dispersed.

Visiting quarries

1. An individual, or the leader of a party, should have obtained prior permission to visit.
2. The leader of a party should have made himself familiar with the current state of the quarry. He should have consulted with the Manager as to where visitors may go, and what local hazards should be avoided.
3. On each visit, both arrival and departure must be reported.
4. In the quarry, the wearing of safety hats and stout boots is recommended.
5. Keep clear of vehicles and machinery.
6. Be sure that blast warning procedures are understood.
7. Beware of rock falls. Quarry faces may be highly danerous and liable to collapse without warning.
8. Beware of sludge lagoons.

Research workers

1. No research worker has the special right to 'dig out' any site.

2. Excavations should be back-filled where necessary to avoid hazards to men and animals and to protect vulnerable outcrops from casual collecting.
3. Don't disfigure rock surfaces with numbers or symbols in brightly coloured paint.
4. Ensure that your research material and notebooks eventually become available for others by depositing them with an appropriate institution.
5. Take care that the publication of details does not lead to the destruction of vulnerable exposures. In these cases, do not give the precise location of such sites, unless this is essential to scientific argument. The details of such localities could be deposited in a national data centre for geology.

Societies, schools and universities

1. Foster an interest in geological sites and their wise conservation. Remember that much may be done by collective effort to help clean up overgrown sites (with permission of the owner, and in consultation with the Nature Conservancy Council).
2. Create working groups for those amateurs who wish to do field work and collect, providing leadership to direct their studies.
3. Make contact with your local Country Naturalists' Trust, Field Studies Centre, or Natural History Society, to ensure that there is coordination in attempts to conserve geological sites and retain access to them.

Geotimes, Nov. 1984.

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Senarai Disertasi Semester 1 Sesi 1984/85, Jabatan Geologi, Universiti Kebangsaan Malaysia
(List of dissertations, semester 1 Session 1984/85, Dept. of Geology, National University of Malaysia)

1. Geologi Struktur dan Stratigrafi Kawasan Karak-Lanchang, Pahang: Basharuddin Ismail (Penyelia: ZH, JMA).
2. Geologi Struktur Kawasan Petaling Jaya Selatan-Pucung: Ruslim Haron (Penyelia: THD).
3. Sifat Fizik dan Mekanik Batuan Basalt Segamat, Johor: Mohd. Hashim Yaccob (Penyelia: IBK).
4. Geologi dan Geofizik (Kemagnetan) Kawasan Segamat, Johor: Ibrahim Lab (Penyelia: ARS)
5. Sifat Fizik dan Mekanik Batuan Granit Semenyih, Selangor: Mohammed Satari Hj. Hashim (Penyelia: IBK).
6. Geologi Struktur Bentong-Teranum, Pahang: Ishak Abd. Manaf (Penyelia: THD)
7. Geologi Kejuruteraan Kawasan Pulau Pinang: Sinnasamy a/l Suppiah (Penyelia: IBK).

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Obituary - Paul Liechti

Paul Liecht, who died in his native town of Emmental, Switzerland,

on 18 August 1984 at the age of 78, made a significant contribution to the geology of Southeast Asia during his short stay in the region. He studied in Bern and Berlin, and was awarded his doctorate in geology. After teaching at one of the Hermann Lieds schools in Germany in 1933, he worked in Bern from 1934-36 for the department dealing with underground construction.

In 1936 he joined Shell, and worked in California, Alaska, and Columbia, Peru, and Venezuela. He was transferred to Balikpapan, Kalimantan, in 1949, and joined the Royal Dutch Shell Group based in Seria, Brunei, as a photogeologist in 1952. He retired as Chief Geologist in 1959 and worked for the Societe National de Petrole d'Aquitaine in France, Spain, and later in Algeria, Argentine, USA, and the Philippines. In 1974 he mapped part of Bunguran (Natuna) Island, and in the 70's spent some time in Turkey, during which he gained a considerable knowledge of the many archaeological and historic sites there.

He is known to Malaysian geologists mainly as the senior author of "The geology of Sarawak, Brunei, and the western part of North Borneo", published as Bulletin 3 of the Geological Survey Department, British Territories in Borneo, and based on work by geologists of the Shell Group and the Geological Survey. Paul Liechti was a very experienced field geologist, and an excellent photogeological interpreter, a skill reflected in the detailed photogeology shown on the 1:500,000 maps in Bulletin 3. An important fault discovered by him from air photographs of the Jerudong Oilfield area of Brunei, was named the "Liechti Fault" in his honour by his colleagures in the Exploration Department of Shell in Seria. Paul was a rugged individualist with a refreshing sense of humour who found conformity to the model of a bland company man uncongenial, if not downright impossible. His reading was wide and deep, and he was particularly influenced by Jungian philosophy. Besides his mother tongue of Swiss-German, he was at home in German, French, English, and Spanish, and had a working knowledge of Malay and Turkish.

His wife, Luise Ronnefeldt from Frankfurt a. M., whom he married in 1933, pre-deceased him. He is survived by a son and a daughter, and three grandchildren.

N.S. Haile

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BERITA DARI UKM (NEWS FROM UKM)

Pada 1 November 1984, Jabatan Geologi UKM telah ditambahkan dengan seorang ahli akademik yang baru. Tenaga yang dimaksudkan ialah Dr. Abdul Ghani Mohd. Rafek yang baru pulang dari German Barat setelah menerima Ijazah Ph.D. (Dr. rer. nat.) dari Universiti Ruhr, Bochum, Jerman Barat dalam bidang Geologi Kejuruteraan.

Dr. Abdul Gahni Rafek berasal dari Kuala Lumpur. Beliau telah mendapat didikan asas di Victoria Institution, sebelum menuntut di Jabatan Geologi, Universiti Malaya pada tahun 1974. Setelah menerima ijazah B.Sc. (Hons). pada tahun 1978 beliau terus berlepas ke Jerman Barat dengan biasiswa Pertukaran Akademik Jerman (German Academic Exchange Services) untuk melanjutkan pelajarannya lagi. Sebelum memulakan pelajaran beliau terpaksa mengikuti satu kursus Bahasa German selama enam bulan di Friesburg.

Di Universiti Ruhr, Bochum, Dr. Abdul Ghani berpeluang mengikuti

beberapa kursus lanjutan mengenai geoteknik dan geologi kejuruteraan serta kursus Geologi Eropah. Pada pertengahan tahun 1980 beliau memulakan penyelidikan untuk memenuhi syarat bagi mendapatkan ijazah Ph.D. Penyelidikan tersebut melibatkan kajian kegunaan kaedah geofizik dalam penjelajahan geoteknik. Dalam masa yang sama Dr. Abdul Ghani diperlukan mengambil satu peperiksaan khas dalam geologi, geofizik dan geoteknik untuk membolehkan kelulusan beliau dari Malaysia dinilaikan kerana wujudnya perbezaan sistem dan taraf kelulusan pelajaran tinggi di German Barat dengan di Malaysia.

Pada masa penyelidikan dijalankan beliau juga sempat bekerja separoh masa dengan satu syarikat geoteknik. Pelajaran serta penyelidikan beliau tamat pada Jun 1984.

Syed S. Almashoor

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PANEL OF INQUIRY

Sahabat Alam Malaysia (SAM) called today for the setting up of a commission of inquiry to investigate the recurrence of highway mishaps the past one week.

Its president, Encik S.M. Mohamed Idris, said the commission should also look into the workings of the Malaysian Highway Authority and the Public Works Department in their planning and management of highways projects.

'SAM is of the view that proper environmental impact assessments, geological surveys and safety tests should have been carried out before the construction of highways' he added.

Such assessments, he said, should be incorporated into the planning studies of highways.

Encik Idris said that this would guarantee the safety of the projects once they were completed and prevent possible landslips and cave-ins.

Star, 29.12.84.

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MAN-INDUCED LAND SUBSIDENCE

Man-induced land subsidence is a new volume just announced in the Reviews in Engineering Geology series published by the Geological Society of Ameria (GSA), edited by Thomas L. Holzer.

The topic is timely because land subsidence presents serious problems world wide. In the U.S. alone land subsidence has been caused by man's activities in at least 37 states, affects an aggregate area estimated at more than 40,000 square kilometers, and has had a related economic impact estimated at more than $100 million annually.

This new GSA volume includes nine papers arranged in three categories: (1) Fluid withdrawal from porous media; (a) Drainage of organic soil; and (3) Collapse into man-made and natural cavities.

GSA Review In Engineering Geology VI (ISBN O-8137-4106-8) is hard-bound, 8-1/2" x 11" format, with dust cover. It has 231 pages, is illustrated, and features Cataloging in Publications (CIP). The price is $28.00, U.S. funds, GSA pays surface postage on prepaid orders.

Copies may be ordered from GSA Publication Sales, P.O. Box 9140, Boulder, Colorado 80301. Check, money order, American Express, CHOICE, MC, or VISA are accepted, as well as all non-U.S. versions of MC & VISA.

News Release from Geological Society of America, Nov. 1984.

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JOURNAL OF SOUTHEAST ASIAN EARTH SCIENCES - ANNOUNCING A NEW JOURNAL IN THE EARTH SCIENCES

Aims & Scope

The Journal of Southeast Asian Earth Sciences is an international interdisciplinary journal devoted to all aspects of research related to the earth sciences in Southeast Asia. Papers featured will include the results of research on regional geology, economic geology, geochemistry, petroleum geology, petrology, paleontology, geophysics (seismology, magnetics, electrical and gravity), structure, tectonics, geomorphology, engineering geology, Quaternary geology and analysis of sedimentary basins.

The geographical area covered by the journal is taken to include Burma, Thailand, Malaysia, Vietnam, Kampuchea, Laos, Hong Kong, Singapore, Indonesia, Papua New Guinea and The Philippines. Papers covering Japan, China and Korea will be considered also, but the subject matter should be of regional interest and related to other parts of this region (e.g. tin-tungsten in China and Korea, petroleum basins off Japan and China, heat flow studies, etc.). The Indian sub-continent is a separate geological unit and only certain aspects of Indian geology which have some bearing on Burma, Thailand, Malaysia and Indonesia can be considered for publication.

Subscription Information

The first issue of the Journal of Southeast Asian Earth Sciences is due in late 1985 and the journal will be published quarterly.

Price to be announced.

Further information can be obtained from Pergamon Press, Headington Hill Hall, Oxford OX3 OBW, U.K. or Fairview Park, Elmsford, New York, 10523, USA.

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SOME ASPECTS OF TIN FUMING AS A TOOL FOR MINERAL PROCESS ENGINEERS

Introduction

In recent years papers on fuming processes for treatment of low

grades tin ores and slags have been included on the agenda of metallurgical conferences around the world. These papers have generally discussed the reaction chemistry, thermodynamics and operational features of fuming plants, and as such have been of more interest to extractive metallurgists. This paper presents the process in simple terms, and suggests some advantages of access to a fuming facility for miners and mineral processors.

Tin extraction from hard rock deposits

Flowsheet development at hard rock mines, with the improvements in cassiterite flotation technology, has tended towards an overall philosophy for tin recovery which provides for easily liberated cassiterite to be extracted by gravity methods to a medium grade (35%-55% Sn) and fine grained and composite material to be extracted by gravity and flotation into a low grade concentrate (5%-20% Sn) at high recovery. This low grade concentrate can then be upgraded by fuming to 60%-65% Sn. If the fuming plant is an integral part of a tin smelting flowsheet, then tin fume and gravity concentrates may be combined for smelting to tin metal. The tin bearing slag from this stage can be recycled to the fuming stage.

Fuming technology

The fuming process is carried out at elevated temperatures, the volatile valuable product (tin fume) is recovered in a collecting unit, and the residual valueless product (slag) is removed from the fuming furnace when the reaction is complete. Types of collecting units include bag houses and electrostatic precipitators, whilst rotary kilns, shaft furnaces, cyclone furnaces, fluidised bed roasters or flash smelting furnaces have all been utilised for the reaction vessels.

For tin, sulphide and chloride technology is possible, however, the sulphide route has been the most successful to date. The following description generally applies to commercial fuming plants currently in operation using sulphide technology.

In essence, low grade concentrates or tin rich slags, together with suitable fluxes are melted in a blast furnace. Carbon in some form is added to create a reducing atmosphere, then sulphur in some form is added. Pyrite or pyrrhotite may be used. The tin oxide under these conditions converts to tin sulphide without passing through the metallic phase, and evolves from the melt. In the throat of the furnace secondary air is added, and a reaction to tin oxide and sulphur dioxide occurs. The tin oxide fume is then collected in a suitable filter (Figs. 1 and 2).

Although low grade concentrate fuming is a molten state process incorporating chemical changes it will be noted from the following simplified reactions that the final tin molecule is identical with that of the natural mineral and in essence the operation can be described as a concentration process. This fact is most important when considering introduction of the process in countries where a government levy is made on sales of tin concentrate.

$$SnO_2 + \text{gangue} + \tfrac{1}{2}C + FeS \rightarrow$$
$$SnS\uparrow + \text{gangue} + FeO + \tfrac{1}{2}CO_2\uparrow \quad - \quad (1)$$

$$SnS + 2O_2 \rightarrow SnO_2 + SO_2\uparrow \quad - \quad (2)$$

From equations (1) and (2) it can be seen that stannous sulphide is the

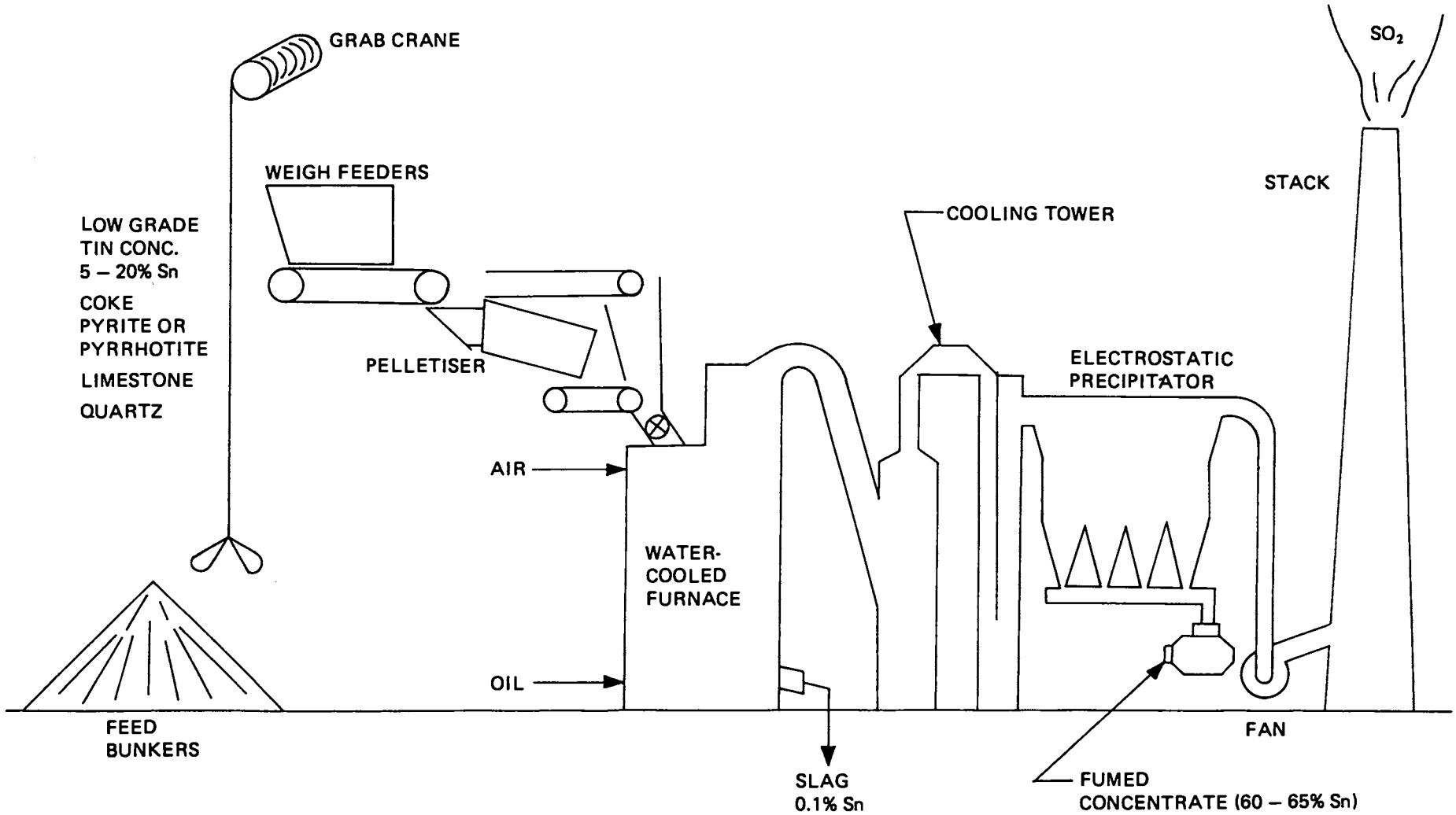

Fig. 1. Fuming plant schematic.

1. Bottom cooling jacket
2. Cooling jacket
3. Furnace flue
4. Taphole for total discharge
5. Working taphole
6. Nozzles for fuel and combustion air
7. Feed charge entry
8. Nozzles for afterburning combustion air
1. Filling level of slag at the beginning of smelting
11. Filling level of slag after smelting

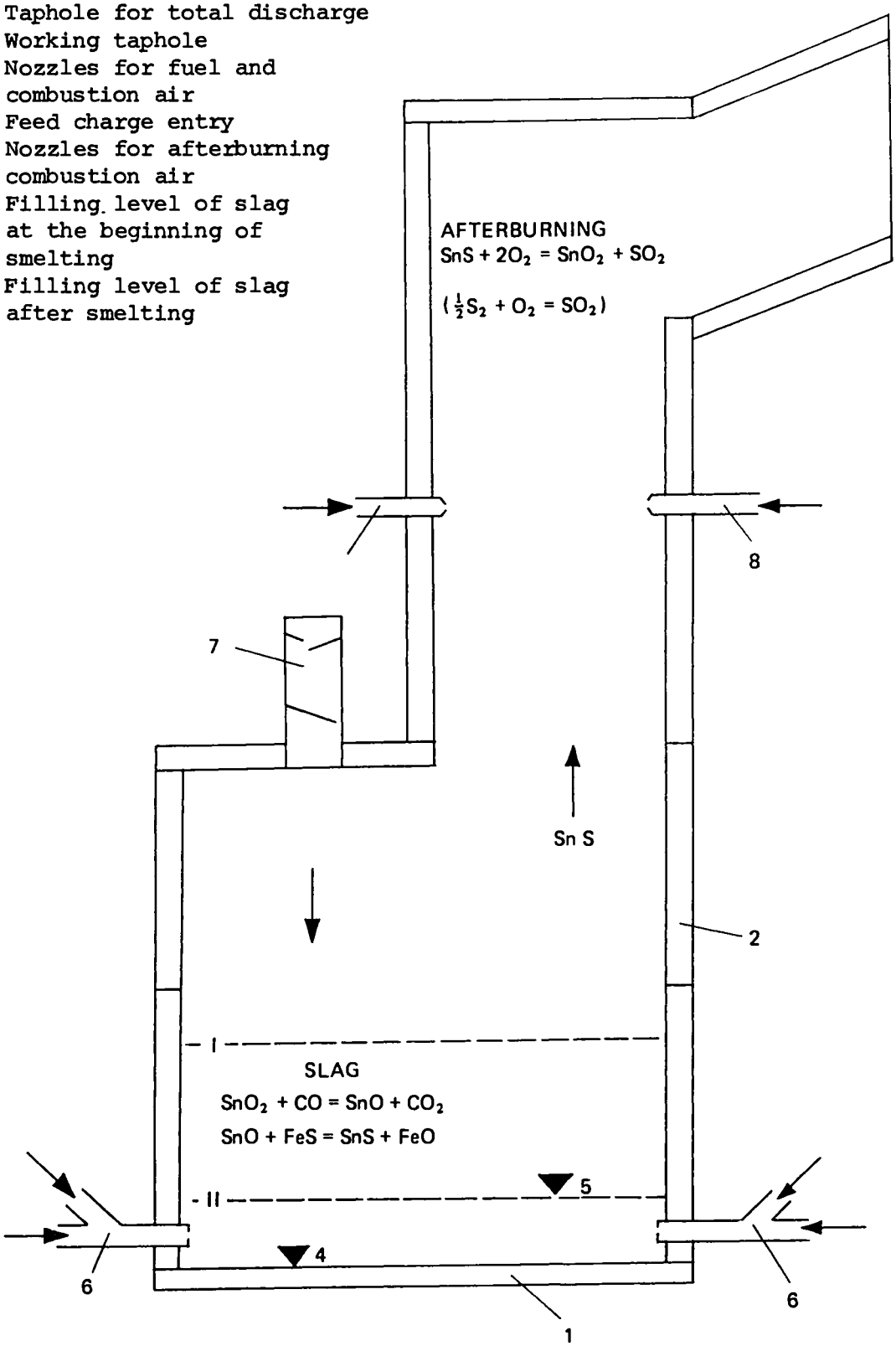

Fig. 2. Fuming furnace main features

volatile tin molecule which is converted back to the cassiterite (SnO_2) form, the significant outcome being the separation of the valuable tin component of the low grade feed from the valuables gangue constituents.

Sulphide fuming technology is gaining in popularity now that extractive metallurgists appreciate its value for replacing the traditional slag cleaning techniques. In some operations one fuming furnace is used for simultaneous slag cleaning and low grade concentrate processing.

Applications of fuming

Tin fuming being a pyrometallurgical process is expensive, and should only be used for tin concentrate upgrading where conventional mineral dressing fails due to grain size, other mineral association, or there is significant benefit in offsetting grade against increased recovery from a low grade, complex ore type. Fuming may also show cost benefits in complex ore processing if expensive mineral dressing processes such as regrinding or floatation can be eliminated or reduced. As an integral part of a tin smelter for primary slag treatment it may show operational, metal recovery, and cost benefits over 'classical' treatment (Figs. 3 & 4).

Examples of the aforementioned are:

1. Tin-iron deposits such as those in Johore State of Malaysia which have to be worked at enormous expense to recovery to achieve saleable grades to smelters due to intimate association of the tin and iron oxide minerals, and fine grain size of the cassiterite

2. Complex lode tin deposits associated with iron sulphides such as those occurring in Tasmania and Cornwall. A general treatment flowsheet is suggested for extraction of tin from iron sulphide or iron oxide deposits (Fig. 5).

3. Deposits in North Queensland and Malaysia, where some of the tin occurs as atoms in the lattice of an iron mineral allowing only low grades to be produced regardless of recovery. This mineral has been christened 'Gillianite' in Queensland and 'Malayaite' elsewhere.

4. Tailings dumps from tin workings worldwide containing fine grained cassiterite, composites and extremely low tin content.

5. Tin bearing tailings streams from operations deemed too low grade for

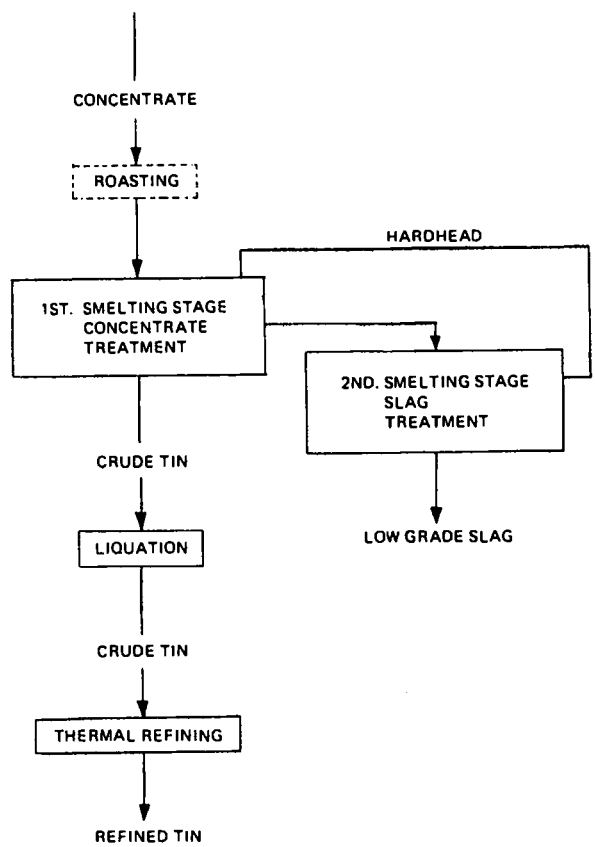

Fig. 3. Classical process flowsheet of tin smelting which has been used for centuries.

economic conventional recovery methods such as occur at lead-zinc mines in Canada.

6. Tailings from tin concentrate dressing plants known as 'AMANG' in South East Asia. Fuming could be used advantageously solely, or in conjunction with conventional plant in the above cases. (1-6).

7. Any smelter with the 'classical' flowsheet could also benefit from addition of a fuming facility.

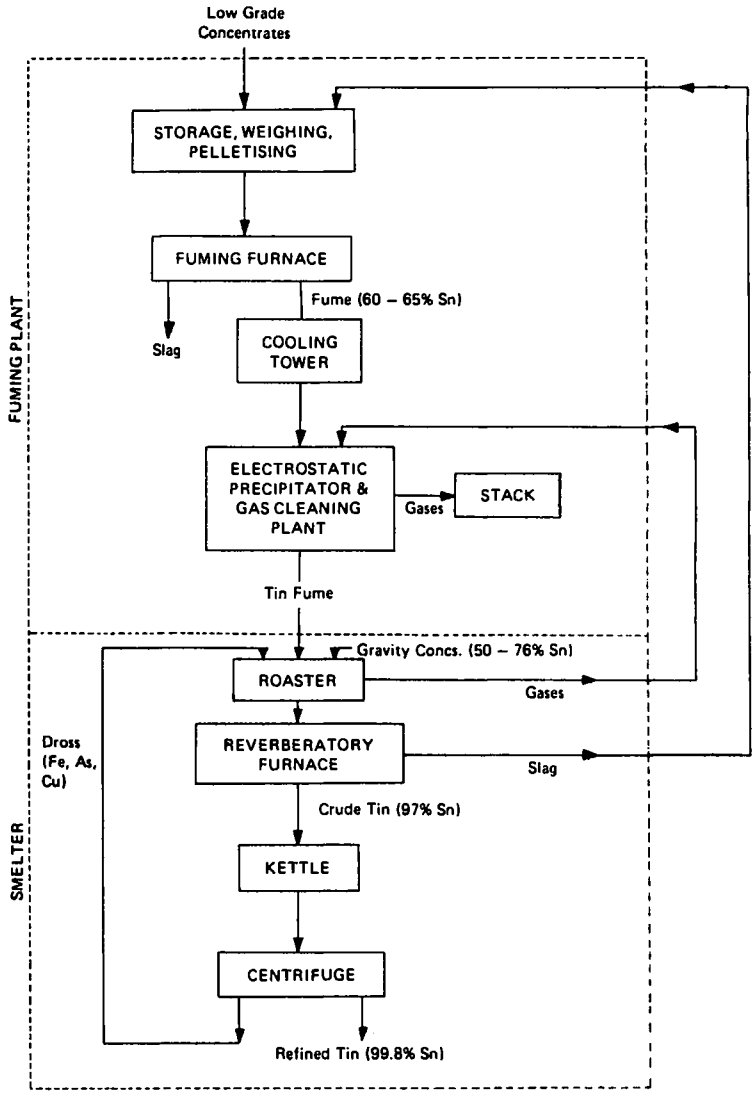

Fig. 4. Extension of fuming to smelting

In the case of Malaysia, Thailand and Indonesia, apart from any benefits associated with replacement of Primary slag treatment plant, deposits not now worked, or worked very inefficiently due to their complex nature may then be developed. The Government levy on a concentrate weight basis in these countries makes conventional processing to high grades, uneconomic in most cases. Fuming, being a high recovery concentrate beneficiation process, should mean that the tax is levied on the high grade fume product. Further, the facility would allow the smelter to purchase more 'dirty' concentrates from overseas. Current intake relies on dilution with clean, high grade, alluvial concentrates. The 'classical' flowsheet cannot tolerate an excess of this as has been demonstrated at smelters in parts of the world not having abundant supplies of high grade, low tramp element concentrates as a major part of the feedstock. In these cases, fuming provides an answer, particularly to the problem of iron build up via the primary slag.

In studies carried out, fuming has been found to be economic for treating material as low as 3% Sn content in some cases. Geographical location, incentive for recovery improvement, capital and operating cost will be factors having most bearing on the definition of 'low grade'.

Conclusion

Fuming can be of major benefit to both mining and smelting organi-

zations in improving efficiency and allowing the treatment of tin bearing materials currently considered uneconomic.

Acknowledgement

The author acknowledges the contribution and influence of colleagues and associates over many years of studying beneficiation of complex tin ores, to these current opinions.

Jurutera Galian
No. 17, 1st Quarter 1985
(Bull. Inst. of Mineral Engineering Malaysia)

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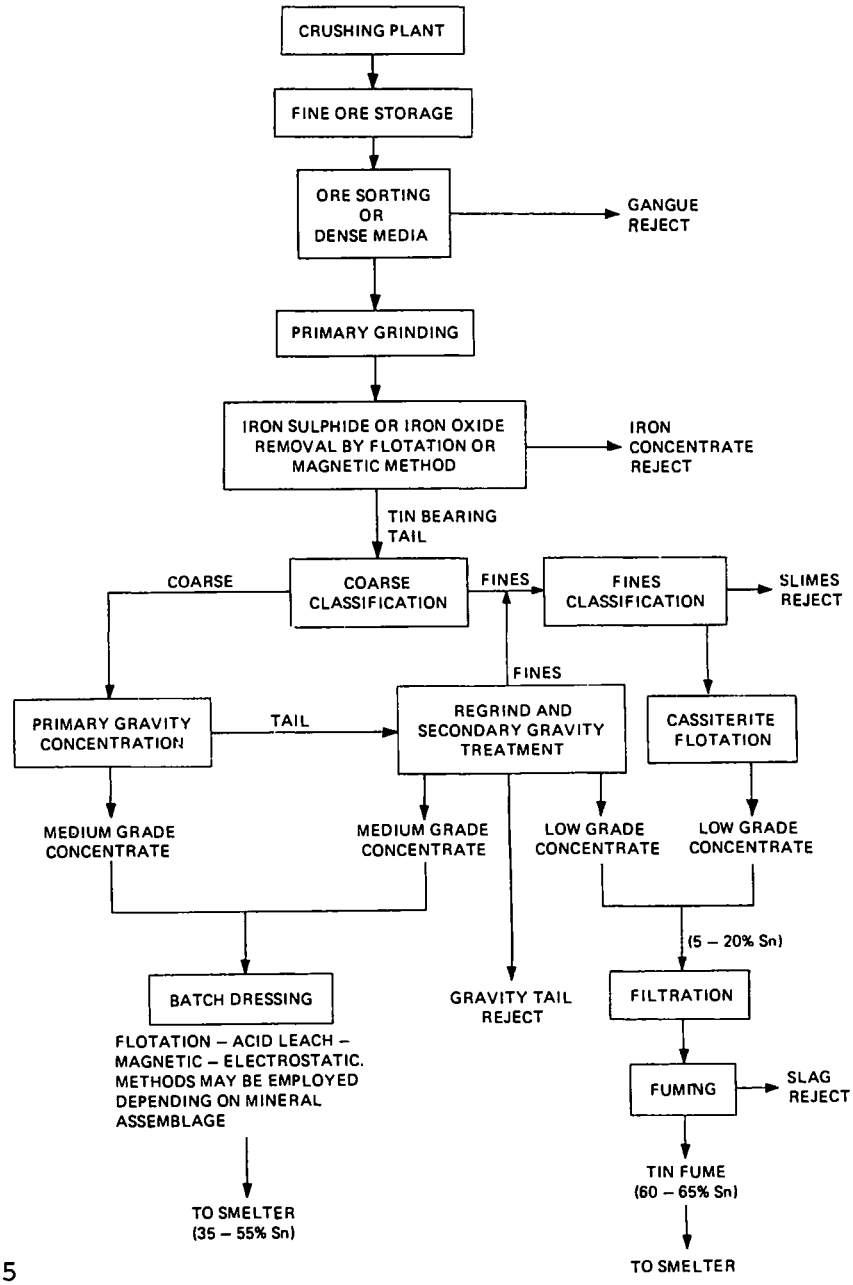

Fig. 5. General flowsheet which may be applied to complex tin ores having iron sulphide or iron oxides as a major gangue component.

GAME 85

An International Conference and Exhibition on Groundwater and Mineral Exploration

Date: 3 - 7 June 1985

Venue: Hyatt Central Plaza Hotel, Bangkok, Thailand.

For further information contact: Conference Manager, GAME 85, P.O. Box 142, Chatswood, NSW 2067, Australia (Telex: AA 75488 'Confex').

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PIPETECH ASIA '85 - Announcement

The first Asian Conference on Pipeline Technology

Venue: Jakarta Fair Grounds, Indonesia

Date: May 14 - 17 1985

Cost: US$570

Further information can be obtained from the Conference Administrator, 11R Exhibitions Pte. Ltd., Suite 08-03 Golden Wall Centre, 89 Short Street, Singapore 0718. (Tel. 3383521; Telex. RS 34834 11R).

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3RD INTERNATIONAL TUNGSTEN SYMPOSIUM - announcement

Date: 13th to 17th May 1985

Venue: Eurobuilding Hotel, Madrid

Organisers: Primary Tungsten Association and
Consumer Reporting Group

Contact: Mr. M.R.P. Maby (PTA Secretary)
Primary Tungsten Association
280 Earls Court Road
London SW5 9AS
Tel: 01-373 7413, Telex: 889077 PTUNGA

Spanish Sponsors: Ministerio de Industria y Energia
Escuela Tecnica Superior de Ingenieros de Minas (Madrid and Oviedo)
Instituto Geologico y Minero de Espana
Empresa Nacional Adaro
Instituto Nacional de Industria
Colegios y Asociacion Nacional de Ingenieros de Minas

Registration forms are available from the PTA Secretary.

Papers and Speakers

Tungsten supply and demand - A. Newey, Charter Consolidated PLC, U.K.

Methods of exploration and evaluation of tungsten deposits - J. Azcarate, IGME, and C. Luaces, ENA, Spain.

South America as a source of tungsten - C. Willig, Min. Sertaneja Ltda, Brazil, and J. Delgado, Mintec Ltda, Bolivia.

Tungsten Ore Processing at Tungsram - J. Csako, Tungsram, Hungary.

Aspects of the tungsten industry in Czechoslovakia - Z. Flat, Kerametal.

Substitution and future uses for tungsten in the cemented Carbide industry - D. Jack, Sandvik Hard Materials UK Research Centre, U.K.

Chemical uses of tungsten - an update - M.B. Macinnis, GTE Sylvania, USA.

Outlook for metals used in powder metal tools - K.L. Friedman, Metallurgical Industries, USA.

The sampling and assaying of tungsten - J. Knight, Alfred H. Knight International Ltd., UK.

Use of tungsten in medium and small calibre kinetic energy applications- R.B. Pepper, Royal Ordnance Small Arms Ltd., UK.

Changes in the pattern of tungsten trade - E. Ho, Amax Inc., USA.

Tungsten pricing: past, present and future - T. Tarring, Metal Bulletin PLC, UK.

Panel discussions will cover recent technical developments in the tung-

sten industry and the future outlook for the market.

Works visits will include the Panasqueira mine in Portugal, the Salau mine in France and in Spain itself, the La Parrilla mine and industrias Bonastre.

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GEOCONGRESS '86 - First announcement

An International Earth Science Congress

Venue:	Johannesburg
Date:	7 - 11 July 1986
Further information:	The Symposium Secretariat S 339 CSIR P.O. Box 395 Pretoria 0001 Republic of South Africa

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TECHNOLOGY FOR RURAL DEVELOPMENT - announcement

The Second Asian Conference on Technology for Rural Development will be held as follows:

Venue:	Kuala Lumpur, Malaysia
Date:	4-7 December 1985
Further information:	Organising Secretary ASIA TECH '85 c/o Rubber Research Institute of Malaysia P.O. Box 10150 Kuala Lumpur, Malaysia.

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SIXTH INTERNATIONAL SEMINAR ON ENVIRONMENTAL IMPACT ASSESSMENT

Venue:	University of Aberdeen, Schotland, UK.
Date:	14 - 27 July 1985
Further information:	Sandra M. Ralston Seminar Organiser CEMP, Dept. of Geography University of Aberdeen Old Aberdeen AB9 2UF Scotland, UK. Telex 73458 UNIABN G.

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

The following Short Courses, Core Workshops and Field Seminars will be conducted by the Society of Economic Paleontologists and Mineralogists (SEPM) under its continuing Education Schedule for 1985.

Short Courses

1. Modern and ancient deep-sea fan sedimentation
   Cost: US$325.00
   Venue: Anchorage, Alaksa
   Date: May 20-21, 1985.
   Lecturers: C. Hans Nelson, Tor H. Nilsen

2. Glacial sedimentary environments
   Cost: US$150.00
   Venue: Lancaster, PA.
   Date: March 16, 1985
   Lecturers: Gail M. Ashley, Norman D. Smith, John O. Shaw.

3. Relationship of organic matter and mineral diagenesis
   Cost: US$225.00
   Venue: New Orleans, LA.
   Date: March 23-24, 1985
   Lecturers: Donald L. Gautier, Yousif K. Kharaka, Ronald C. Surdam

4. Mechanics of sediment movement
   Cost: US$200.00
   Venue: New Orleans, LA
   Date: March 23-24, 1985
   Lecturers: Gerard V. Middleton, John B. Southard

5. Ichnology: The use of trace fossils in sedimentology and stratigraphy
   Cost: US$250.00
   Venue: New Orleans, LA
   Date: March 23-24, 1985
   Lecturers: Richard G. Bromley, A.A. (Tony) Ekdale

6. Patterns of sedimentation, diagenesis and hydrocarbon accumulation in Cretaceous Rocks of the Rock Mountains
   Cost: US$150.00
   Venues: Casper, WY and Salt Lake City, UT
   Dates: April 11, 1985 and October 3, 1985
   Lecturers: Dudley D. Rice, Donald L. Gautier

7. Platform margin and deep water carbonates
   Cost: US$550.00
   Venues: Midland, Tx and Houston, Tx
   Dates: April 29 - May 1 and November 4-6, 1985
   Lecturers: Harry E. Cook, Albert C. Hine, Henry T. Mullins

8. Recognition of fluvial depositional systems and their resource potential
   Cost: US$295.00
   Venue: Golden, Co.
   Date: August 10-11, 1985
   Lecturers: Romeo M. Flores, Andrew Miall, Thomas D. Fouch, Frank G. Ethridge, William E. Galloway

9. Shelf sands and sandstone reservoirs
   Cost: US$325.00
   Venue: Denver, Co.
   Date: November 7-8, 1985
   Lecturers: Donald J.P. Swift, Roderick W. Tillman, Roger G. Walker.

Core Workshops

1. Deep-water carbonates: buildups, turbidites, debris flows and chalks

Cost:	US$115.00	US$115.00
Venue:	New Orleans, LA	New Orleans, LA
Date:	March 23, 1985	March 24, 1985

   Organizers: Paul D. Crevello, Paul M. Harris

2. Rocky Mountain carbonates

Cost:	US$100.00	US$100.00
Venue:	Golden, Co.	Golden, Co.
Date:	August 10, 1985	August 11, 1985

   Organizers: David E. Eby, Mark W. Longman, Keith W. Shanley

Field Seminar

Modern and ancient Eolian deposits
Cost: US$1,395.00
Venue: Alamosa, Co.
Date: September 8-12, 1985
Leaders: Sarah Andrews, Lee F. Krystinik, Steven G. Fryberger

For further details write to:

Continuing Education Dept.
SEPM
P.O. Box 4756
Tulsa, Oklahoma 74159-0756
USA
(Tel. 918 743-2498 or 743-9765

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AUSTRALIAN MINERAL FOUNDATION: COURSES

The Australian Mineral Foundation will be conducting the following courses.

Drill Stem Test Interpretation	25-29 Mar	Adelaide
Sucker Rod Pumping - 2 identical courses	1- 3 & 9-11 April	Adelaide
Introduction to Exploration for Oil & Gas One day courses	22 April	Adelaide
	17 June	Melbourne
	19 June	Sydney
	23 Sept.	Perth
Petroleum Taxation Law	22-24 May	Adelaide
Basic Surface Production Operations	27-31 May	Adelaide

For further details contact: The Course Registrar, Australian Mineral Foundation, PB 97, Glenside, South Australia 5065. (Tel. (08) 797821; Telex: AA87437).

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March 1985 -April 1985

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

March 6 - April 3 1985

STRUCTURAL GEOLOGY (Dehra Dun, India). Second regional training course organized by Wadia Institute of Himalayan Geology and sponsored by Unesco. For information: Dr. V.C. Thakur, Wadia Institute of Himalayan Geology, Dehra Dun - 248001, India.

May 1985 - June 1985

GEOPHYSICS APPLIED TO GEOTHERMAL PROSPECTION (Manizales, Colombia). Annual course organized for Latin Americans by the Latin American Organization for Energy with financial assistance from Unesco. Language: Spanish. For information: Organizacion Latioamericana de Energia (OLADE), P.O. Box 119, Quito, Ecuador.

Mid 1985

WORKHSOP ON GOLD GEOLOGY OF MELANESIA (Papua New Guinea).

June 1985 - August 1985

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

June 1985 - August 1985

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

June 1985 - November 1985

GENERAL HYDROLOGY with emphasis on groundwater (Argentina). Postgraduate course organized every other year and sponsored by Unesco. Language: Spanish. For information: IHP National Committee of Argentina, Comite Nacional para el Programa Hidrologico Internacional de la Republica Argentina, Av 9 de Julio 1925 - 15° piso, 1332 Buenos Aires, Argentina.

July 1985 - August 1985

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

July 1985 - September 1985

VOLCANOLOGY (Quito, Ecuador). Annual 10-week course organized for Latin Americans by the Latin American Organization for Energy with financial assistance from Unesco. Language: Spanish. For information: Organizacion Latinoamericana de Energia (OLADE), P.O. Box 119, Quito, Ecuador.

August 1985 - October 1985

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

August 1985 - June 1987

SOIL SCIENCE AND WATER MANAGEMENT (Wageningen, The Netherlands). Two-year M.Sc. course designed for B.Sc graduates from developing countries. Language: English. For information: Director of Studies of the M.Sc. course in Soil Science and Water Management, P.O. Box 37, 6700 AA Wageningen, The Netherlands.

September 1985

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

September 1985 - October 1985

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

September 1985 - October 1985

REMOTE SENSING: FUNDAMENTALS OF APPLICATIONS AND ANALYSIS TECHNIQUES, 24th International Workshop. (Sioux Falls, South Dakota, USA). Program of training workshops organized by the US Geological Survey for non-U.S. scientists, engineers and resources managers. For information: Training Section, Office of International Geology, U.S. Geological Survey, National Center (917), Reston, VA 22092, USA.

September 1985 - November 1985

DRILLING OF GEOTHERMAL WELLS (Mexicali, Mexico). Annual 12-week seminar organized for Latin Americans by the Latin American Organization for Energy with financial assistance from Unesco. Language: Spanish. For information: Organizacion Latinoamericana de Energia (OLADE), P.O. Box 199, Quito, Ecuador.

September 1985 - November 1985

GEOTHERMAL RESERVOIR ENGINEERING (Mexicali, Mexico). Annual 9-week course organized for Latin Americans by the Latin American Organization for Energy with financial assistance from Unesco. Language: Spanish. For information: Organizacion Latinoamericana de Energia (OLADE), P.O. Box 119, Quito, Ecuador.

September 1985 - November 1985

GEOTHERMAL ENERGY (Kyushu, Japan). Annual short course organized by the Government of Japan and sponsored by Unesco. Language: English. For information: Japan International Cooperation Agency (2nd Training Civision, Training Affairs Dept.), P.O. Box 216, Shinjuku Mitsui Bldg., 2-1, Nishi-shinjuku, Shinkuku-ku, Tokyo 160, Japan.

September 1985 - August 1986

MINING EXPLORATION AND EXPLORATION GEOPHYSICS (Delft, The Netherlands). Annual diploma courses organized by the International Institute for Aerial Survey and Earth Sciences and sponsored by Unesco. Lan-

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

October 1985 - November 1985

TECTONICS, SEISMOLOGY AND SEISMIC RISK ASSESSMENTS (Potsdam, East Germany). One-Month training course organized annually by East German Academy of Sciences in collaboration with Unesco. Language: English. For inforamtion: Prof. Dr. H. Kautzleben, Director, Central Earth's Physics Institute, Academy of Sciences of the German Democratic Republic, Telegraphenberg, DDR 1500 Postdam, German Democratic Republic.

October 1985 - September 1986

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

October 1985 - September 1986

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

November 1985 - December 1985

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

November 1985 - December 1985

SMALL MINE POTENTIAL AND TECHNOLOGY (Leoben, Austria). Annual training course sponsored by Austria and Unesco. Language: English. For information: Prof. Wolfbauer, Forschungsgesellschaft Joanneum, Roseggerstrasse 15, A-8700 Leoben, Austria.

November 1985 for two 11-month sessions

ENGINEERING GEOLOGY (Delft, The Netherlands). New post-graduate diploma course leading to M.Sc. degree in Engineering Geology. For information: ITC Student Registration Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

December 1985 - January 1986

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

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KALENDAR (CALENDAR)

March 11 - 15, 1985
SE ASIAN GEOTECHNICAL CONFERENCE (8th), Kuala Lumpur, Malaysia. (The Hon. Secretary, 8th SEAGC, The Institution of Engineers, Malaysia, P.O. Box 223, Petaling Jaya, Selangor, Malaysia).

March 12 - 15, 1985
TUNNELLING 85 (4th International Symposium), Brighton, England. (Tunnelling 85, The Secretary, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK).

March 11 - 15, 1985
LUNAR AND PLANETARY SCIENCE (Conference), Houston, Texas, USA. Co-sponsored by IUGS-CCP (Pamela Jones, Lunar & Planetary Institute, 3303 NASA Road 1, Houston, Tx. 77058, USA).

March 20 - 21, 1985
PETROLEUM AND MINERALS REVIEW (Conference), Canberra, Australia. (E.E. Young, BMR, Dept. of Resources and Energy, Box 378, Canberra, ACT 2601, Australia).

March 24 - 27, 1985
AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS (Annual Convention), New Orleans, USA. (George Severson, The Louisiana Land and Exploration Co., P.O. Box 60350, New Orleans, LA 70160, USA).

March 24 - 30, 1985.
GEOCHEMICAL EXPLORATION IN TROPICAL RAIN FORESTS (International Workshop), Manaus, Brazil. Co-sponsored by AEG, SBG and AGID. (Richard W. Lewis, Jr., Geoquimica Ltda., Rau Aguaraiba, 86, Bonsucesso, Rio de Janeiro, RJ-Brazil).

March 25 - 26, 1985
EXTRACTIVE INDUSTRY GEOLOGY (4th conference), Nottingham, UK. (Conference Dept., British Geological Survey, Exhibition Road, London SW7 2DE, UK).

March 28 - 29, 1985
MAJOR CRUSTAL LINEAMENTS AND THEIR INFLUENCE ON THE GEOLOGICAL HISTORY OF THE CONTINENTAL LITHOSPHERE (Meeting), London, UK. (J.V. Watson, Dept. of Geology, Imperial College of Science and Technology, Prince Consort Road, London SW7 2BP, UK).

April 1 - 4, 1985
REMOTE SENSING FOR EXPLORATION GEOLOGY (International Symposium), San Francisco, Calif., USA. (Remote Sensing Center, Environmental Research Institute of Michigan, P.O. Box 8618, Ann Arbor, MI 48107, USA.

April 1 - 4, 1985
EUROPEAN UNION OF GEOSCIENCES (Biennial Conference), Strasbough, France. (Organizing Committee, Dept. of Earth Sciences, University of Cambridge, Downing Street, Cambridge CB2 3EQ, UK).

April 1 - 5, 1985
NUMERICAL METHODS IN GEOMECHANICS (5th International Conference), Nagoya, Japan. (Prof. T. Kawamoto, Dept. of Civil & Geotechnical Engineering, Nagoya University, Chikusa, Nagoya 464, Japan).

April 1 - 6, 1985
THE NUMERICAL CALIBRATION OF THE GEOLOGICAL TIME SCALE (Symposium, Annual Meeting IGCP Project 196), Part of EUG biennial conference, Strasbourg, France. (N.H. Gale and G.S. Odin, Universite Curie, 4 place Jussieu, departement geologie dynamique, 75230 Paris Cedex 05, France).

April 2 - 3, 1985
MINERAL DIAGENESIS IN HYDROCARBON RESERVOIRS (Meeting), Cambridge, UK. Sponsored by Mineralogical Society and Petroleum Exploration Society of Great Britain. (C.V. Jeans, Dept. of Applied Biology, University of Cambridge, Pembroke Street, Cambridge CB 2 3DX, UK).

April 8 - 11, 1985
ASIAN CHEMICAL CONFERENCE 1985, Singapore. Contact: The Secretary, Dept. of Chemistry, National University of Singapore, Kent Ridge, Singapore 0511.

April 9 - 12, 1985
EVOLUTION OF THE EUROPEAN LITHOSPHERE (MEGS 4: Meeting of European Geological Societies), Edinburgh, UK. (Dr. S.K. Monro, Institute of Geological Sciences, Murchison House, West Mains Road, Edinburgh EH9 3LA, Scotland, UK).

April 10 - 12, 1985
MACRO-MESO-MICRO (Conference on structural geology), Utrecht, The Netherlands. (Vakgroep Structurele Geologie, Instituut voor aardwetenschappen, Budapestlaan 4, Ryksuniversiteit, Utrecht, The Netherlands).

April 14 - 17, 1985
PROSPECTING IN AREAS OF DESERT TERRAIN (Conference), Rabat, Morocco. (Conference Office, IMM, 44 Portland Place, London W1N 4BR, UK).

April 14 - 19, 1985
GEOMORPHIC AND STRATIGRAPHIC INDICATORS OF NEOGENE-QUARTERNARY CLIMATIC CHANGE IN ARID AND SEMI-ARID ENVIRONMENTS (GSA Penrose Conference), Lake Havasu City, Arizona, USA. (John Dohrenwend, US. Geological Survey, MS 941, 345 Middlefield Road, Menlo Park, Ca 94025, USA).

April 15 - 16 1985
DEFORMATION MECHANISMS IN SEDIMENTS AND SEDIMENTARY ROCKS (Geological Society of London Conference), London, UK. (Dr. M.E. Jones, Dept. of Geology, Kings College London, Strand, London WC2 UK).

April 15 - 17, 1985
INTERNATIONAL ASSOCIATION OF SEDIMENTOLOGISTS (6th Regional Meeting), Lleida, Spain. (Joan Rosell, Dpt. Geologia, Universitat Autonoma, Bellaterra, Barcelona, Spain).

April 15 - 19, 1985
ANALYTICAL CHEMISTRY IN THE EXPLORATION, MINING AND PROCESSING OF MATERIALS (2nd International Symposium), Pretorial, South Africa. (Symposium Secretariat, S.328, CSIR, P.O. Box 395, Pretoria 0001, South Africa).

April 15 - 19, 1985
NON-METALLIC MINERALS (World Congress), Belgrade, Yugoslavia. Languages: English, Russian, Serbo-Croatian. (Svetski Kongres O Nemetalicnim Mineralnim, Sirovinama, Sava Centar, 11070 Beograd, Yugoslavia).

April 16 - 17 1985
GEOCHEMISTRY AND HEALTH (international Symposium) (Dr. Iain Thornton, Applied Geochemistry Research Group, Dept. of Geology, Imperial College, London SW7 2BP, UK).

April 16 - 19, 1985
MINING TECHNOLOGY: MINING IN SOFT GROUND (International Forum), Nottingham, U.K. (J. Snedegar, 223 Transportation Research Building, University of Kentucky, Lexington, KY 40506, USA).

April 18 - 20, 1985
CONTINENTAL EXTENSIONAL TECTONICS (Special Meeting, Geological Society of London), Durham, UK. (J.F. Dewey, Dept. of Geological Sciences, University of Durham, Science Laboratories, South Road, Durham DH 1 3LE, UK).

April 20 - 30, 1985
WORKSHOP ON GRANITE GEOLOGY, ALTERATION AND RELATED MINERALIZATION, Chiang Mai, Thailand. Contact: Mr. Chamrat Mahawat, Coordinator, Working Group 1, IGCP Project No. 220, Dept. of Mineral Resources, Geological Survey Division, Rama VI Road, Bangkok 10400, Thailand.

April 23 - 26, 1985
GROUNDWATER MANAGEMENT (Conference), Berlin. (The Secretary-General, International Water Supply Association, 1 Queen Anne's Gate, London SW1H 9BT, UK).

April 28 - May 1, 1985
GEOCHEMICAL EXPLORATION (11th International AEG Symposium), Toronto, Canada. (Dr. W.B. Coker, Kidd Creek Mines Ltd., 357 Bay st., Ste. 300, Toronto, Ontario, Canada M5H 1T7).

April 30 - May 3, 1985
PACIFIC COAL (1st Conference and Exhibition), Brisbane, Australia. (J. Prentice, Conventions Queensland, 30 McCaul Street, Taringa 4068, Queensland, Australia)

May 1 - 2, 1985
OCEAN FRACTURE ZONES (meeting), London, U.K. (R.S. White, c/o Carolyn Symonds, Geological Society of London, Burlington House, Piccadilly, London W1, UK).

May 6 - 15, 1985
NEOGENE PHOSPHORITES OF THE SE UNITED STATES (International field workshop and seminar). North Carolina and Florida. Sponsored by IGCP 156. (Stanely R. Riggs, Dept. of Geology, East Carolina University, Greenville, NC 27834, USA).

May 7 - 10, 1985
ARCTIC RIFTING (Symposium), Calgary, Alberta, Canada. Sponsors: International Lithosphere Program. (John W. Pierce, Petro-Canada Resources, P.O. Box 2844, Calgary, Alberta T2P 3E3, Canada).

May 7 - 10 1985
PETROCHEM MALAYSIA '85, Kuala Lumpur, Malaysia. (Conference and Exhibition Services Sdn. Bhd., 9A, Jalan SS24/8, Taman Megah, Petaling Jaya, Malaysia. Tel. 749257).

May 9 - 10, 1985
PRE-PERMIAN EVAPORTIES OF WESTERN EUROPE (meeting), Brussels, Belgium. (C.L.V. Monty, Secretaire du Groupe de Contact Sedimentologie, C.A.P.S., Laboratoire de Paleontologie Animale, Universite de Liege, 7, place du Vingt-Aout, 4000 Liege, Belgium).

May 13 - 17, 1985
TUNGSTEN (3rd International Symposium), Madrid. (Mr. M.R.P. Maby, Secretary, Primary Tungsten Association, 280 Earls Court Road, London SW5 9AS, UK).

May 13 - 18, 1985
JAPAN AND EAST CHINA SEAS STUDY (3rd Workshop), Tsukuba University, Japan. (Takashi Ichiye, Dept. of Oceanography, Texas A & M University, College Station, Tx. 77843, USA).

May 15 - 17, 1985
TURBIDITE-HOSTED GOLD DEPOSITS (International Symposium). Fredericton, New Brunswick, Canada. (Simon J. Haynes, Nova Scotia Dept. of Mines and Energy, P.O. Box 1087, 1690 Hollis Street, Halifax, Nova Scotia, Canada B3J 2X1).

May 16 - 17, 1985
GENESIS OF NEOGENE TO MODERN PHOSPHORITES (International Symposium), Tallahassee, Florida, USA. Sponsored by IGCP 156. Follows Workshop, May 6 - 15. (William C. Burnett, Dept. of Oceanography, Florida State University, Tallahassee, FL 32306, USA).

May 20 - 25, 1985
METALLOGENESIS OF THE PRECAMBIRAN IN EUROPE (International Conference), Tabor, Central Bohemia, Czechoslovakia. Sponsored by IGCP-91. (international Conference on Metallogenesis of the Paecambiran in Europe. Attention Dr. Gabriel, Malostranske nam. 19, 118 21 Praha, Czechoslovakia).

May 26 - 31, 1985
EUROPEAN ASSOCIATION OF SCIENCE EDITORS (2nd Conference), Holmenkollen, Norway. (Nancy Morris, EASE Secretariat, P.O. Box 33, Farnham, Surrey GU10 3JX, UK).

May 27 - 31, 1985
DENSITY DISTRIBUTION OF THE LITHOSPHERE: STATIC AND DYNAMIC MODELS (Meeting), Zurich, Switzerland. (J. Bartholomew, Institut fur Geodasie und Photogrammetrie, HPV G 53, ETH-Honnggerberg, 8093 Zurich, Switzerland).

May 27 - June 1, 1985
CORAL REEF CONGRESS: Reef and Man (5th International), Papeete, Tahiti. Sponsored by IGCP 200, INQUA, ICL and IGU. (The Organizing Committee, Coral Reef Congress, Sea-level Meeting, B.P. 562, Papeete, Tahiti, French Polynesia).

May 27 - June 1, 1985
IGCP - 200 (International Annual Meeting), Papeete, Tahiti, (Dr. Paolo A. Pirazzoli, CNRS-INTERGEO, 191, rue St-Jacques 75005 Paris, France).

May 27 - June 2, 1985
TERRANES IN THE CIRCUM-ATLANTIC PALEOZOIC OCEANS (Penrose Conference),

Liscombe Lodge, Nova Scotia, Canada. (J.D. Keppie, N.S. Depart. Mines and Energy, Box 1087, Halifax, N.S. B3J 2X1, Canada).

June 1985
SOIL DYNAMICS AND EARTHQUAKE ENGINEERING (2nd International Conference), on board the liner Queen Elizabeth 2. (Dr. C.A. Brebbia, Computational Mechanics Centre, Ashurst Lodge, Ashurst, Southampton, SO4 2AA, UK).

June 2 - 9, 1985
INTERNATIONAL MINERAL PROCESSING CONGRESS (15th), Cannes, France. Languages: French, English, German and Russian. (International Mineral Processing Congress Secretary, BRGM SGN/Mineralurgie, B.P. 6009-45060 Orleans Cedex, France).

June 3 - 7, 1985
STOCHASTIC APPROACH TO SUBSURFACE FLOW (Symposium), Fontainebleau, France. (G. de Marsily, GRECO Hydrogeologie, Ecole des Mines de Paris, Centre d'Informatique Geologique 35 rue Saint-Honore, 77305 Fontainebleau Cedex, France).

June 4 - 7, 1985
EUROPEAN ASSOCIATION OF EXPLORATION GEOPHYSICISTS (47th Meeting), Budapest, Hungary. (E. van der Gaag, European Association of Exploration Geophysicists, P.O. Box 162, NL-2501 AN The Hague, The Netherlands).

June 4 - 7, 1985
MAFIC DYKE SWARMS (International Conference), Toronto, Ontario, Canada. Sponsored by IUGS, ILP, and GSC. (Dr. H.C. Halls, Erindale Campus, University of Toronto, Mississauga, Ontario, Canada L5L IC6).

June 9 - 15, 1985
WATER RESOURCES (5th World Congress), Brussels, Belgium. (Dr. L.W. Debacker, c/o Brussels International Conference Centre, Parc des Expositions, Place de Belgique, B-1020 Brussels, Belgium).

June 10 - 14, 1985
MINING '85 (International Conference), Birmingham, U.K. (Institution of Mining Engineers, Danum House, South Parade, Doncaster DN1 2DY, U.K.).

June 16 - 21, 1985
SEISMICITY AND SEISMIC RISK (3rd International Symposium), Liblice, Czechoslovakia. (Dr. Z. Schenkova, Geophysical Institute, Bocni II, 14131 Prague 4, Czechoslovakia).

June 16 - 23, 1985
SEA-LEVEL CHANGES ON THE WEST NORWEGIAN COAST (Symposium and Field Excursion). INQUA Shorelines Commission and IGCP Project 200. (Prof. P.E. Kaland, Botanical Institute, University, P.O. Box 12, N-5014 Bergen - Universitetet, Norway).

June 18 - 19, 1985
MARINE MINERALS IN EXCLUSIVE ECONOMIC ZONES (Meeting), London, U.K. (S.A. Moorby, Geology Dept., Imperial College, London SW7 2BP, UK).

June 24 - July 1, 1985
SWISS LAKE, MIRE AND RIVER HISTORY (Joint Symposium INQUA Euro-

siberian Subcommission for the Study of the Holocene and IGCP Projects 158 A and B), Hunigen/Berne, Switzerland. (Prof. Dr. G. Lang. Systematisch- Geobotanisches Institut, Altenbergrain 21, CH-3013 Bern, Switzerland).

June 26 - 28, 1985
ROCK MECHANICS (26th U.S. Symposium), Rapid City, South Dakota, USA. (Prof. Eileen Ashworth, South Dakota School of Mines and Technology, Rapid City, SD 57701-3995, USA).

July/August, 1985
SEMINAR ON EXPLORATION TECHNIQUES FOR PRIMARY TIN DEPOSITS, Ipoh, Malaysia. Contact: Director, SEATRAD Centre, Tiger Lane, Ipoh, Perak, Malaysia.

July - August, 1985
GOLD IN MELANESIA (Workshop), Papua New-Guinea. (RMRDC, Jalan Jenderal Sudirman 623, Bandung, Indonesia).

July 7 - 9, 1985
IAHS (2nd Scientific Genral Assembly), Budapest, Hungary. (Dr. A. Szollosi-Nagy, VITUKI, H-1453, Budapest, Pf27, Hungary).

July 7 - 12, 1985
AUSTRALASIAN INSTITUTE OF MINING AND METALLURGY (Annual Conference), Queensland, Australia. (AusIMM, P.O. Box 310, Carlton South, Vic. 3053, Australia).

July 7 - 19, 1985
KARST WATER RESOURCES (International Symposium), Antalya/Ankara, Turkey. Sponsored by IAHS. (Prof. G. Gunay, Hydrogeological Engineering Dept., Hacettepe University, Beytepe, Ankara, Turkey).

July 8 - 10, 1985
HYDROLOGY (International Symposium), Port Collins, Colorado, USA. (H.W. Shen, Dept. of Civil Engineering, Hydrology and Water Resources Program, Foothills Campus, Colorado State University, Fort Collins, Co. 80523, USA).

July 8 - 12, 1985
MICROMORPHOLOGY OF SOILS (Meeting), Paris, France. (N. Fedoroff, I.N.A. - P.G., Dpt des sols, F-78850 Thiverval-Grignon, France).

July 10 - 12, 1985
STABLE ISOTOPES AND FLUID PROCESSES IN MINERALIZATION (International Conference), Brisbane, Australia. (Mary E. McGregor, UniQuest Conference Systems, University of Queensland, St. Lucia, Brisbane, QLD 4067, Australia).

July 10 - 12, 1985
GEOLOGICAL SOCIETY OF TRINIDAD AND TOBAGO (1st Conference), Port-of-Spain, Trinidad, West Indies. Language: English. (Mr. Winston Ali, Programme Chairman, Geological Conference of the G.S.T.T., c/o Geological Dept., Trinmar Ltd., Point Fortin, Trinidad, West Indies).

July 14 - 30, 1985
MAGMATIC SULFIDES IN MAFIC ROCK (IGCP 161 - Field Conference 4), Ketchikan, Alaska to Duluth, Minnesota, USA. (Gerald K. Czamanske,

M.S. 984, U.S. Geological Survey, Menlo Park, Ca. 94025, USA.)

July 16 - 23, 1985
CEPHALOPODS: PRESENT AND PAST (2nd International Symposium), Tubingen, West Germany. (Prof. Jurgen Kullman, Geol. -Palaont. Institut, Sigwartstrasse 10, D-7400 Tubingen, Federal Republic of Germany).

July 25 - 29, 1985
CONODONTS (4th International Symposium), Nottingham, U.K. (Dr. R.J. Aldridge, Dept. of Geology, The University, Nottingham, NG7 2RD, UK.)

July 27 - August 7, 1985
PLATINUM (4th International Symposium), Duluth, Minnesota, USA to Sudbury, Ontario, Canada. (A.J. Naldrett, Dept. of Geology, University of Toronto, Toronto, Oetario, Canada M5S 1A1).

July 28 - August 2, 1985
CLAY (8th International Conference), Denver, Colorado, USA. Sponsored by AIPEA. (Dr. A.J. Herbillon, Groupe de Physico-Chimie Minerale et de Catalyse, Univ. Catholique de Louvain, Place Croix du Sud 1, B-1348 Louvain-la-Neuve, Belgium).

July 29 - August 1, 1985
OSTRACODA (9th International Symposium), Shizuoka, Japan. (Dr. Tetsuro Hanai, Institute of Geosciences, University of Shizuoka, Shizuoka, 422, Japan).

July 29 - August 9, 1985
TSUNAMI '85 (International Symposium), Victoria, British Columbia, Canada. (Tsunami '85, P.O. Box 2267, Sidney, B.D., Canada V8L 3S8).

August 5 - 16, 1985
COMPARATIVE STUDIES OF THE INNER PLANETS AND THE EVOLUTION OF CLIMATE AS RELATED TO CO_2 (IAMAP/IAPSO Joint Assembly), Honolulu, Hawaii, USA. (Joint Assembly, American Geophysical Union, 2000 Florida Avenue NW, Washington, D.C. 20009, USA).

August 5 - 17, 1985
INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY (5th Scientific Assembly), Prague, Czechoslovakia. (Michael Gadsden, Natural Philosophy Dept., Aberdeen University, Aberdeen AB9 2UE, Scotland, UK).

August 5 - 17, 1985
MAGNETIC ANOMALIES OVER MARGINS OF CONTINENTS AND PLATES (IAGA Symposium), Prague, Czechoslovakia. (Mr. Vaclav Bucha, Geophysical Institute, Acad. Sco., Bocni 11, 141 31 Prague 4, Czechoslovakia).

August 6 - 10, 1985
SCIENCE AND TECHNOLOGY EDUCATION AND THE QUALITY OF LIFE (International Conference), Bangalore, India. Sponsored by ICSU/CTS (J. Lewis, Physics Dept., Malvern College, Malvern, Worcs. U.K).

August 6 - 10, 1985
GROUND FREEZING (4th International Symposium), Sapporo, Japan. (ISGF 85, Institute of Low Temperature Science, Hokkaido University, Sapporo 060, Japan).

August 7 - 9, 1985
FLUVIAL SEDIMENTOLOGY (3rd International Conference), Fort Collins, Colorado, USA. (F.G. Ethridge, 3rd International Fluvial Sedimentology Conference, Colorado State University, Fort Collins, Co. 80523, USA).

August 11 - 15, 1985
INTERNATIONAL SOCIETY FOR SOIL MECHANICS AND FOUNDATION ENGINEERING (11th International Conference), San Francisco, California, USA. (K. Hyland, American Society of Civil Engineers, 345 East 47th Street, New York, NY 10017, USA).

August 12 - 14, 1985
HYDROTHERMAL REACTIONS (2nd International Symposium), University Partk, Penn., USA. (Symposium on Hydrothermal Reactions, The Pennsylvania State University, Keller Conference Center, University Park, Pa 16802, USA).

August 19 - 23, 1985
GONDWANA (6th Symposium), Columbus, Ohio, USA. Sponsored by IUGS and Geological Society of America. (D. Elliott, Institute of Polar Studies, Ohio State University, 103 Mendenhall, 125 South Oval Mall, Columbus, Oh 43210, USA).

August 24 - September 2, 1985
GRAPTOLITES (3rd International Conference, Graptolite Working Group IPA), Helsingor, Denmark. (Dr. M. Bjerreskov, Institute of Historical Geology and Palaeontology, University of Copenhagen, Oster Voldgade 10, DK-1350, Copenhagen K, Denmark).

August 27 - 30, 1985
INTERNATIONAL MINING HISTORY (Conference), Melbourne, Australia. (P. Richardson, Economic History Dept., University of Melbourne, Parkville, Vic. 3052, Australia).

September 1985
DEEP INTERNAL PROCESSES AND CONTINENTAL RIFTING (International Symposium), Chengdu, P.R. China. Co-sponsored by ICL and Chinese Lithospheric Committee. Languages: Chinese and English. (Claude Froidevaux, Universite Paris-Sud, Lab. Geophysique-Bat. 510, 91405 Orsay, France: Tan Tjong Kie, Institute of Geophysics, Academia Sinica, Beijing, People's Republic of China).

September 2 - 4, 1985
ROLE OF ROCK MECHANICS IN MINING (International Symposium), Mexico City, Mexico (Sociedad Mexicana de Mecanica de Rocas AC, Camino a Santa Teresa 187, Villa Olimpica, MEX-14020 Mexico DF, Mexico).

September 8 - 13, 1985
HYDROGEOLOGY IN THE SERVICE OF MAN (18th IAH Congress - International Symposium), Cambridge, U.K. (J. Day, Hydrogeology Unit, Maclean Building, Crowmarsh Gifford, Wallingford, OX10 8BB, U.K.).

September 9 - 12, 1985
EXTRACTION METALLURGY (International Symposium), London, U.K. (Conference Office, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK).

September 10 - 11, 1985
NON-MARINE SOURCE ROCKS: ENVIRONMENTS OF DEPOSITION OF LACUSTRINE AND DELTACI SOURCE ROCKS (joint Meeting of Petroleum Group and IGCP Project 219), London, U.K. (K. Kelts, Geological Institute, ETH-Z, CH-8092 Zurich, Switzerland).

September 14 - 22, 1985
GRANITE-RELATED MINERAL DEPOSITS (International Symposium), Halifax, Nova Scotia, Canada. (Richard P. Taylor, Dept. of Geology, McMaster University, 1280 Main Street West, Hamilton, Ontario, Canada L8S 4M1).

September 22 - 26, 1985
HIGH HEAT PRODUCTION, GRANITES, HYDROTHERMAL CIRCULATION AND ORE GENESIS (Conference), St. Austell, Cornwall, U.K. (IMM, 44 Portland Place, London W1N 4BR, U.K.).

September 23 - 29, 1985
MAJOR NEW TRENDS IN QUANTITATIVE METHODS FOR PREDICTING AND RESOURCES EVALUATIONOF MINERAL, OIL AND GAS DEPOSITS (International Symposium), Alma-Ata, Kazakh Soviet Socialist Republic. Cosponsored by IAMG. Languages: English and Russian. (A.N. Bugaets, Organizing Committee 'Symposium Alma-Ata - 1985', KazIMS, K. Marx str. 105, Alma-Ata 480091, USSR).

September 25 - 27, 1985
GEOTECHNICAL CONFERENCE (38th Annual), Edmonton, Alberta, Canada. Sponsored by Canadian Geotechnical Society. (Bob Wallace, Program Chairman, E.B.A. Engineering Consultants, 14535 - 118th Avenue, Edmonton, Alberta, Canada).

October 2 - 4, 1985
CONCENTRATION MECHANISMS OF URANIUM IN GEOLOGICAL ENVIRONMENTS (International Meeting), Nancy, France. (J. Leroy, CREGU, BP 23, 54501 Vandoeuvre-les-Nancy Cedex, France).

October 2 - 5, 1985
BAUXITE PROSPECTING AND MINING (International Symposium), Tapolca, Hungary, (Mr. J. Gebhardt, Director of Mining, President of the Organizing Committee, H-1387, Budapest, P.O. Box 30, Hungary).

October 7 - 11, 1985
FIRST ASIAN WATER TECHNOLOGY EXHIBITION AND CONFERENCE, Putra World Trade Centre, Kuala Lumpur, Malaysia. (International Conferences & Exhibitions Ltd., 6 Porter Street, Baker Street, London W1M 1HZ, UK. Tel: 01-487 2622; Telex: 21591 CONFEX G.

October 10 - 13, 1985
METALLOGENY OF THE EARLY PRECAMBRIAN (international Symposium), Changchun, People's Republic of China. Sponsored by China's National Committee of IGCP, Changchun College of Geology, and Chinese Work Group of IGCP Project 91. Languages: Chinese and English. (Prof. Zhang Qiusheng, Chinese College of Geology, Changchung, Jilin, People's Republic of China).

October 14 - 17, 1985
LATERITE (International Seminar), Tokyo, Japan. Co-sponsored by IGCP. (Dr. Y. Ogura, International Seminar on Laterite, c/o The Mining and Metallurgical Institute of Japan, 5-4 Ginza, 8-Chrome, Chuo-ku, Tokyo 104, Japan).

October 14 - 18, 1985
COAL RESEARCH (7th International Conference), Pretoria, South Africa. (W.G. Jensen, International Committee for Coal Research, Bte 11, B-1150 Bruxelles, Belgium).

October 14 - 18, 1985
MATHEMATICAL METHODS IN GEOLOGY (International Symposium), Pribram, Czechoslovakia. (Sekretariat symposia, Hornicka Pribram ve vede a Technice, post. schranka 41, Pribram 261 02, Czechoslovakia).

October 28 - November 1, 1985
COAL SCIENCE (International Conference), Sydney, Australia. Sponsored by IEA (R.W. Hinde, CSIRO Div. of Fossil Fuels, Box 136, North Ryde, NSW 2113, Australia).

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B A C K I S S U E S A V A I L A B L E

Bulletin 1 (1968). 79 p. Studies in Malaysian Geology edited by P.H. Stauffer. A collection of papers presented at a meeting of the Geological Society on 31st January 1967. Price: M$3.00 (US$1.50).

Bulletin 2 (1968). 152 p. Bibliography and Index of the Geology of West Malaysia and Singapore by D.J. Gobbett. Price: M$10.00 (S$5.00) - softcover; M$15.00 (US$7.50) - hardcover.

Bulletin 3 (1970). 146 p. Papers in Geomorphology and Stratigraphy (with Bibliography supplement). Edited by P.H. Stauffer. Price: M$10.00 (US$5.00).

Bulletin 4 (1971). 100 p. Papers in Petrology, Structure and Economic Geology. Edited by P.H. Stauffer. Price: M$10.00 (US$5.00).

Bulletin 5 (1973). 70 p. The Search for Tungsten Deposits by K.F. G. Hosking. Price: M$10.00 (US$5.00).

Bulletin 6 (1973). 334 p. Proceedings, Regional Conference on the Geology of Southeast Asia. A collection of papers, Kuala Lumpur, March 1972. Edited by B.K. Tan. Price: M$22.00 (US$11.00) - hardcover only.

Bulletin 7 (1974). 138 p. A collection of papers on the geology of the Asean Region. Edited by B.K. Tan. Price: M$12.00 (US$6.00).

Bulletin 8 (1977). 158 p. A collection of papers on the geology of the Asean Region. Edited by T.T. Khoo. Price: M$12.00 (US$6.00).

Bulletin 9 (1977). 277 p. The relations between granitoids and associated ore deposits of the Circum-Pacific region. A collection of papers presented at the IGCP Circum-Pacific Plutonism Project Fifth Meeting, 12 - 13 November 1975, Kuala Lumpur. Edited by J.A. Roddick & T.T. Khoo. Price: M$25.00 (US$12.00).

Bulletin 10 (1978). 95 p. A collection of papers on the geology of the Asean region. Edited by C.H. Yeap. Price: M$10.00 (US$5.00).

Bulletin 11 (1979). 393 p. Geology of Tin Deposits. A collection of papers presented at the International Symposium on 'Geology of Tin Deposits', 23-25 March 1978, Kuala Lumpur. Edited by C.H. Yeap. Price: M$50.00 (US$22.00).

Bulletin 12 (1980). 86 p. A collection of papers on the geology of Malaysia. Edited by G.H. Teh. Price: M$20.00 (US$9.50).

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Bulletin 16 (1983). 239 p. A collection of papers on the geology of the Asean Region. Edited by G.H. Teh. Price: M$30.00 (US$14.00).

Field Guide for a 7-day one thousand mile, geological excursion in Central and South Malaya (West Malaysia and Singapore) (1973). 40 p. by C.S. Hutchison. Price: M$5.00 (US$2.50).

Abstracts of papers. Regional Conference on the Geology of Southeast Asia. Kuala Lumpur (1972). 64 p. 8 figs. 3 tables, many extended abstracts. Edited by N.S. Haile. Price: M$6.00 (US$3.00).

Proceedings of the Workshop on Stratigraphic Correlation of Thailand and Malaysia. Vol. 1: Technical Papers (1983). 383 p. Price: M$25.00 (US$12.00). (Members: M$12.00/ US$6.30).

WARTA GEOLOGI (Newsletter of the Geological Society of Malaysia). Price: M$5.00 (US$3.20). (for non-members) per bimonthly issue from July 1966).

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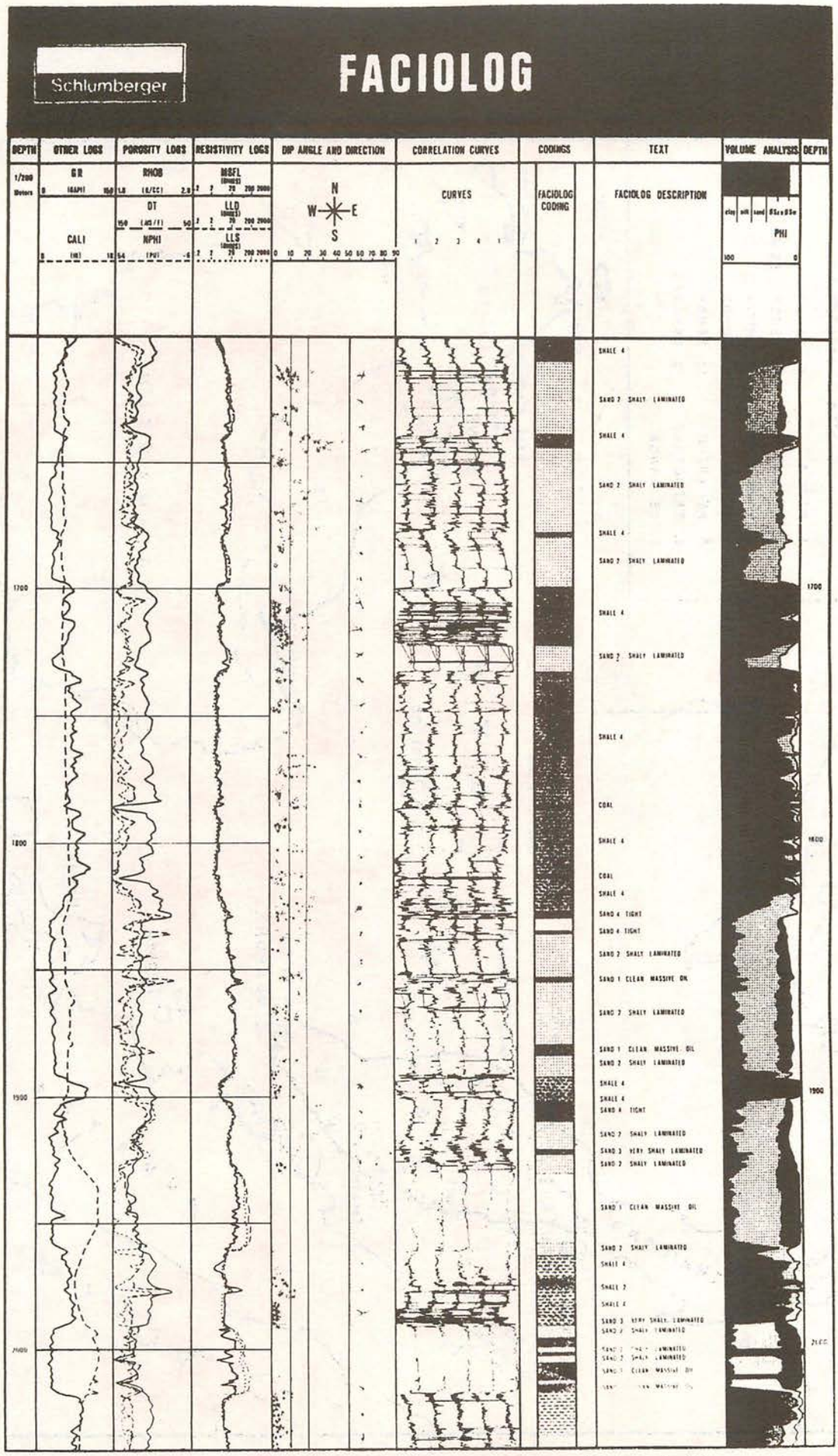
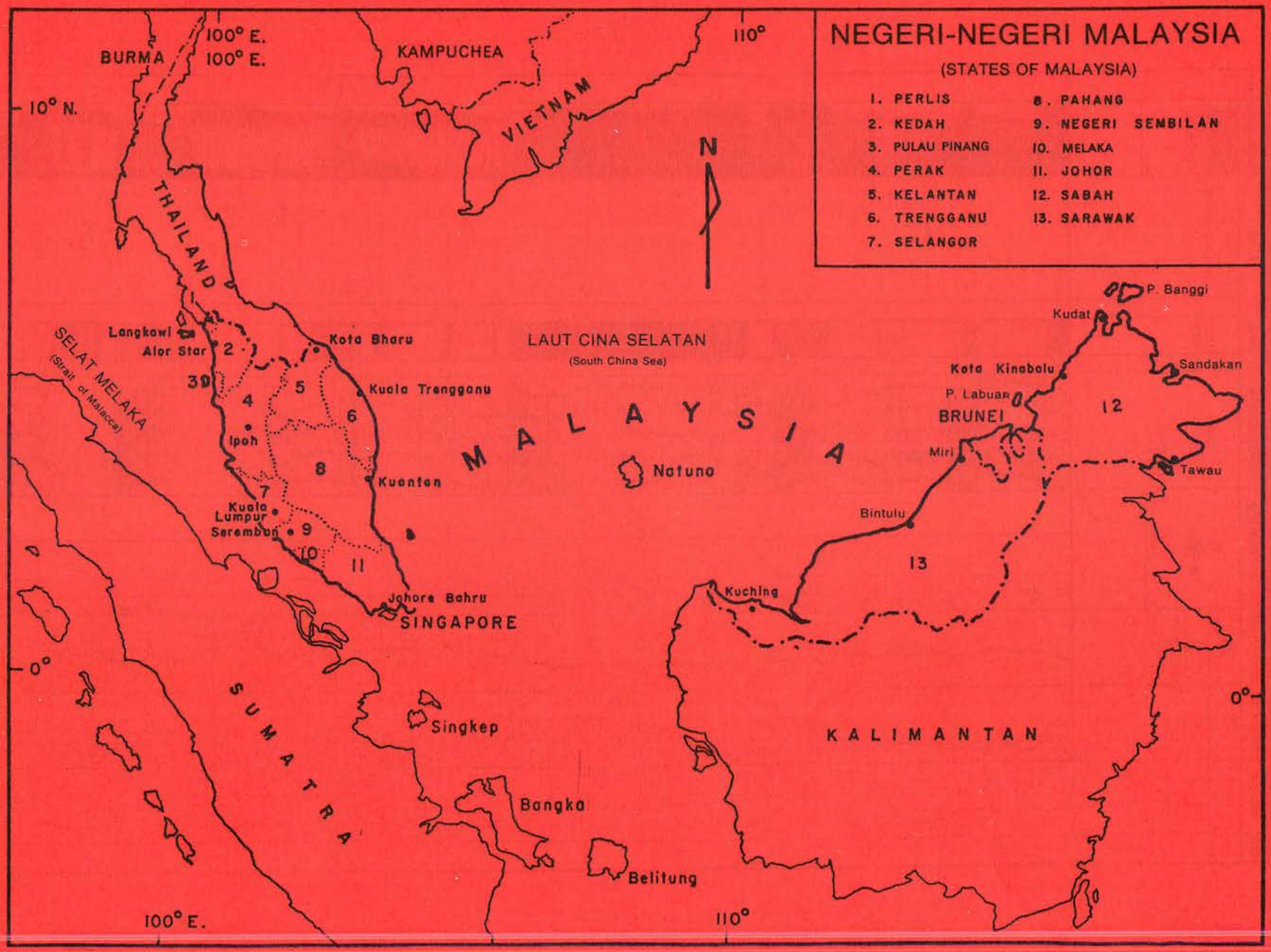


Wireline logging data is finding wider applications in sedimentology. This began with the study of log curve shapes to identify different depositional sequences. Recent developments have led to the use of logs to identify "electrofacies"—that is, a set of log responses that characterizes a sediment and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


NEGERI-NEGERI MALAYSIA
(STATES OF MALAYSIA)
1. PERLIS
2. KEDAH
3. PULAU PINANG
4. PERAK
5. KELANTAN
6. TRENGGANU
7. SELANGOR
8. PAHANG
9. NEGERI SEMBILAN
10. MELAKA
11. JOHOR
12. SABAH
13. SARAWAK
BURMA
KAMPUCHEA
VIETNAM
THAILAND
100° E.
110°
10° N.
0°
N
LAUT CINA SELATAN
(South China Sea)
SELAT MELAKA
(Strait of Malacca)
MALAYSIA
Langkawi
Alor Star
Kota Bharu
Kuala Trengganu
Ipoh
Kuantan
Kuala Lumpur
Seremban
Johore Bahru
SINGAPORE
Natuna
SUMATRA
Singkep
Bangka
Belitung
KALIMANTAN
Kuching
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Miri
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Tawau