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CATATAN GEOLOGI
(GEOLOGICAL NOTES)

MALAYAITE ($\text{CaO} \cdot \text{SnO}_2 \cdot \text{SiO}_2$) AND ITS RELATIONSHIP TO CLOSELY
ASSOCIATED CASSITERITE FROM THE DACHANG MINING REGION,
PEOPLES' REPUBLIC OF CHINA

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United Kingdom.

Abstract

Islets of economic minerals occurring in a diopside-rich skarn sample from the Dachang mining region contain, in the probable order of development, malayaite, varlamoffite, cassiterite, scheelite, pyrrhotite, pyrite, stannite, chalcopyrite and sphalerite. One, or more, generations of quartz, calcite and fluorite are also present.

Development of each islet was essentially centrifugal in that later species tended to be deposited marginally to earlier, although overlapping, and replacement of earlier species by later commonly occurred.

Malayaite, not before recorded from Dachang was part-replaced by strongly colour-zoned cassiterite. The orientation of the cassiterite crystals and their colour-zoning was determined by the orientation of the malayaite crystals that they had replaced.

Later, the matrix of the cassiterite crystals was locally replaced by pyrite and chalcopyrite while the cassiterite remained intact.

The note is of some interest in that apart from recording the presence of malayaite in the Dachang deposits it also indicates a hitherto unrecorded factor that on occasion can control the orientation of cassiterite crystals and their colour zones.

Introduction

According to Zhang Zhenggen and Li Xilin (1982, p. 361) 94 minerals have been found in the Dachang mining region, Guangxi, Peoples' Republic of China, and 90 of these have been identified. Malayaite is not included in their list of identified species (*op. cit.*, p. 362-363) and I have found no reference to malayaite having been found in the Dachang ores in any of the papers available to me.

The prime reason for writing this note is the fact that I have discovered malayaite in a specimen of skarn ore that I collected from underground at Dachang in October, 1984. A further reason for compiling this note stems from some interesting relationships between malayaite and closely spatially associated cassiterite that I have noticed in thin section under the microscope.

As far as the geology of the Dachang mining region is concerned it is sufficient for the purpose of this note to state that within an area of about 20 km x 20 km a considerable number of viable deposits, not all stanniferous, occur. Lodes, vein swarms, metasomatic deposits and skarns are all spectacularly represented. These deposits occur in

Middle and Upper Devonian sediments, which are dominated by the presence of limestones and which have been folded, faulted and intruded by granitoid stocks, dykes and apophyses.

The nature, etc., of the malayaite-bearing skarn specimen

The original specimen was of modest dimensions, c. 5 x 5 x 2.5 cm and so may be far from truly representative of the ore-deposit from which it was collected.

A thin and a polished section were prepared from half of the specimen.

A cursory examination of the thin section (Fig. 1) indicated the presence of malayaite and this was confirmed by examining the intact half of the original specimen under short-wave ultraviolet light. The malayaite fluoresced yellowish and other areas fluoresced blue suggesting the probable presence of scheelite. Subsequent examination of the thin section confirmed the presence of a few scheelite crystals.

Further study of the sections under the microscope showed that the rock in which the ore-minerals occurred consisted essentially of a rather fine mosaic of pale diopside crystals with which was associated minor calcite. A few large grossularite crystals which contained diopside inclusions and were veined by calcite, were also present. Adjacent to the largest of the garnet crystals were a few plagioclase crystals exhibiting locally, under crossed polars, fine polysynthetic twinning. These plagioclases were considerably replaced by calcite and grossularite. Within this essentially silicate matrix islets of ore-minerals occurred. These islets consisted essentially, and in the probable order of major deposition, of malayaite, cassiterite, scheelite, pyrite, chalcopyrite and sphalerite. An unknown amount of varlamoffite, plus calcite and quartz, were generated by the degradation of some of the malayaite originally present. Minor stannite, immediately predating chalcopyrite, and minor pyrrhotite, predating pyrite, were also recorded. During the course of the generation of this suite of minerals there were several periods of minor fracturing and some of the resulting narrow fissures were infilled with sulphides, quartz and calcite. The nature of the infill of a given veinlet naturally depended on when it was first developed and whether it was, or was not subsequently reopened. Another obvious result of fracturing is the presence of broken cassiterite crystals. This topic will be returned to later.

The deposition of the malayaite and the subsequent species noted above occurred in certain areas which were, throughout the period of deposition, points of intersection of preferred passageways of mineralising agents. Beyond reasonable doubt the deposition of malayaite and the minerals that followed it was due to replacement. The malayaite, which may occur in a calcite, quartz or fluorite gangue, lacks inclusions, and perhaps the preferred passageways of the mineralising agents tended to develop in those places where calcite rather than diopside dominated the local scene. In any event, some of the malayaite crystals subsequently became degraded, to varying degrees, to calcite, quartz, varlamoffite and/or cassiterite. Precisely when the degradation took place is not known but it may have occurred during or immediately before the major phase of cassiterite deposition.

The sites of cassiterite deposition were coincident with the major malayaite sites. Deposition of the cassiterite appears to have commenced near the centres of these sites and to have advanced centrifugally, often

obliterating all but the peripheral parts of the malayaite aggregates. Occasionally, however, irregularly shaped inclusions of malayaite and quartz or calcite occur within the essentially cassiterite areas. Why such inclusions escaped destruction is unknown. On occasion, individual cassiterite crystals, with acute terminations, grew beyond the malayaite. The terminal parts of these cassiterite crystals, which are now in a matrix of calcite, colourless fluorite, or quartz, have sometimes been fractured and the broken parts have been somewhat displaced. It has not been established whether these elongate cassiterite crystals grew into minute druses which were subsequently infilled with calcite, fluorite or quartz before fracture occurred, or whether they developed by replacement of calcite which was, on occasion, replaced by fluorite or quartz before fracturing took place. In this section the cassiterite crystals are pale-ochre in colour with string rust-brown colour zones. Some of the larger crystals are not unusual in appearance in that the colour zones are parallel to crystal faces and more-or-less continuous throughout the crystal. However in some cassiterite aggregates the colour zones are restricted to bands that are much shorter than the crystals in which they occur, and collectively the bands in a given aggregate may display curious patterns. Examination of the malayaite/cassiterite contact zones provide an explanation of the latter curious phenomena. There, locally, malayaite crystals partly converted to cassiterite occur. In addition, the line of contact between the malayaite and cassiterite aggregates is commonly an irregular one because the cassiterite developed most rapidly along malayaite crystals whose long axes were more-or-less normal to the advancing cassiterite front. In such instances it is clear that the orientation of the cassiterite crystals and of their colour zones that are parallel to prism faces were determined by the orientation of the malayaite crystals that they were overprinting. Where the advancing front had encountered malayaite crystals whose orientation changed markedly from those just previously eliminated by the cassiterite the fact was signalled by a change in the orientation of the colour zones of the subsequently deposited cassiterite. cursory examination of one such example seen in thin section suggested that the terminal parts of a large zoned cassiterite crystal had been sheared, because attached to it was a mass of cassiterite shaped like a wind-blown flame of a candle. Further examination proved that shearing had not occurred, and the disposition of the colour zones provided the reason for the curious shape of the aggregate (Fig. 2).

Little need be said about the species that post-date the cassiterite and occur as discontinuous, somewhat overlapping zones at each of the islets of mineralization except to note that locally pyrite and chalcopyrite have invaded the cassiterite zone and replaced the matrix in which the cassiterite occurred but leaving the tin species intact.

References

Zhang Zhengen and Li Xilin, 1982. Studies on mineralisation and composition of DC ore field, Guangxi, China. Geochemistry, 1, no. 4, 355-368.

Manuscript received 27 August 1985

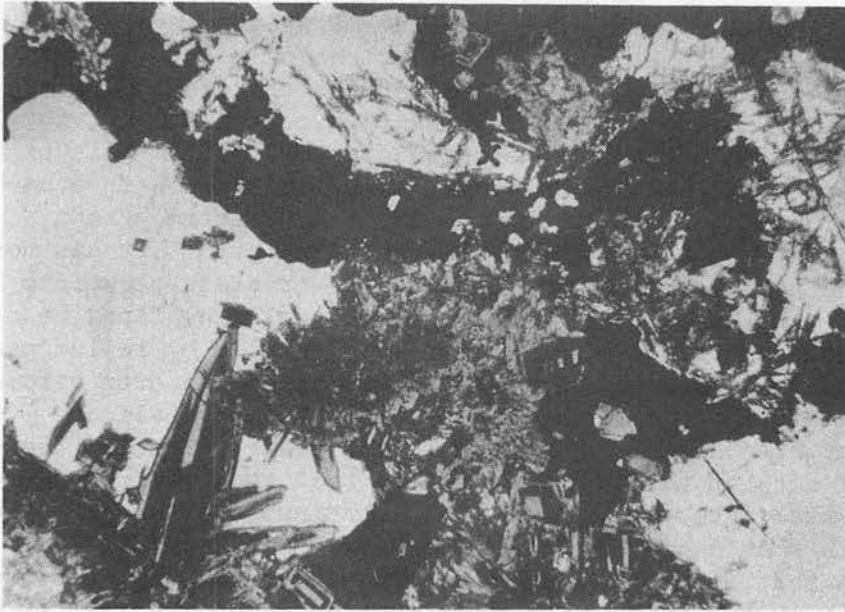


Fig. IA.

0.5 mm

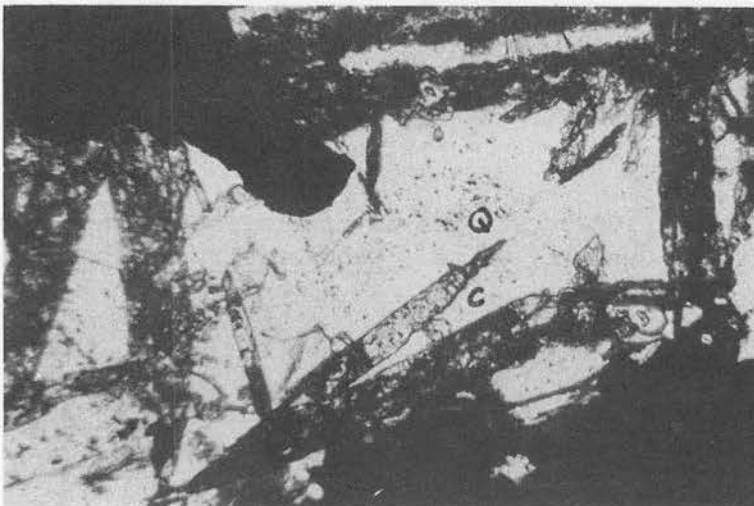
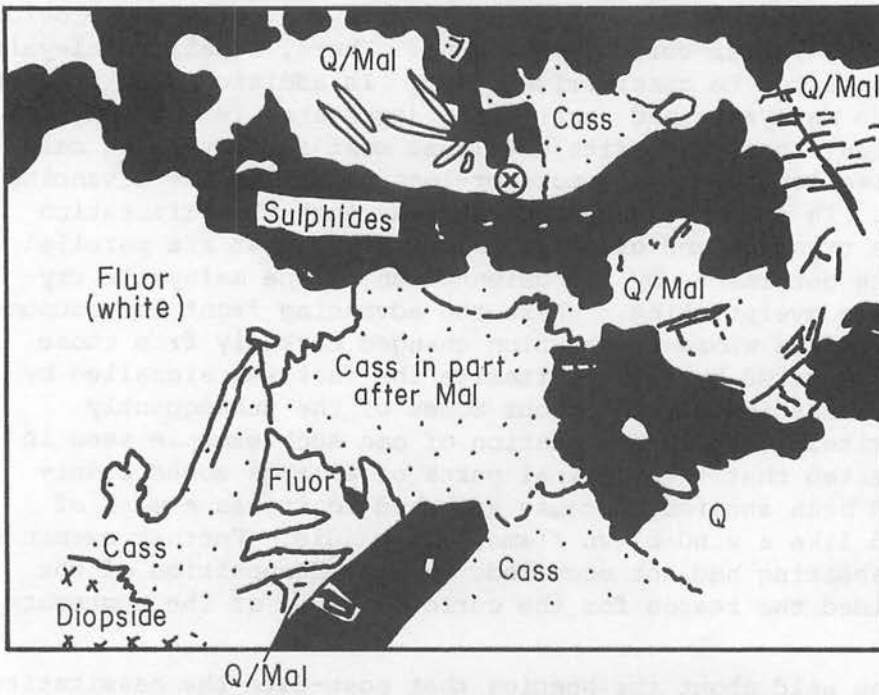


Fig. IB.

0.1mm.

Fig. 1A. Photomicrograph of a thin section of malayaite-bearing ore. The accompanying tracing is provided as a key to the photomicrograph.

Fig. 1B. A photomicrograph, taken at a higher magnification, of the area indicated by X in the photomicrograph and tracing of Fig. 1A.

In this area malayaite, which is part-degraded to cassiterite and varlamoffite, calcite and quartz, is in a matrix consisting largely of quartz (Q), but a little calcite occurs in the area C.

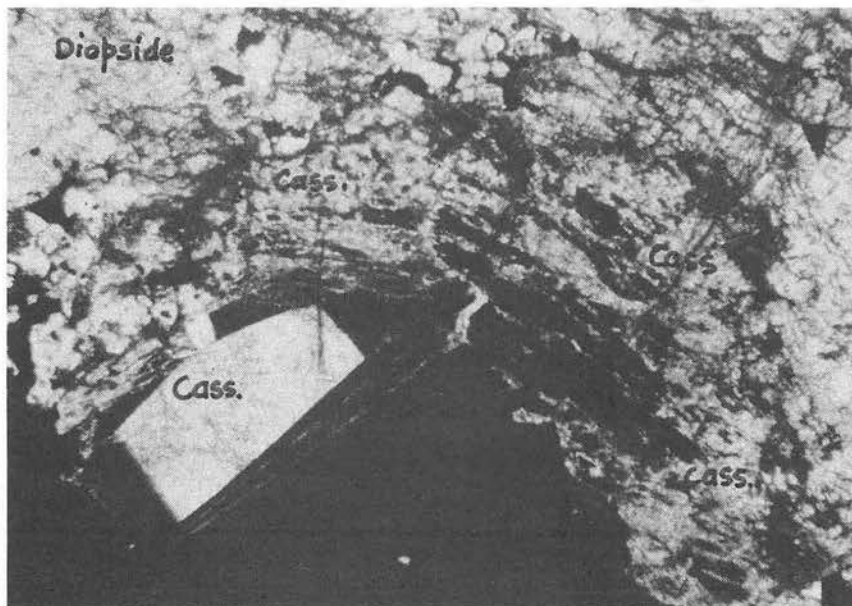


Fig. 2. A photomicrograph of a thin section of Dachang ore showing a large zoned crystal of cassiterite largely enclosed in sulphide (black) and haloed by a mass of cassiterite containing dark zones. These dark zones, which provide a pseudo-sheared texture, are believed to owe their disposition to the location of malayaite crystals that were obliterated by the invading cassiterite. The local matrix is unshaped diopside.

LOWER CRETACEOUS RADIOLARIA FROM THE CHERT-SPILITE FORMATION, KUDAT, SABAH

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Introduction

The Chert-Spilite Formation of Kudat crops out at Tanjung Bangau and Bukit Pengaraban. The formation consists of spilite and chert with shale, siltstone and marl. At Bukit Pengaraban the Chert-Spilite is underlain by a rock association equivalent to that of the basement complex in Darvel Bay, and overlain unconformably by the Wariu Formation to the south. At Tanjung Bangau the spilitic lava flow of the formation is bounded by chert. This formation is separated from the Kudat Formation by the Loro-Bak Bak fault in the north and the Bangau-Dampirit fault in the south. A traverse along the Sin San - Bak Bak road shows that the radiolarian chert lies on top of the pillow lava. Three samples of radiolarian cherts were collected from Tanjung Bangau (Locality I) and five samples from Bukit Pengaraban (Locality II). The samples yielded many species of quite well preserved radiolaria. The radiolarian assemblage indicates that the age of the formation is Lower Cretaceous.

Material & Method

The samples of radiolarian chert were crushed into about 1 cm fragments. The radiolaria were then extracted from the chert by using the hydrofluoric acid technique (Pessagno and Newport, 1972). The radiolaria were retrieved as whole specimens and then treated with hydrogen peroxide solution to remove the remaining matrix. The specimens retrieved using this method are quite well preserved and some of them can be identified up to the species level.

Results & Discussion

The samples from Tanjung Bangau yielded a very low number of species, and they were poorly preserved. Only three species were recognised, *Archaeodictyomitra* sp. *Hemicryptocapsa pseudopilula* Tan Sin Hok, and *Conosphaera tuberosa* Tan Sin Hok.

The samples from Bukit Pengaraban yielded high diversity and a number of individuals. The most common species are *Pseudodictyomitra leptonica* (Foreman), *Conosphaera tuberosa* Tan Sin Hok, *Spongodiscus renilaeformis* Cambell and Clark, *Archaeodictyomitra lacrimula* (Foreman), *Patellula planoconvexa* (Pessagno), *Archaeodictyomitra puga* Schaaf, *Hemicryptocapsa pseudopilula* Tan Sin Hok, *Sethocapsa orca* Foreman and *Stichocapsa pseudodecora* Tan Sin Hok. The rare species are *Orbiculiforma* cf. *perampala* Rüst *Paronaella* sp., *Histiastrium aster* Lipman, *Hagiastrium euganeum* (Squinabol) *Obesacapsula somphedia* (Foreman), *Parvicingula boesii* (Parona), *Archaeodictyomitra pseudoscalaris* Tan Sin Hok, *Spongocapsula palmerae* Pessagno, *Spongodruppa coccus* Rüst and many more species yet to be identified. The detailed taxonomy of these species will be published elsewhere.

The common occurrence of some short ranged characteristic index forms such as *Archaeodictyomitra lacrimula*, *Parvicingula boesii*, *Sethocapsa orca*, *Pseudodictyomitra leptonica* indicates that the age of chert

spilite Formation may range from the *Staurosphaera septemporata* zone (Barrenian) to the *Acaeniotyle umbilicata* zone (early Albian) (Schaaf, 1981). The rare occurrence of *Histiastrum aster*, *Obecapsula somphedia* indicate the upper limit is probably Albian and the occurrence of *Spongocapsula palmerae* suggests that the lower limit is probably Berriasian. No other younger forms were found in the present material. The Lower Cretaceous zonal markers such as *Staurosphaera septemporata*, *Diblolachras tythopora*, *Crolianium pythiae*, *Archicapsa similis* and *Acaeniotyle umbilicata* are absent in the present material.

The assemblage of the radiolaria in the samples studied indicates that the age of the Chert-Spilite Formation in Kudat area is Lower Cretaceous and partly equivalent to those in the Upper Segama area (Leong, 1977).

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Manuscript received 25 July 1985.

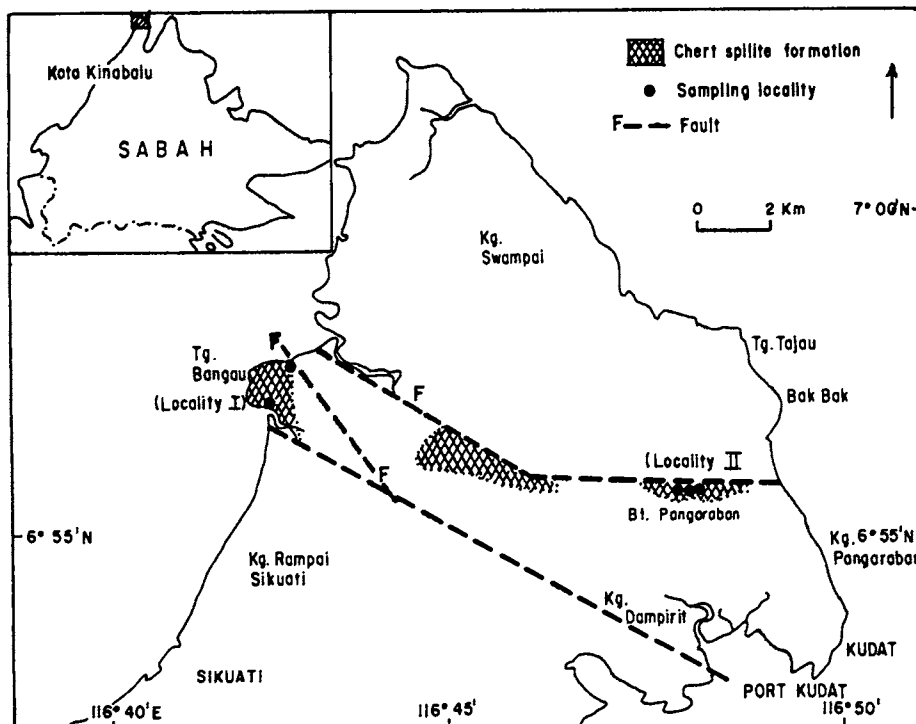


Fig.1 Distribution of Chert-Spilite Formation, Kudat, Sabah.

HUBUNGAN ANTARA GRED LULUHAWA DENGAN UJIAN PENUSUKAN PIAWAI: SATU PENILAIAN AWAL

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Sinopsis

Ujian penusukan piawai (UPP) telah digunakan dengan meluas untuk menilai sifat kejuruteraan bahan bumi semasa kerja penyiasaan tapak. Catatan ini mengutarakan satu penilaian awal mengenai hubungan antara gred luluhawa dengan nilai-N. Hubungan ini dilakukan dengan menggunakan log lubang gerudi yang dikumpul mewakili berbagai jenis batuan. Hasil yang diperolehi dapat digunakan untuk menafsir gred luluhawa dari data lubang gerudi.

Synopsis

The standard penetration test (SPT) has been used extensively during site investigation for evaluating the engineering properties of earth material. This note will highlight a preliminary assessment of the relationship between weathering grade and N-value. The data is obtained from available borehole logs representing various rock types. The result can be used in the evaluation of different weathering grades in boreholes.

Pengenalan

Semasa menjalankan kajian penerokaan bawah tanah, terutama dengan bantuan penggerudian, pelaksanaan ujian penusukan telah menjadi satu kebiasaan. Di antara berbagai jenis ujian penusukan yang telah diperkembangkan, ujian penusukan piawai (UPP) telah menjadi sangat popular di negara ini, sehingga hampir semua penerokaan bawah tanah yang telah dijalankan mengintegrasikan sama ujian ini.

Negara seperti Malaysia, dimana keadaan iklim tropiknya telah menyebabkan proses luluhawa bergiat dengan sangat pantas, hampir seluruh kawasan batuanya telah berubah menjadi tanah. Secara purata ketebalan tanah hasilan luluhawa umumnya melebihi 30 m. Memandangkan dari batuan induk yang sama kini telah berubah menjadi beberapa lapisan tanah yang berbeza, maka pendekatan kajian keadaan bawah tanah berdasarkan gred luluhawa menjadi sangat penting (Ibrahim Komoo, 1985). Malangnya praktis yang diamalkan di Malaysia mengenai keadaan bawah tanah masih menitikberatkan tekstur tanah. Walaupun pada umumnya amalan ini baik dan banyak faedahnya, tetapi apabila bekerja dengan tanah hasilan luluhawa yang tebal ia sering mengelirukan.

Catatan ini bertujuan menunjukkan hubungan antara nilai UPP dan gred luluhawa berdasarkan kepada penelitian yang telah dijalankan terhadap data log lubang gerudi dari berbagai jenis batuan di negara ini.

Ujian Penusukan Piawai

Ujian UPP pertama kali diperkenalkan pada tahun 1927 oleh Raymond Concrete Pile Company (Sanglerat, 1972). Pada prinsipnya ujian ini digabungkan dengan kaedah pensampelan tanah yang menggunakan pensampel "split-spoon" berdiameter luar 51 mm dan dengan panjang 457 mm. Untuk menjalankan ujian ini beban seberat 63.5 kg dijatuhkan secara menegak ke hujung atas pensampel dari jarak 750 mm. Jatuhan beban diulang sehingga

alat pensampel menusuk sedalam 450 mm, jumlah ulangan jatuhan atau ketukkan untuk penusukan sedalam 150 mm dicatat sebagai rujukan, sementara 300 mm berikutnya diambil sebagai kerintingian penusukan atau lebih dikenali sebagai nilai-N. Sekiranya sampel tanah yang diuji sangat keras, lazimnya nilai penusukan sehingga 50 ketukkan digunakan.

Walaupun ujian UPP umumnya mudah dan pantas, ia mempunyai pengertian yang mendalam untuk memahami beberapa sifat kejuruteraan tanah. Umpamanya Terzaghi dan Peck (1948) telah menunjukkan hubungan yang baik antara nilai-N dengan sifat ketumpatan bandingan pasir, dan sifat kekonsistenan serta kekuatan mampatan lempung. Pada masa ini, nilai UPP juga dapat dikaitkan dengan beberapa parameter kejuruteraan yang penting, umpamanya untuk meramal penurunan tanah, menganggar kekuatan tampung pasir, meramal kemungkinan kejadian pencairan tanah (liquefaction), dan menentukan kedalaman mampatan (Nixon, 1982).

Gred Luluhawa

Jasad batuan terubah akibat proses luluhawa secara beransur dan berterusan. Zon yang menunjukkan peralihan dari batuan segar ketanah baki dikenal sebagai profil luluhawa dan mudah digredkan. Terdapat berbagai kaedah pengredan yang telah diperkenalkan oleh pengkaji terdahulu, tetapi dalam catatan ini cadangan gred luluhawa jasad batuan yang dikemukakan oleh IAEG (1981) akan digunakan. Pengredan ini tidak sahaja mudah digunakan, tetapi ia juga telah mengambil kira kebanyakan pandangan pengkaji terdahulu dan diharapkan satu masa nanti menjadi kaedah pengredan yang baku.

Pada prinsipnya gred luluhawa cadangan IAEG melihat kehadiran tanah dan/atau batuan dalam jasad batuan. Gred I dan II keseluruhannya terdiri daripada batuan, gred III dan IV merupakan gabungan di antara tanah dan batuan dengan perkadaran tertentu, sementara gred V dan VI pula keseluruhannya terdiri dari tanah (Jadual 1). Perlu juga diberikan perhatian memandangkan pengelasan ini untuk jasad batuan, tumpuan harus diberikan kepada keseluruhan jasad batuan dan tidak kepada sifat batuan utuhnya.

Hubungan antara gred luluhawa dan UPP

Banyak yang telah dibincang mengenai hubungan erat antara sifat kejuruteraan jasad batuan dan gred luluhawanya. Aspek ini tidak akan dibincangkan, dan kepada yang berminat bolehlah merujuk di antaranya dalam Fookes, *et al.* (1971), Dearman, *et al.* (1978) dan Irfan dan Dearman (1978). Sementara hubungan antara tanah dan nilai UPP pula telah disentuh terdahulu. Memandangkan konsep luluhawa lebih bersifat faktor geologi, sementara UPP atau nilai-N merupakan fakta kejuruteraan geoteknik maka hubungan kedua aspek ini sangat sedikit diperkatakan.

Perkara kedua, gred luluhawa mudah dikelaskan apabila bekerja di singkapan umpamanya di potongan jalan, muka kuari, tapak empangan atau terowong, tetapi ia menjadi lebih rumit apabila membuat pengiogan dari lubang gerudi. Kerja begini memerlukan ahli geologi yang majir, dan tidak oleh seorang jurutera. Memandangkan kebanyakan pengerudian untuk penerokaan bawah tanah di negara ini diselia oleh jurutera, ternyata maklumat gred luluhawa dan nilai-N jarang sekali terkumpul bersama dalam suatu log lubang gerudi.

Maklumat yang akan dipersembahkan dalam catatan ini merupakan satu kajian awal. Kira-kira 50 log lubang gerudi yang terdiri dari berbagai jenis batuan, di antaranya granit, metasedimen dan sedimen telah diselidiki. Berdasarkan maklumat asas yang terdapat di log lubang gerudi,

terutamanya tekstur, warna dan sifat ketumpatan atau kekonsistenan, gred luluhawa daripada profil lubang gerudi tersebut ditafsirkan. Rajah 1 menjelaskan ringkasan dari hasil yang diperolehi.

Dalam penilaian awal ini keseluruhan hubungan yang diperolehi dianggap sebagai satu unit, perbezaan jenis batuan induk tidak diambil kira. Ringkasan pengelompokan nilai-N yang berkaitan dengan gred luluhawa adalah seperti berikut:

<u>Gred Luluhawa</u>	<u>Nilai-N</u>
VI. Tanah Baki	0 - 12
V. Terluluhawa sepenuhnya	6 - 50
IV. Terluluhawa tinggi	30 - 100 (50/15)
III. Terluluhawa sederhana	50 - 610 (50/2.5)
II. Terluluhawa sedikit	lebih 610 (50/2.5)

Dari data di atas nilai saling menindih antara gred luluhawa agak tinggi, umpamanya antara 6 hingga 12 untuk gred VI - V, 30 hingga 50 untuk gred V - IV, dan antara 30 hingga 50 untuk gred III - II. Pertindihan ini tidak dapat dielakkan memandangkan sempadan di antara gred luluhawa itu sendiri kurang jelas. Bagaimana pun, sela pertindihan ini boleh dikurangkan sekiranya hubungan antara gred luluhawa dengan nilai-N dibuat untuk satu-satu jenis atau kumpulan batuan tertentu.

Kesimpulan

Kajian awal menunjukkan satu hubungan yang baik antara gred luluhawa dan nilai UPP boleh disediakan. Oleh kerana kedua-dua maklumat tidak tersedia dalam log lubang gerudi yang lazim, maka nilai gred luluhawa terpaksa ditafsirkan berdasarkan sifat fizik dan tekstur bahan bumi. Sela pertindihan nilai-N yang agak besar di antara gred luluhawa disebabkan faktor jenis batuan tidak diambil kira. Bagaimana pun untuk mengelakkan kekeliruan penjelasan berdasarkan gabungan gred, umpamanya VI - V, V - IV boleh diperkenalkan. Kajian yang lebih mendalam dengan mengambil kira faktor jenis batuan boleh menghasilkan hubungan antara gred luluhawa dan nilai-N yang lebih baik.

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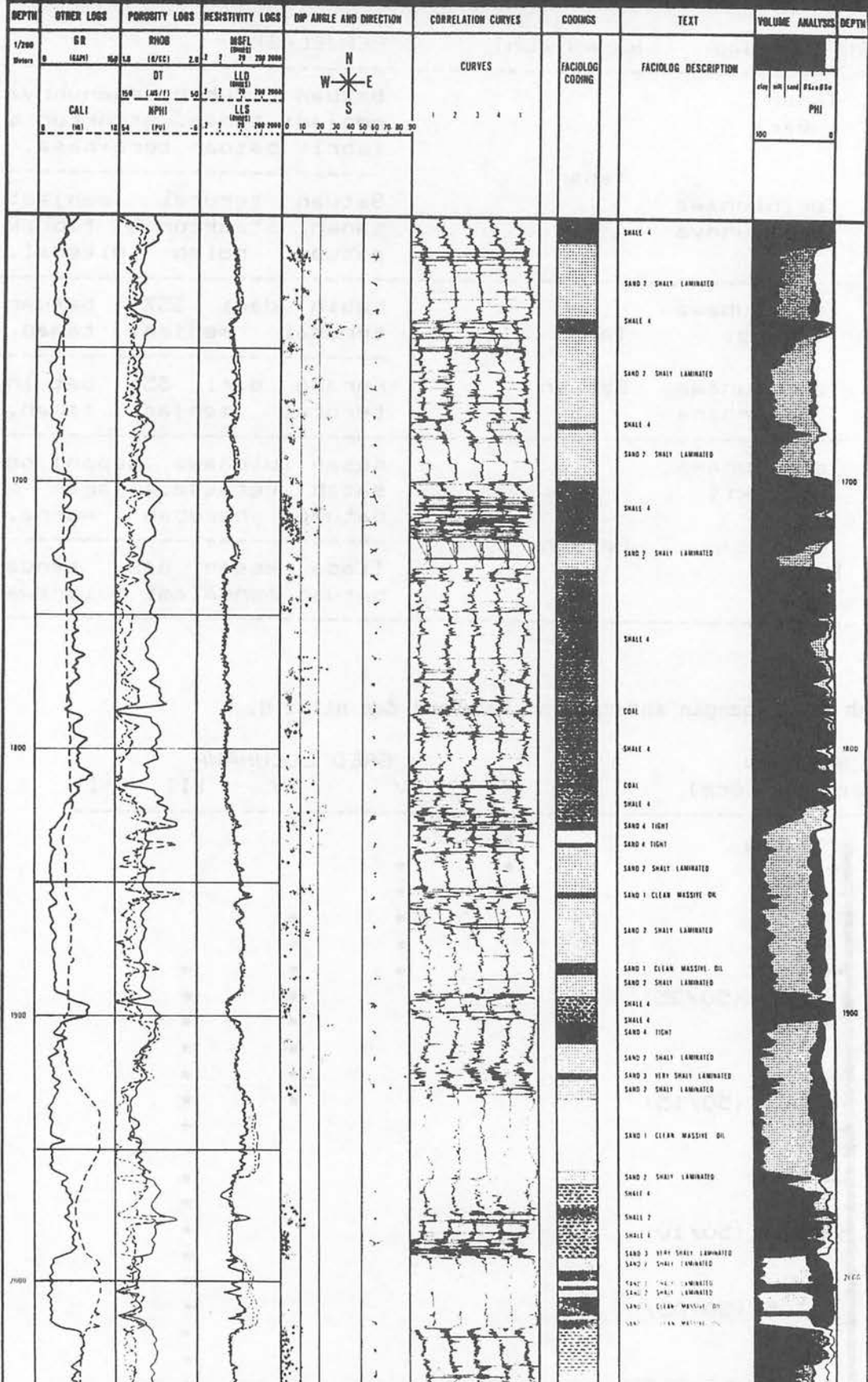
Manuscript received 22 June 1985

Jadual 1. Gred luluhawa jasad batuan (berdasarkan IAEG, 1981)

GRED LULUHAWA	BAHAN BUMI	PENJELASAN
VI, Tanah Baki	Tanah	Batuan terubah sepenuhnya menjadi tanah. Struktur & fabrik batuan terbinasa.
V, Terluluhawa Sepenuhnya		Batuan terurai menjadi tanah. Struktur & fabrik batuan bolen dikenal.
IV, Terluluhawa Tinggi	Tanah & Batuan	Lebih dari 35% batuan terurai menjadi tanah.
III, Terluluhawa Sederhana	Batuan	Kurang dari 35% batuan terurai menjadi tanah.
II, Terluluhawa Sedikit	Batuan	Kesan luluhawa sepanjang satah ketakselajaran & batuan berubah warna.
I, Batuan Segar		Tiada kesan dan tanda batuan mengalami luluhawa.

Rajah 1. Hubungan antara gred luluhawa dan nilai-N.

NILAI-N (ketukan/30cm)	GRED LULUHAWA				
	VI	V	IV	III	II
0	*				
10	*	*			
20		*			
30		*	*		
40		*	*		
50		*	*	*	
60 (50/25)			*	*	
70			*	*	
80			*	*	
90			*	*	
100 (50/15)			*	*	
110				*	
120				*	
130				*	
140				*	
150 (50/10)				*	
				*	
				*	
305 (50/05)				*	
				*	
				*	
610 (50/2.5)				*	*



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

PERTEMUAN PERSATUAN
(MEETINGS OF THE SOCIETY)

TECHNICAL TALKS

A.J. Sinclair: A geostatistical study of global and local reserves in an Indonesian primary tin deposit.

The above talk was presented to about 25 members of the Society on the 15th July 1985 at 6.00 p.m. in the Department of Geology, University of Malaya. Prof. A.J. Sinclair, who is with the Department of Geological Sciences at the University of British Columbia in Canada, spoke of the application of geostatistics to the evaluation of ore reserves in the Tempelang No. 10 deposit on Bangka Island.

Prof. Sinclair started by briefly explaining the geological framework of the deposit and pointed out that primary mineralization was discovered when initial dredging and later gravel pump mining, of overlying alluvium led to the exposure of granite and metasediments. During the feasibility stage of investigation, several vertical boreholes were drilled into the bedrock on a 100 m x 50 m grid and this exploration data formed the background for the geostatistical study. Prof. Sinclair then stated that this exploration data was first checked for accuracy and then transformed prior to statistical treatment. Auto-correlation plots of several variables were then plotted to examine the role of geological factors in controlling mineralization. From the results of the auto-correlation plots, the deposit was subdivided into four quadrants and auto-correlation semi-variograms were then determined prior to the calculation of ore reserves. Prof. Sinclair concluded by stating that the results of the study supported the distinct viability of geostatistics in evaluating ore reserves though he cautioned on the choice of cut-off grade as this had influenced the estimation of the reserves to a very large extent.

J.K. Raj

M. Barbetti: Recent advances in the C^{14} dating technique

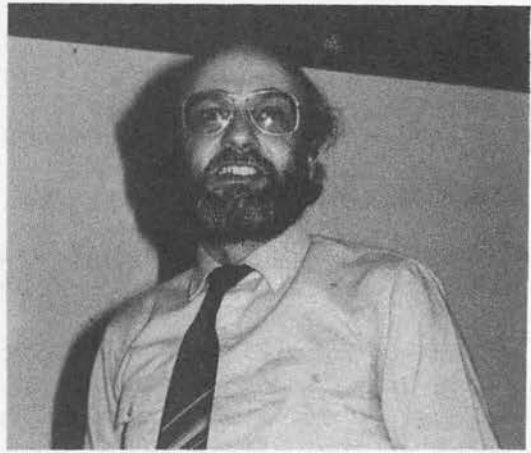
The above talk was presented to about 30 members of the Society on 29th July 1985 at 5.00 pm in the Department of Geology, University of Malaya. Dr. Michael Barbetti, who is with the Mackintosh Centre for Quaternary Dating at the University of Sydney, Australia, was in Malaysia to assist in the setting-up of a C^{14} dating laboratory at PUSPATI.

In his talk, Dr. Barbetti introduced the mixed audience to the basic principles of the C^{14} dating technique and pointed out that when organisms die, no fresh C^{14} replaces the C^{14} decaying in tissues, and their radioactivity decreases by half every 5,730 years. Dr. Barbetti then spoke in detail of the method currently employed for C^{14} dating at the Mackintosh Centre for Quaternary Dating. In concluding his talk, Dr. Barbetti provided details on the different equipment presently available for C^{14} dating. Sizes of samples required for analyses and the accuracy of results of the different equipment were also provided.

In the lively discussion which followed the talk, several questions were raised by the audience regarding the accuracy of C^{14} dating, particularly on the accuracy of results among different laboratories. Ques-



A.J. SINCLAIR



M. BARBETTI

tions were also raised on the method of collection of samples for C^{14} dating and the usefulness of the C^{14} dating technique for groundwater investigations. These, and other similar questions were readily answered by Dr. Barbetti.

J.K. Raj

Petang Siswazah (Graduates Evening)

The Graduates Evening this year was on 29 August 1985 at the Geology Department, University of Malaya at 5.00 p.m. A crowd of about 35 turned up to listen to 2 talks on Sabah presented by 2 recent graduates, K.H. Kok and T.B. Chuah, from the Geology Department, University of Malaya.

Kok Heng Hung: Stratigraphy of Mantanani Islands, Sabah

The Mantanani Islands, offshore western Sabah consist entirely of Tertiary strata and Quaternary carbonate sands. Predominantly, limestone with minor calcareous sandstone lithologies form steeply dipping strata which emerge as elongate limestone ridges on the islands.

'Mantanani Limestone' is proposed for the sequence of strata exposed on the islands. It is divided into:

- (a) a massive' conglomeratic unit (upper unit) overlying
- (b) a well-bedded unit (lower unit).

The lower unit is essentially of calcareous quartzarenite with very minor calcilutite while bioclastic packstone and variable intercalation of calcareous sandstone comprise the upper unit. Foraminiferal fossil (*Globigerinoides transitoria* Blow) delineated an Upper Burdigalian to Lower Langhian age for these strata.

The steeply dipping (60° - 75°) strata of the islands form a tight westward plunging anticlinal structure which is transected and displaced by a WNW-ESE trending right-lateral strike-slip fault.

Faunal assemblage indicated that the palaeoenvironment is warm shallow marine, essentially restricted to the photic zone. The upper unit is inferred to be deposited within the neritic zone. The lower unit is of slightly deeper marine deposition. These are shelfal deposits with frequent influx of terrigenous detritus.

The lower unit is interpreted as a turbiditic unit after which a



H. H. KOK



T. B. CHUAH

shallower marine environment prevailed promoting deposition¹ of the prograding and aggrading upper unit. The large bioclasts and flow texture of the bioclastic packstone of the upper unit is due to the storm current action on the numerous patch reefs and isolated coral colonies, producing a storm deposit. Alternatively, there was a minor uplift causing the equivalent shallower condition as the area here is known to have up-faulted blocks in the same time frame.

Chuah Teong Ban: The Geology of Suanlamba-Sukau Area, Sandakan, Sabah.

The Suanlamba-Sukau area lies on the Lubang platform on the South Western portion of the West Sulu Basin and is formed entirely of Tertiary sedimentary rocks that are made up of three formations, namely the Labang Formation, Gomantong Limestone and Tanjong Formation.

The Labang Formation is estimated to be of Middle Oligocene to Early Aquitanian (Te_{1-4}) and was deposited in a deep marine environment with flysch-type of deposits. The presence of Bouma's sequence and *Paleodicyton* sp. indicate a turbidite deposit. The sandstones are mostly greywacke and are also fossiliferous. The provenance of the sandstones of Labang Formation, situated NW of the studied area, is determined from palaeo-current and petrographic studies.

The Gomantong Limestone of age Te_{5-f} , which overlies the Labang Formation unconformably, was deposited in a shallow marine environment with reefal and foraminiferal limestone.

The Tanjong Formation which is the lateral equivalent of the Gomantong Limestone is believed to overlie unconformably the Labang Formation. It consists mainly of massive tuffaceous sandstone and some mudstone with traces of lignite deposited in the prodelta region of a shallow marine environment. The sandstones are mainly greywacke and their non-fossiliferous nature hindered palaeontological controls and age determination.

This area is structurally, complexly deformed with common overturned strata that are caused by both tectonic and slumping. A few faults and some small scale folds were observed. The tectonics could have been activated by the various stages of uplift of the Crocker Formation that controlled the sedimentary and structural geology of this area.

BERITA - BERITA PERSATUAN
(NEWS OF THE SOCIETY)

EDITOR'S NOTE AND PROGRESS REPORT ON SOCIETY'S PUBLICATIONS

"It's great to be back!", so the saying goes, and it is heartening indeed to see the Acting Editor, Dr. S. Paramanathan, doing such a fine job on the Society's publications in my absence. My appreciation too on the unselfish effort put in by our many reviewers to see that the GEOSEA V papers are carefully reviewed. To all I say a big 'thank you' and look forward to their continued support.

One avenue where we need help from all members is to look for financial assistance towards the realisation of our 2 voluminous volumes of the GEOSEA V papers, Bulletin nos. 19 and 20. If every member puts in some effort I am sure we can raise something substantial to offset the financial burden on the Society's funds. Just call the Society's "hotline" 03-577036 if you can come up with something.

1. Bulletin No. 18 - Special Petroleum Geology Bulletin

The page-proofs for the 5 papers in this bulletin are ready and being edited. The galleys for the sixth paper is now ready. Another 2 papers are being considered for this bulletin. The bulletin should be out before the Petroleum Geology Seminar '85.

2. GEOSEA V Volumes (Bulletin Nos. 19 & 20)

The first batch of galleys for Bulletin 19 are ready and being proof read. Papers for Bulletin 20 are being submitted for typesetting. As such, reviewers who have not sent back their comments are advised to do so as soon as possible.

We hope to bring out Bulletin 19 before the end of the year, and Bulletin 20 will follow immediately after that.

3. Bulletin No. 21

So far 2 papers have been received for consideration.

4. WARTA GEOLOGI

We are in need for articles again. Members should take advantage of the quick publication of their contributions in the newsletter.

5. Border Correlation (Volume 2)

Dr. Paramanathan is finalising the publication of this volume.

G.H. Teh

GSM'S COUNCIL'S NOMINATION LIST FOR 1986/87 COUNCIL

The Council on the recommendation of the Nominations Committee have drawn up the following list of nominees for the various positions in the coming 1986/87 Council:

President: John Kuna Raj (Universiti Malaya)

Vice President: Ahmad Said (Petronas)
Hon. Secretary: S. Paramanathan (Universiti Pertanian Malaysia)
Hon. Asst. Secretary: Ibrahim Komoo (Universiti Kebangsaan Malaysia)
Hon. Treasurer: Chow Weng Sum (Geological Survey Malaysia)
Hon. Editor: Teh Guan Hoe (Universiti Malaya)
Councillors: Wan Fuad Hassan (Universiti Kebangsaan Malaysia)
(2-years) Koh Tuck Wai (Petronas)
Idris Mohamad (Universiti Malaya)
Abd. Ghani Rafek (Universiti Kebangsaan Malaysia)
Councillors: Abdullah Hasbi Hj. Hassan (SEATRAD)
(1-year) Azhar Hussein (Universiti Malaya)
Albert Loh (Malaysia Mining Corp)
Ahmad Tajuddin (Universiti Malaya).

The general membership are invited to make further nominations for the various positions. Please use the Nomination Form (will be supplied on request) and should include the written consent of the nominee and two supporting signatures. Nominees and supporters should be corporate members (in good standing).

Nominations must be received by the Hon. Secretary by 31 Oct. 1985.

USE OF NEW POSTAL CODE

Local members are advised to inform the Society of the new postal code of their addresses following notification by the Postal Department.

PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

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

1. Ramly Khairuddin, Petronas Laboratory, P.O. Box 12444, Kuala Lumpur
2. R.L. Pile, BP Petroleum Thailand, Sitthivorakit Building, 13 Floor, 5 Soi Pipat, Silom Road, Bangkok 10500, Thailand.
3. David Harrison, Gearhart Geodata Services Ltd., 118, Tagore Lane, Singapore 2678.
4. David G. Newton, - do -
5. C.K. Burton, P.T. Sungai Kencana, Setiabudi Bldg., 1, 4th Floor, Blcok D/3, Jl. H.R. Rasuna Said, Kuningan, Jakarta Selatan, Indonesia.
6. Roeland Hillen, c/o Narcislaan 18, 5595 EG Leende, The Netherlands.
7. Tan Aik Min, 61, Jalan 17/5, Petaling Jaya.
8. Robert B. Tate, Apt. B, 28 Floor, Causeway Centre, 28 Harbour Road, Wanchai, Hong Kong.
9. Foo Wah Yang, No. 17, Jalan SS17/2B, Subang Jaya, Selangor.

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

BACK ISSUES AVAILABLE

- 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 (US\$5.00) - softcover; M\$15.00 (US\$7.50)
- 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 geology. Edited by B.K. Tan. Price: M\$12.00 (US\$6.00)
- Bulletin 8 (1977). 158 p. A collection of papers on geology. 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 Southeast Asia. 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 geology. Edited by G.H. Teh. Price: M\$20.00 (US\$9.50)
- Bulletin 13 (1980). 111 p. A collection of papers on the geology of Malaysia and Thailand. Edited by G.H. Teh. Price: M\$20.00 (US\$9.50)
- Bulletin 14 (1981). 151 p. A collection of papers on the geology of Southeast Asia. Edited by G.H. Teh. Price: M\$30.00 (S\$14.00)
- Bulletin 15 (1982). 151 p. A collection of papers on geology. Edited by G.H. Teh. Price: M\$30.00 (S\$14.00)
- Bulletin 16 (1983). 239 p. A collection of papers on geology. Edited by G.H. Teh. Price: M\$30.00 (US\$14.00)

Bulletin 17 (1984). 371 p. A collection of papers on geology. Edited by G.H. Teh. Price: M\$35.00 (US\$17.00)

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) per bimonthly issue from July 1966

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All prices quoted are inclusive of postage and packing by surface mail; for airmail, please write in for enquiry. Allow 8 - 10 weeks for delivery.

Cheques, money orders or bank drafts must accompany all orders.

Orders should be addressed to: The Hon. Assistant Secretary
Geological Society of Malaysia
c/o Dept. of Geology
University of Malaya
Kuala Lumpur
Malaysia

PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The following publications were added to the Library:

1. The Science Reports of the Tohoku University, vol. 55, no. 1 (1984), no. 2 (1985)
2. Contributions from the Institute of Geology and Palaeontology, Tohoku University, no. 87, 1985
3. Acta Palaeontologica Sinica, vol. 24, nos. 1-3, 1985
4. Journal of Stratigraphy, vol. 9, no. 1, 1985 and vol. 8, no. 4, 1984
5. Acta Micropalaeontologica Sinica, vol. 2, nos. 1-2, 1985
6. Commonwealth Science Council Newsletter, July/Aug 1985
7. Journal of Geosciences, Osaka City University, vol. 28, 1985.
8. Pulp density measurement at Kin Fatt Mines Sdn. Bhd. by Vichit Boonrasri & others, 1984
9. Bangka-1. A system for filing, editing and displaying Banka borehole data. Designed for microcomputers with small memory capacity by Eric K.H. Goh. 1984
10. Mineralogy of tin and niobium-tantalum bearing minerals in Thailand by Jaturong Prachitwan. 1985
11. Bulletin Science and Technology, Malaysia, vol. 4, no. 1, 1985
12. Jurutera Galian, no. 18 and 19, 1985
13. National Library Singapore, adult reference collections, accessions list, June 1985
14. AAPG Explorer, June and July 1985
15. Chronique de la recherche miniere, no. 479, 1985
16. The University of Kansas, Paleontological contributions, Papers 113 & 114, 1985
17. Seatrad Library, acquisitions list, Jan-Mar 1985
18. Annales Academiae Scientiarum Fennicae, Series A, no. 139, 1985
19. Asian Oil and gas, June 1985
20. Bulletin, American Museum of Natural History, vol. 179, article 3, 1985
21. American Museum Novitates, nos. 2815, 2816, 1985
22. Oklahoma Geological Survey Bulletin 138, 1985
23. Episodes, vol. 8, no. 2, 1985
24. Institution of Mining and Metallurgy Transactions, Section A, vol. 94, July 1985
25. Institution of Mining and Metallurgy Bulletin 944 & 945, 1985
26. Geological Survey of India, News, vol. 15, nos. 4-6, 1984
27. Seatrad Bulletin, vol. VI, no. 2, 1985
28. Geological Report of the Hiroshima University, no. 25, 1985
29. Memoirs of the Faculty of Science, Kyushu University, vol. xxv, nos. 2 (1984) & 3 (1985)
30. Science Reports, Dept. of Geology, Kyushu University, vol. 14, no. 3, 1985
31. Preliminary studies on the upgrading of Pinyok plant concentrates by G. Zambrana, 1984
32. Studies on the selective flotation of cassiterite with special emphasis on hematite depression by G. Zambrana & Ali Fahrudin Mattjik, 1984.
33. Investigation of the improvement of geochemical data interpretation for tin exploration in anomaly 7201, Terengganu, Malaysia by Thanawat Sirinawin & W.K. Fletcher, 1985
34. Mineralogical study of tin and niobium-tantalum bearing minerals in Omkoi area, Chiangmai, Thailand by Jaturong Praditwan, 1984
35. Some characteristics of niobium-tantalum bearing minerals from Patana Mine, Kanchanaburi, Thailand by Jaturong Praditwan, 1984

36. The primary tin-magnetite deposit of Gunung Selumar, Belitung Island, Indonesia: interim results of an exploration research study with ore genetic implications by H. van Wees & C.P. De Vente, 1984
37. Studies on liquid-liquid extraction of cassiterite in the -9 micron size range by G. Zambrana & Ali Fahrudin Mattjik, 1984

CHINA - NEW MAP AND ATLAS

published by Science Press, China and distributed by
Asian Research Service, GPO Box 2232, Hong Kong.

Marine and Continental Tectonic Map of China and its Environs (1:5,000,000)

English edition

US\$66.70

The map is in 17 colors, with its interior outline 1590 mm x 1826 mm in size. It covers an area of 70°E - 160°E and 55°N - 12°S at the scale of 1:5,000,000.

On the basis of a large amount of information and sufficient data concerning continental geology, marine geology, Precambrian geology, geophysics and remote sensing geology in China and its environs, combining important results of researches on plate tectonics, the map contributes greatly to studies of the origin, development and mutual transformation of continental, transitional and oceanic crusts by the geomechanical and geohistorical analyses as well as the fault-block tectonic theory. Systematic classifications of evolution stages, tectonic cycles and structural units of marine and continental tectonics of China and its environs are presented. It provides guidance for acquisition of the distribution of mineral deposits and analysis of regional stability.

The chief compiler of this map is Prof. Zhang Wen-you. The first draft of this map which has quite significant value in science was approved for exhibition at the 26th International Geological Congress. Prof. Zhang's lecture on this subject in Japan and America has profound significance and has received favourable comments from international geological circles, so that he, with other authors, won the Second Degree Scientific and Technological Prize of China.

Atlas of False Colour Landsat Images of China (1:500,000)

Bi-lingual (Chinese & English) edition

US\$2,765.00

553 sheets bound in three deluxe volumes

This 3-volume set of 1:500,000 Landsat images, selected from MSS four band black-and white satellite negative films obtained from U.S. ERTS-1 and 2 as well as Landsat 3, was compiled and printed into the present false colour imageries by means of composition together with image enhancement and processing, in addition to extra terrain elements drawing according to physical geographic features of a corresponding site. It contains 553 sheets, including China's territory and border regions (excluding sheets on all of the Islands in South China Sea). These false colour composite images are exquisite in design and contain considerable amount of information which reflects detailed characteristics of geographic landscape concerning geology, geomorphology, drainage systems, soil, vegetative cover as well as land use. The natural landscape exposed to surface is not only clearly discernible in the satellite images but the hidden geographic and geologic phenomena as well as trends of their dynamic changes are revealed

accordingly. These images are compiled by the Institute of Geography, Academia Sinica, China.

MEETINGS, CONFERENCES, SYMPOSIA: INTERNATIONAL COMPLEX SULFIDES SYMPOSIUM

1985 TMS-AIME Extractive & Process Metallurgy Fall Meeting
Hotel Inter-Continental, San Diego, California, USA
November 10-13, 1985

The Metallurgical Society, Inc. and the Canadian Institute of Mining and Metallurgy are co-sponsoring an International Complex Sulfides Symposium focussing on the processing of ores, concentrates, and by-products.

New approaches will be required as complex sulfides become a more important source of base metals. This symposium will examine the future role of complex sulfides, review currently applied technologies, and present the latest developments in new technology.

Three plenary lectures will address the topic of Complex Sulfides in Perspective.

- * Importance of Complex Sulfides to the Future: Colin Dixon, Imperial College
- * Current Processing Technology and Problems: Klaus Konigsmann, Noranda Mines Ltd
- * New Technology and Opportunities: Dr. Rolf Wesely, Anaconda Minerals Company

70 papers, examine all phases of complex sulfides processing, including: mineralogy, beneficiation, hydrometallurgy, pyrometallurgy, electro-metallurgy, economics, and basic science in the following technical sessions:

- * Flotation
- * Precious/By-Product Metals Recovery
- * Existing Technology
- * Beneficiation I & II
- * Hydrometallurgy I & II
- * Existing/Emerging Technology
- * Pyrometallurgy
- * Basic Science I
- * Economics
- * Mineralogy
- * Basic Science II/Environmental Control

Other highlights include an exhibit of processing technologies, and a poster session presenting recent developments. A welcoming reception, luncheon, and symposium banquet provide an excellent opportunity for informal professional exchange.

The Hotel Inter-Continental, located in the heart of San Diego is just minutes from San Diego International Airport, Sea World, the famous San Diego Zoo, Del Mar Racetrack, bay excursions and beaches. 15 miles to the south is Tijuana, Mexico with its Jal-Alai, bullfights, horse racing, and shopping attractions.

A hard bound copy of the proceedings will be available at the conference.

Call or write today for your advance registration packet including

housing and registration information, abstracts, and publication prices.
(International Complex Sulfides Symposium, The Metallurgical Society, Inc.,
420 Commonwealth Drive, Warrendale, PA 15086 (412) 776-9050).

THIRD ASCOPE CONFERENCE AND EXHIBITION: PRELIMINARY CONFERENCE PROGRAMME

Putra World Trade Centre, Kuala Lumpur, Malaysia, 2-5 December 1985

Day 1, Monday, 2 December 1985, Conference Hall

Opening Ceremony

0930 hrs Arrival of Guests
0940 hrs Arrival of ASCOPE Council Members
0955 hrs Arrival of The Honourable Dato' Seri Dr Mahathir Mohamad,
Prime Minister of Malaysia
1000 hrs Welcoming Address
Yang Mulia Raja Tan Sri Mohar Raja Badiozaman
Chairman, Petroliam Nasional Berhad (PETRONAS)
1015 hrs Opening Address
The Honourable Dato' Seri Dr Mahathir Mohamad,
Prime Minister of Malaysia
1045 hrs Tour of Exhibition

Venue: Conference

1400 hrs Presentation of ASCOPE Council Policy Papers:
Indonesia
Malaysia
Philippines
Singapore
Thailand
1545 hrs Refreshments

Day 2, Tuesday, 3 December 1985

Technical Sessions Programme

Keynote address Venue: Conference Hall
0845 - 0930 The role of Statoil as a national oil company in the
petroleum industry by A. Johnsen, President, Statoil,
Norway
0930 - 0945 Refreshments

Session 'A' Advances in Petroleum Exploration

Meeting Room No. 1

Morning Session

0945 - 1030 Paper 1 3D seismic data for structure, stratigraphy and
reservoir evaluation by Dr. A.R. Brown, Geophysical
Services Inc., USA
1030 - 1115 Paper 2 Enhanced seismic interpretation using well logs and
VSP data by A. Winchester and R. Gir, Nippon Schlum-
berger K.K., Japan
1115 - 1200 Paper 3 The Southern Palawan-Balabac Area; an accreted or
non-accreted terrane? by Dr. K. Hinz and H.U.
Schluter, BGR, Germany
1200 - 1300 Lunch Break

Afternoon Session

- 1330 - 1415 Paper 4 Global basin classification and hydrocarbon plays by Dr. D.R. Kingston and C.P. Dischroon, Esso Exploration Inc., USA
- 1415 - 1500 Paper 5 Bubble effect in shallow water shooting by J. Cheng and C.H. Hsu, CPC, Taiwan
- 1500 - 1515 Refreshments
- 1515 - 1600 Paper 6 Progress in isotope geochemical surface exploration by Prof. W. Stahl, BGR, Germany
- 1600 - 1645 Paper 7 3D seismic survey of Block 21 in the Gulf of Thailand by L. Lee, Petro-Canada Resources, Canada and Chalee Siriratanamongkol, PTT, Thailand

Session 'B' Developments in Petroleum Engineering

Meeting Room No. 2

Morning Session

- 0945 - 1030 Paper 1 Reservoir performance of the Magpie Oilfield, offshore Negara Brunei Darussalam by Zainal Abidin Ali, BSP, Negara Brunei Darussalam
- 1030 - 1115 Paper 2 Trends and challenges in reservoir simulation by Dr. J.W. Watts, EPRCo, USA
- 1115 - 1200 Paper 3 Heated pipeline systems in Central Sumatra by Hidayat Maruta and Dwi Ispraptono, P.T. Caltex Pacific, Indonesia
- 1200 - 1330 Lunch Break

Afternoon Session

- 1330 - 1415 Paper 4 Drilling deviated well through the Terengganu shale-PETRONAS Carigali experience by Mohd. Johari Dasri *et al.*, PETRONAS Carigali Sdn. Bhd., Malaysia
- 1415 - 1500 Paper 5 Central Luconia development planning and early production history by Daulat Mamora, Sarawak Shell Berhad, Malaysia
- 1500 - 1515 Refreshments
- 1515 - 1600 Paper 6 Petroleum reservoir and bottom hole design of production wells in Fang Oilfield, Chiangmai Province, Thailand by Col. Pinit Kulasing, PTT, Thailand
- 1600 - 1645 Paper 7 Simplified floating production system by R.A. Busch, Ranhill-Flour Sdn. Bhd., Malaysia

Session 'C' Natural Gas Utilisation

Meeting Room No. 3

Morning Session

- 0945 - 1030 Paper 1 Natural gas, the ideal fuel for efficient, common and advanced industrial applications by W.A. van der Lugt, Gasunie Engineering B.V., The Netherlands
- 1030 - 1115 Paper 2 Gas conversion by Dr. E.V. Vogt, Shell International Gas Ltd., U.K.
- 1115 - 1200 Paper 3 Experience in MTBE and in exploiting C4 streams by R. Trotta, Snamprogetti, Italy
- 1200 - 1330 Lunch Break

Afternoon Session

- 1330 - 1415 Paper 4 Implementation of the Malaysian peninsular gas utilisation project by Hashim Salleh, PETRONAS Gas Sdn. Bhd., Malaysia
- 1415 - 1500 Paper 5 Gas utilisation in Thailand by Dr. Tongchat Hongladaromp, PTT, Thailand
- 1500 - 1515 Refreshments
- 1515 - 1600 Paper 6 Acid gas removal in the processing plant at Kertih

by Ibrahim Johari and Dr. Ramlee Karim, PETRONAS Gas Sdn. Bhd., Malaysia

1600 - 1645 Paper 7 Conversion of natural gas to liquid fuels and petrochemicals by G. Allen and A. Johnson, Stone & Webster, USA

Day 3 Wednesday, 4 December 1985

Keynote Address Venue: Conference Hall

0845 - 0930 Current and future world supply and demand of petroleum (to be delivered by a representative of OPEC)

0930 - 0945 Refreshments

Session 'D' Energy Resources and Automotive Fuels

Meeting Room No. 1

Morning Session

0945 - 1030 Paper 1 Palm diesel as alternative renewable energy by Prof. A.S.H. Ong *et al.*, PORIM, Malaysia

1030 - 1115 Paper 2 Compressed natural gas (CNG) an alternative motor fuel: infrastructure and economics by D.I. Hertzmark, Price Waterhouse, USA

1115 - 1200 Paper 3 Liquid fuels from natural gas by G.F. Tice *et al.*, Flour Technology Inc., USA

1200 - 1330 Lunch Break

Afternoon Session

1300 - 1415 Paper 4 Effect of MTBE unleaded gasoline on engine performance by L.K. Kou *et al.*, CPC, Taiwan

1415 - 1500 Paper 5 ASCOPE cooperation in laboratory test correlation programme by ASCOPE Technical Committee

1500 - 1515 Refreshments

1515 - 1600 Paper 6 An optimal geothermal expansion-interconnection policy for the Philippines by R.C.M. Malate, PNOC, The Philippines

1600 - 1645 Paper 7 Potential of Indonesia's natural gas resources by A.K. Soejoso, PERTAMINA, Indonesia

1645 - 1730 Paper 8 Energy policies and prospects to the year 2005 A.D. by International Energy Agency, France

Session 'E' The Economics of Energy Development

Meeting Room No. 2

Morning Session

0945 - 1030 Paper 1 Changing environment of the oil industry and its impact on Southeast Asia by Dr. T. Meloe, Texaco Inc., USA

1030 - 1115 Paper 2 The economics of enhanced oil recovery by Dr. D.J. Graue, Scientific Software Intercomp., USA

1115 - 1200 Paper 3 Long range outlook of petroleum product supply and demand and the utilisation of refining capacity in the ASEAN region by ASCOPE Economic Committee

1200 - 1330 Lunch Break

Afternoon Session

1330 - 1415 Paper 4 Natural gas price adjustment - the Canadian experience by Prof. M.L. Kliman, McMaster University, Canada

1415 - 1500 Paper 5 World Bank's role in the development and utilisation of natural gas potential in Asian developing countries by E.D. McCarthy, World Bank, USA

1500 - 1515 Refreshments

1515 - 1600 Paper 6 The use of LPG as a petrochemical leadstock by E.I.

- Williamson, The College of Petroleum Studies, UK.
1600 - 1645 Paper 7 Impact of the recent refinery expansion project in Indonesia by Bambang Pitoyo, PERTAMINA, Indonesia
1645 - 1730 Paper 8 Competition in petrochemicals by A.G. Kridl, SRI International, USA

Session 'F' Safety and Environmental Conservation
Meeting Room No. 3

Morning Session

- 0945 - 1030 Paper 1 Developing an effective oil, gas and environment conservation programme by Dr. V. Bohme, Energy Resources Conservation Board, Canada
1030 - 1115 Paper 2 ASCOPE cooperation on environment and safety by ASCOPE Technical Committee
1115 - 1200 Paper 3 A review of SSB/SSPC's structural integrity programme for some 115 offshore platforms by J.W. van de Graaf and A.W. van Beek, Sarawak Shell Bhd., Malaysia
1200 - 1330 Lunch Break

Afternoon Session

- 1330 - 1415 Paper 4 Developments in fire protection in the petrochemical industry by J.R. Maclay, 3M, Australia
1415 - 1500 Paper 5 Comparative study of petroleum safety regulations for offshore exploration and production by ASCOPE Legal Committee
1500 - 1515 Refreshments
1515 - 1600 Paper 6 Safe and reliable gas distribution by British Gas Corporation, U.K.
1600 - 1645 Paper 7 Energy conservation in refining and gas treatment by G. Sarazin, Elf Aquitaine, France
1645 - 1730 Paper 8 ASCOPE cooperation in training and technology transfer by ASCOPE Technical Committee

Day 4 Thursday, 5 December 1985, Conference Hall

Plenary Session Programme

- 0900 - 0945 Paper 1 The development of the oil industry in Australia by Hon. David Parker, Minister of Minerals and Energy, Australia
0945 - 1030 Paper 2 Oil scene in India by Col. S.P. Wahi, Chairman, ONGC, India
1030 - 1045 Refreshments
1045 - 1130 Paper 3 Present and future energy requirements in Malaysia by YB Datuk Leo Moggie, Minister of Energy, Telecommunication and Post, Malaysia
1130 - 1215 Paper 4 Outlook of Japanese energy demand, its relation to ASEAN countries and investigation of alternative energy sources by Mr. H. Kigami, President, NOMURA Research Institute, Japan
1215 - 1345 Lunch Break
1345 - 1430 Paper 5 The petroleum industry in Canada by a distinguished speaker to be announced
1430 - 1515 Paper 6 Petroleum-based industries, prospects and problems by Mr. C.A. Steinbaum, Vice President, CHEM Systems Inc., USA
1515 - 1600 Paper 7 Prospects and development of petroleum exploration production in offshore China by Mr. Qin Wencai, President, CNOOC, People's Republic of China

Closing Ceremony

Thursday, 5 December 1985

Venue: Conference Hall

1630 hrs Closing Ceremony

1700 hrs 'Selamat Jalan' Reception

Dress: Lounge Suit

9TH BANGKOK GEOTECHNICAL SYMPOSIUM ON ENVIRONMENTAL GEOTECHNICS AND PROBLEMATIC SOILS AND ROCKS

Bangkok, 2-12 December 1985

There has been an overwhelming response to the preliminary call for papers for the 9th Bangkok Geotechnical Symposium on Environmental Geotechnics and Problematic Soils and Rocks to be held at the Asian Institute of Technology in December 1985. The Symposium covers environmental geotechnical aspects of major infrastructure developments, natural hazards and resource development projects, action related to the modification of physio-chemical properties of materials and re-use of wastes, solids removed from surface and underground, solid accumulation on surface, fluid extraction from underground, fluid storage on surfaces and underground deposits.

Two Workshops are being organized to focus special attention on important aspects. The first will cover the Application of Geophysical Methods to Environmental and Geotechnical Problems. The second will comprise laboratory and Field Testing Methods for Soils and Rocks. Comprehensive notes will be distributed to the participants.

Application of Geophysical Methods to Environmental and Geotechnical Problems

Co-chairmen: Dr. R.J. Whiteley & Dr. G. Rantucci

Geophysical methods offer a cost-effective means for site investigation and may be used to examine and monitor ground-water conditions and in the search for buried objects. This session is designed to introduce the latest geophysical methods, their interpretation and their advantages and limitations. Examples of their application to geotechnical and environmental problems will be presented together with a field demonstration of geophysical equipment.

Laboratory and Field Testing Methods for Soils and Rocks

Co-chairmen: Dr. D.T. Bergado & Dr. S. Chandra

The Geotechnical Engineering Laboratory at the Asian Institute of Technology provides excellent facilities for field investigations including universal drilling machine, Dutch cone, vane shear and pressuremeter apparatus. Field instrumentation comprises inclinometers, settlement gauges, earth pressure cells, and piezometers. The laboratory is equipped for tests using a large oedmeter (75 cm dia), cubical triaxial apparatus (100 x 100 x 100 mm), cyclic triaxial apparatus, triaxial apparatus for rocks, elastometer. This workshop will include methods of conducting these tests and demonstration of some of the tests in the field and the laboratory.

Registration Fee: Symposium	US\$ 120.00
Workshop on Geophysical Methods	US\$ 100.00
Workshop on Testing Methods	US\$ 100.00
Accompanying Person	US\$ 80.00

Deposit for Hotel Accommodation	US\$ 60 - 80
Preferable Range	US\$ 80 - 100
Fee for Exhibition	US\$1,500.00

Cheques should be made payable to the "Asian Institute of Technology".
Please contact: Prof. A.S. Balasubramaniam

Division of Geotechnical & Transportation Engineering
Asian Institute of Technology
GPO Box 2754
Bangkok 10501, Thailand

6TH OFFSHORE SOUTH EAST ASIA

Conference & Exhibition, World Trade Centre Singapore, 28-31 January 1986

The Programme Committee for the 6th Offshore South East Asia Conference has reviewed more than 150 abstracts from 80 countries before finally selecting 81 papers to be presented at the Conference in January.

The speakers chosen include representatives from a wide range of public and private sector organisations, including:

Union	Atlantic Richfield	ONGC
Mobil	Pakistan Petroleum Ltd.	Woodside Petroleum
Shell	Liapco	Petrobangla
Esso	Cities Service	Philipps
Texaco	Petronas	BHP
Chevron	PNOC	

The papers have been grouped into 15 technical sessions:

Geology/Exploration	(3)	Well Logging	(1)
Well Completions	(1)	Production	(1)
Economics	(1)	Petroleum Engineering	(1)
Gas Development	(1)	Drilling	(2)
Marine	(1)	Marine Construction	(1)

The Programme Committee is made up of representatives from the three sponsoring societies - Society of Petroleum Engineers, Southeast Asia Petroleum Exploration Society and the Society of Naval Architects and Marine Engineers of Singapore.

8TH AUSTRALIAN GEOLOGICAL CONVENTION

"Earth Resources in Time and Space"

February 16 - 21, 1986

Flinders University, Adelaide
P.O. Box 292
Eastwood, South Australia 5063
Telex: AA88692

Convener: Dr. C.D. Branch
Telephone 2747500
Secretary: Mr. L.C. Barnes
Telephone 2747580

The Convention will present a broad spectrum of papers from Industry, Educational Institutions and Government. Lectures and displays will reflect present and future activities associated with the exploration, evaluation and exploitation of mineral, water, petroleum and coal resources, particularly in Australasia.

Members of the various Specialist Groups have been encouraged to participate in convention sessions, rather than at concurrent Specialist Group symposia. This approach will stimulate greater communication between all earth scientists. Accordingly, contributions to technical sessions have been received from palaeontologists, stratigraphers, economic/coal/structural geologists, geophysicists, geochemists, hydrogeologists and earth-science historians.

Two evenings have been set aside for Specialist Group meetings.

As well as pre- and post-convention excursions, one day of the technical sessions has been set aside for excursions to local areas of geological interest including:

- * Late Palaeozoic glacial sequences at Hallett Cove
- * type sections of the SA marine Tertiary
- * classic sections of Adelaidean sediments.

Keynote Speakers

In addition to the Presidential Address and the Mawson Lecture, three invited Keynote Speakers and Professor Holland, President of the Geological Society of London, will address the Convention. One Keynote Address will be presented on each of Technical Sessions, timed such that all delegates can attend. We are fortunate to have the following speakers.

Dr. Nicholas Christie-Blick, Lamont-Doherty Geological Observatory, Columbia University, USA

Topic: Tectonic analysis to predict initiation of passive subsidence of Palaeozoic continental margins; seismic stratigraphic concepts in Proterozoic syn-rift deposits.

Professor Frederick J. Sawkins, University of Minnesota, USA

Topic: Ore generating systems through geologic time: uniformitarian and non-uniformitarian aspects.

Dr. Robert M. Sneider, Robert M. Sneider Exploration Inc., Houston, USA

Topic: The synergistic approach: its value to petroleum exploration and development in the next decade.

Technical Sessions

Nearly 150 papers have been programmed, covering a broad spectrum of titles as listed below. These will be presented at three concurrent sessions to provide delegates with a wide choice of subjects.

Although authors of both oral and poster presentations should have received an invitation to register and participate in the Convention, they are reminded that an Abstract, together with proposed slides and overhead transparencies, must be with the Secretary by 19 October 1985.

Papers invited for presentation at the Technical Sessions include the following topics:

1. Archean and Early Proterozoic
Geochemistry, geochronology, nickel mineralisation, and tectonic evolution of the Lincoln Complex (S.A.), Arunta Block (N.T.), Yilgarn and Pilbara Blocks (W.A.), Broken Hill (N.S.W.) and Mount Isa region (Odl.)
2. Mid Proterozoic
Mineralogy, sedimentology, geophysics, geochemistry and mineralisation of the Olympic Dam deposit (S.A.) and McArthur Basin (N.T.)
3. Proterozoic magmatism, metamorphism and crustal evolution
Tectonic evolution, metamorphism, granites, mineralogy and structural

geology of the Mount Isa region (Qld.), Pilbara Block (W.A.), Arunta Block (N.T.), Willyama Complex (S.A.), New Mexico (U.S.A.) and Bushveldt Complex (S. Africa).

4. Adelaidean and Cambrian
Sedimentation, stromatolite biostratigraphy, tectonics, Precambrian metazoa, geochemistry, plutonism and mineralisation of the Pilbara Block (W.A.), Adelaide Geosyncline and Stuart Shelf (S.A.), Kimberley region (W.A.), western N.S.W. and Mount Read Volcanics (Tas).
5. Precious metals through time
Gold mineralisation at Cassilis (Vic.), Archean of W.A., Tirad Porphyry System (Philippines), Arltunga (N.T.) and Kidston gold deposit (Qld.)
6. Crustal structure and development of the lithosphere
Seismic studies and tomography of the Australian crust; tectonics, mineralisation and structure of the Kerguelen Plateau (Indian Ocean), McArthur Basin (N.T.), and southeastern Lachlan Fold Belt (N.W.S.).
8. Mid Palaeozoic to Mesozoic
Silurian/Ordovician: lavas, massive sulphides (Vic.), Permian: coals, geochemistry, tectonics, petrography and thermal history of the Bowen, Collie, Cooper and Gympie Basins.
Palaeozoic/Mesozoic: petroleum prospectivity of various Australian basins
10. Cainozoic environments and resources
Tertiary: coal deposits, palaeogeography, sedimentation of the St. Vincent and Eucla Basins (S.A.) and Kerguelen Plateau (Indian Ocean).
Quaternary: clay minerals and paleosols of South Australia, uranium series dating, phosphorites, micro-faunas, sedimentary facies, plant ecology, gossan formation, aminostratigraphy and tectonics of the St. Vincent Basin and Port Gawler (S.A.).
11. Silica in the geological environment
Opal, chrysoprase, silica-rich layering and weathering in Queensland and South Australia
12. Groundwater: resource or environmental problem
Water resources, utilisation and recharge mechanisms in Adelaide and the Barossa Valley (S.A.)
14. Earthquakes and volcanoes in Australia
Risk maps, tectonic boundaries, hypocentre determination, crustal structure, seismicity of South Australia, Queensland and New South Wales.
17. Earth resources and people: historical perspectives
Gold rushes at Cracow and Croydon Goldfields; H.I. Jensen.

Excursions

Closing date for booking pre and post convention excursions is Friday, 6 December 1985.

Pre-Convention

A1 Olympic Dam (plane)		
14 - 15 February	\$350	40 people
A2 Flinders Ranges (bus/hotel/motel)		
11 - 16 February	\$330	45 people
A3 Opal Fields (plane/motel/guest house)		
13 - 15 February	\$450	18 people

During Convention

19th February Full Day - \$30/person (includes lunch)
Half Day - \$20/person

- B1. Glen Osmond Historic Mines and Winery
(half day - afternoon)
Australia's first metalliferous mines, opened in 1841, now used as cellars by Woodley Wines (Queen Adelaide wines).
- B2. Hallett Cover/Port Stanvac (full day)
Turbidites and shallow marine sandstones (with hummocky cross-stratification) of the Late Proterozoic Brachina Formation exposed in coastal sections, Permian glacial sediments and Cainozoic deposits.
- B3. Victor Harbor (full day)
Encounter Bay granites, Cambrian Kanmantoo Group metasediments, Permian glacial topography, spectacular coastal scenery.
- B4. Eastern St. Vincent Basin (full day)
Type and reference sections in the Willunga and Noarlunga Embayments. Stratigraphy, tectonics, hydrogeology, coastal processes and protection measures, sand mining. Most exposures are in coastal cliffs, accessed via sandy beaches. Includes the picturesque southern vales with lunch at a winery.
- B5. Sellick Hill (full day)
Cambrian-Precambrian boundary and Cambrian Mississippi Valley Pb-Zn mineralisation. Includes the picturesque southern vale with lunch at a winery.
- B6. St. Kilda (full day)
Holocene and Pleistocene coastal sequences and modern intertidal mangrove environments. Includes North Adelaide Plains vineyards and lunch at a winery.
- B7. Eastern Mount Lofty Ranges (full day)
Stratigraphy, metamorphism and sulphide mineralisation in Cambrian Kanmantoo Group metasediments of the Mount Torrens, Nairne and Kanmantoo areas.
- B8. Rocks, soil, water and wine (full day)
Geology and hydrogeology of the Barossa Valley and problems of winery waste disposal.
- B9. Gumeracha - Birdwood - Williamstown (full day)
Gold, talc, clay, mica and Australia's only sillimanite mines. Historic Mount Torrens battery.
- B10. City of Adelaide Building Stones (twilight)
Walking tour illustrating the use of stone in both historic and contemporary buildings.

Post Convention

C1 Southern Eyre Peninsula		
21 - 24 February	\$300	45 people
C2 Central Adelaide Fold Belt (Safari style)		
21 - 24 February	\$250	20 people
C3 Olary - Broken Hill (plane/bus/motel)		
21 - 24 February	\$350	45 people

Geoscience Exhibition

A large exhibition of geoscientific equipment and services is planned to accompany the Convention.

THIRD INTERNATIONAL SYMPOSIUM ON RIVER SEDIMENTATION

with central theme on ESTUARINE AND COASTAL SEDIMENTATION

March 31 - April 4, 1986

Jackson, Mississippi, USA

Principal Sponsors: Mississippi-Alabama Sea Grant Consortium, and The University of Mississippi

Symposium Objectives

As a continuation of the highly successful First and Second International Symposia on River Sedimentation held in China in 1980 and 1983, the Third Symposium will provide an essential forum for scholars and researchers to review recent accomplishments and progress in all areas of sedimentation research. Here, significant new research findings will be reported, the current state of the art will be reviewed and avenues of future development determined, and research experience and ideas will be exchanged.

The central theme of the Third Symposium is Estuarine and Coastal sedimentation; however, all other areas related to sedimentation research covered by the two previous symposia also will be included.

As the only international forum specifically designated in the field of sedimentation research, this series is jointly supported by many professional societies and institutions around the world. The permanent Secretariat of the Symposia is at the International Research and Training Center on Erosion and Sedimentation (IRTCES) in Beijing, China, where the first Symposium was held in 1980. The Second was held in Nanjing in 1983.

Scope

This symposium will focus on the following areas:

- * Sediment sources and sediment yields
- * Properties of sediment materials
- * Hydraulics and hydrology of sediment transport
- * River mechanics, estuarine and coastal hydrodynamics
- * Sediment discharge formula
- * River sedimentation and training
- * Sedimentation in reservoirs and lakes
- * Estuarine and coastal sedimentation
- * River bank migration and shore erosion
- * Sediment control methods and hydraulic structures
- * Analytic, numeric and physical modeling methodology
- * Environmental effects of sedimentation
- * Other areas important to sedimentation research

Papers

Papers incorporating recent research results and state of the art reviews are solicited in all the areas listed. Intending authors are requested to submit an abstract of approximately 500 words to the following address no later than Sept. 15, 1985. Authors of selected papers will be notified by October 15, 1985. Completed final manuscripts on author-prepared mats will be due on December 15, 1985. Formal acceptance of the final manuscripts will be sent to authors by January 15, 1986. For paper submission and further technical information, please contact:

Dr. S.Y. Wang, School of Engineering, The University of Mississippi, University, MS. 38677, USA.

Tele: 601-232-7219

Chinese participants, please contact:

Mr. Dai Dingzhong, Department of Science and
Technology, Ministry of Water Resources and
Electric Power, P.O. Box 2906, Beijing, China.
Tele: Beijing 362018, 367971.

Technical Program

All formal presentations and written papers are to be in English. Chinese and English may be used during the Question/Answer periods immediately following each lecture and presentation. Interpreters will be available for this purpose.

Conference proceedings including all keynote addresses, general lectures, and contributed papers presented at the Symposium will be published in English in hardcover book form for distribution to participants and other interested individuals and institutions.

Field Trips and Tours

A whole day field trip to the U.S. Army Engineers Waterways Experiment Station including the Hydraulics Laboratory, Environmental Laboratory, and Coastal Engineering Research Center is planned.

Post-Symposium tours of hydraulic engineering projects along the lower Mississippi River, Mississippi Sound, coastal region of the Gulf of Mexico, including sight-seeing in Mississippi, Louisiana, Florida, Alabama and Texas may be arranged.

INTERNATIONAL CONFERENCE ON ENERGY RESOURCES IN ASIA

August 11 - 14, 1986 at Hotel Furama Inter-Continental, Hong Kong
Organized by International Center for Asian Studies, A division of Asian Research Service, 397 Hennessy Road, 2nd Floor, Mailing Address, GPO Box 2232, Hong Kong. Tel. Nos. 5-733641, 5-731788. Cable: 'APROFILE' Hong Kong. Telex: 63899 HX CONPA

Objectives

The Conference will include presentations of individual papers/panels of papers and poster presentations, and an exhibition of publications emphasizing the following objectives:

1. To further a better understanding of the energy resources and their development problems in Asia
2. To encourage innovation and cooperation in the solution of energy development problems
3. To advance the applications of new technology in the exploration, utilization and conservation of energy resources
4. To foster closer contact among energy specialists both within and outside Asia.

Forms of Participation

Participation may be on attending or non-attending basis. A participant may present a paper in person at the Conference (i.e. attending), or contribute a paper for publication in the proceedings without attending the Conference (i.e. non-attending).

Call for Papers

Papers on any topics concerned with the above objectives are cordially invited. They may be presented individually or in a panel focusing on a particular theme or in a poster session.

All persons interested in contributing/presenting a paper or forming a panel are invited to submit an abstract of about 500 words no later than March 11, 1986. The full paper in reproducible form for publication must be submitted by July 11, 1986. Guidelines for the preparation of papers will be sent to registered participants.

Abstracts of Papers will be distributed to registered participants at the Conference.

Working Language

The Conference will be conducted in English. All papers submitted to the Conference should be written in English in accordance with the specifications prescribed in the Guidelines.

Proceedings

Selected papers will be published in a Conference volume by Macmillan Press in association with the International Center for Asian Studies, Asian Research Service after the Conference.

Exhibition

An International Exhibition of Publications on Energy Resources in Asia will be held concurrently with the Conference from 11th to 14th August 1986. Publications will include books, reports, journals, periodicals, magazines, charts and maps. Information on participation in the exhibition and reservation of space for display is available on request.

Transport and Accommodation

Special arrangement for purchase of international air tickets to Hong Kong at concessional rates will be made for participants who require this service. Accommodation at Hotel Furama or at specified alternative hotels is available at reduced rates if reservation is booked through Asian Research Service. Further information is available on request.

Registration and Participation Fees

1. Attending participants will pay the following:
 - (a) A registration fee of US\$45.00 payable on registration for participation. (This registration fee is not refundable).
 - (b) A participation fee of US\$150.00 payable before June 11, 1986. (This participation fee includes three luncheons and a copy of Abstracts of Papers)
2. Non-attending participants will pay the following:

A combined registration and participation fee of US\$45.00 payable on registration for participation.

All registered participants (attending or non-attending) will receive a free copy of Abstracts of Papers

Tours

A tour to rural Hong Kong and an optional post-conference tour to China will be conducted for interested participants.

Asian Energy Map Project (AEMP)

A set of color maps to show the distribution and development of energy resources in Asia is planned as a follow-up project of the International Conference on Energy Resources in Asia.

The approach to the implementation of the Map Project will be multi-disciplinary.

An International Committee will undertake the compilation work of the Map Project. The Committee will comprise members from various fields of expertise, including geologists, geographers, cartographers, technologists, engineers, ecologists, economists and energy specialists with research interest in the Asian region.

International participation and collaboration in the Asian Energy Map Project (AEMP) are cordially invited.

For further information, please contact:
The Co-ordinator, AEMP, Asian Research Service,
G.P.D. Box 2232, Hong Kong.

INTERNATIONAL SOUTH EUROPEAN SYMPOSIUM ON EXPLORATION GEOCHEMISTRY

The Institute of Geology and Mineral Exploration, Athens, and the Association of Exploration Geochemists are organizing an international symposium on exploration geochemistry, which is to be held in Athens from 9 to 11 November, 1986. Presentations are being sought on the subjects of stream and soil geochemistry in mineral exploration; lithogeochemistry in mineral exploration; hydro-, bio- and gas geochemical prospecting; geochemistry of geothermal energy and related subjects; fluid inclusion and isotopic geochemistry in mineral exploration; statistical treatment of geochemical data and related subjects; and recent advances in analytical techniques for exploration geochemistry. Emphasis will be placed on case histories from southern European countries. Papers are also invited on 'Marine geochemistry: submarine hydrothermal systems: results of recent expeditions', 'The Cyprus Crustal Study Project: geochemistry as an aid for locating Cyprus-type massive sulphide ore deposits' and 'Environmental geochemistry'. Poster displays, field trips and social tours will be arranged. (The Organizing Committee, I.S.E.S.E.G., Institute of Geology and Mineral Exploration, 70 Messoghion Street, 11527 Athens, Greece.).

MINERAL DEPOSITS STUDY GROUP

On 20 and 21 December, 1985, a Mineral Deposits Study Group conference will be held at Strathclyde University, Glasgow, following a field trip on 19 December to Tyndrum and Dalradian mineralization. Contributions are invited on the theme 'Genesis of and exploration for industrial and ore minerals'. (Mrs. G. Ainsworth or Professor M.J. Russell, Department of Applied Geology, University of Strathclyde, James Weir Building, 75 Montrose Street, Glasgow G1 1XJ, Scotland.

ROCK ENGINEERING AND EXCAVATION IN AN URBAN ENVIRONMENT

The first international conference organized by the Institution of Mining and Metallurgy and the Hong Kong Local Section of the IMM will take place in Hong Kong from 23 to 28 February, 1986.

The papers submitted include 'Role of geomechanical parameters and dynamic stresses in fracture control blasting' by P. Berry and E.M. Dantini (Italy); 'Subsurface investigations of abandoned limestone workings in the West Midlands of England by use of remote sensors' by P.A. Braithwaite and K. Cole (United Kingdom); 'Remedial works to a major rock slope in Hong Kong' by S. Buttling (Singapore); 'Excavation of Montedoro tunnel, Trieste, Italy' by M. Carastro and R. Ribacchi (Italy); 'Seismic effect near blasting operations' by F. Cermak (Czechoslovakia); 'Damage problems in excavation of an underground water reservoir in granite rock' by R. Ciccu *et al.*, (Italy); 'Appraisal of potential effects of surface blasting on a rock tunnel, with particular reference to Tai Lam Chung water tunnel' by A.W. Clover (Hong Kong); 'Site formation in volcanic rocks of Hong Kong: a case history' by A.W. Clover (Hong Kong); 'Engineering geological evaluation - an integral part of rock slope formation works in Hong Kong' by J. Costello and C.K. Wu (Hong Kong); 'Safe and cost-effective blast designs for underground excavations in an urban environment' by T.N. Hagan (Australia); 'Stability analysis of rock slopes with the aid of a microcomputer' by S.C. Kheok and co-workers (Singapore); 'Rockbolting for tunnelling in the sensitive environment under an urban area' by Lu Bang-Zhao (China); 'Drill-and-blast tunnel excavations for the Buffalo, USA., rapid transit system' by D.S. McAllister and co-workers (USA); 'Seismic refraction surveying in urban areas' by P.W. McDowell (United Kingdom); 'Design and excavation of stable slopes in hard rock with particular reference to presplit blasting' by G.D. Matheson (United Kingdom); 'Investigation and design of rock slope remedial works for differing risks' by G.E. Powell and T.Y. Irfan (Hong Kong); 'Blast vibration monitoring on anchored retaining walls and within boreholes' by T.J. Wilton and R.L. Hills (United Kingdom).

On the occasion of the conference the Australian Mineral Foundation, in association with the IMM, is organizing two short courses in Hong Kong. Safe and cost-effective blasting in an urban environment will take place from 19 to 21 February, 1986, and will cover the nature and generation of undesirable side-effects of blasting; effects of weather; influence of ground and air vibrations on structures and humans; desirable effects of blasting; design and implementation of blasts; underwater blasting; and cost-effectiveness considerations, especially in urban areas. The leader of this course will be Dr. T.N. Hagan, Golder Associates Pty., Ltd., Melbourne, Australia. Engineering rock mechanics for the design of slopes, foundations and underground excavations will be led by Dr. E. Hoek, Golder Associates, Vancouver, Canada and will be held from 3 to 7 March, 1986. The topics will be rock as a material; geological data collection and graphical presentation; use of spherical projections; rock properties, classification and testing; analysis of behaviour of slopes, foundations and excavations, including structurally controlled instability; reinforcement; and the role of groundwater. For details of both courses are available from either the IMM or the Australian Mineral Foundation, P.O. Box 97, Glenside, South Australia 5065.

EMPLOYMENT CORNER

Mark E. Yoder is 28, a geologist and would like to work for a company

in Malaysia. He would like to be involved in finding or developing fields such as Tapis and Samarang or help any company in exploration and production projects. He can do subsurface geologic mapping, prospect generation and log analysis. He is a good wellsite geologist with experience in the Powder River and other Rocky Mountain basins including remote and hostile locations. Anyone interested in Mr. Yoder's services can contact him directly at 2654 Ash Street, Denver, Co. 80207, USA. Tel. (303) 333-5350.

KURSUS-KURSUS LATIHAN & BENGKEL-BENGKEL (TRAINING COURSES & WORKSHOPS)

Centre of Studies in Resources Engineering, Indian Institute of Technology, Bombay:

Short term courses: APPLICATION OF REMOTE SENSING TO WATER RESOURCES STUDIES, 27-31, January 1986

APPLICATION OF REMOTE SENSING TO MINERAL EXPLORATION
24-28 February 1986

APPLICATION OF REMOTE SENSING TO GEOTECHNICAL
ENGINEERING, TERRAIN EVALUATION, URBAN DEVELOPMENT
AND LANDUSE PLANNING, 24-28 March 1986

Objectives of the Courses

These are preliminary courses designed mainly for individuals dealing with the application of Remote Sensing and to acquaint the participants with the techniques of Image Processing and Digital analysis of Landsat Data (available in the form of CCT and imagery) with special emphasis on the application of techniques to the fields of Water Resources, Pedology, Forestry, Geotechnical Engineering, Earth Sciences and Mineral Resources.

Intended for:

These courses are designed for persons who are already working and dealing with the application of Remote Sensing. Candidates possessing degree in Computer Sciences/Electrical Engg./Physics/Earth Sciences/Forestry/Civil Engg./Metallurgy are eligible. Qualifications will be relaxed in case of serving personnel having experience in the area during the last 3 years.

The candidates sponsored by Institute/Agency/Department will be preferred.

Number of Participants

Total number of participants will be a maximum of 15 per course.

Fee

Rs. 1500/- per participant per course towards registration fee, course material, boarding and lodging at the IIT Guest House for the duration of the courses and the cost of Transport to TIFR Computer Centre and back.

Enrolment:

Enrolment for admission to the courses should be made on the prescribed Form obtainable from Training Cell, CSRE, IIT, Powai, Bombay-400 076. The

form should be accompanied by a fee of Rs. 1500/ (Rupees one thousand five hundred only) for each course and should reach by three weeks in advance of the commencement of the course. Firm enrolment will be done only on 'First come First served basis'. The Demand Draft for the amount should be drawn in favour of Indian Institute of Technology, Bombay-400076.

Last dates for the receipt of Enrolment form duly filled in alongwith payment of fees:Rs. 1500/- per course

Water Resources Studies -	6.1.1986
Mineral Exploration -	3.2.1986
Geotechnical Engineering-	3.3.1986

Contents of Application of Remote Sensing to Water Resources Studies Course:

1. Principles and Techniques of Remote Sensing
2. Spectral characteristics of water and related features
3. Hydrological application of Remote Sensing
4. Pattern recognition methods of Water and related feature extraction
5. Image Processing for corrections and enhancement
6. River basin development and flood plain management
7. Application to coastal area problems
8. Discussions on case studies
9. Landsat Data analysis practice - Digital and visual

Discussions on the results of the case studies and group discussions on specific problems and CCT data analysis practice using computer are planned for the afternoon sessions.

Contents of Application of Remote Sensing to Mineral Exploration Course:

1. Remote Sensing for resources recognition and evaluation
2. Principles of Satellite Remote Sensing
3. Landsat CCT processing
4. Image classification through pattern recognition
5. Overview of image processing software based on micro computer system
6. Development of Natural Resources data base
7. Lectures relating to exploration for various mineral resources

Discussions on the results of the case studies and group discussions on specific problems and CCT data analysis practice using computer are planned for the afternoon sessions.

Contents of Application of Remote Sensing to Geotechnical Engineering, Terrain Evaluation, Urban Development and Landuse Planning Course:

1. Overview of Space Satellite Programme and its impact on Engineering and Landuse problems
2. Principles of Satellite Remote Sensing
3. Landsat CCT forming Image Processing, Pattern recognition etc.
4. Concept of integrated approach for geotechnical engineering
5. Study of Geomorphic characteristics by remotely sensed data
6. Identification of drainage patterns
7. Data acquisition and sensors
8. Problems of Terrain Evaluation
9. Use of remotely sensed data for Landuse Planning
10. Use of remotely sensed data for coastal and urban development
11. Data bank and retrieval system
12. Computer Systems for digital analysis

Discussions on the results of the case studies, group discussions on specific problems and CCT data analysis practice using computer are planned for the afternoon sessions.

General Information

All correspondence related to these courses should be addressed to: Dr. T.V. Pavate, Chief Project Engineer, Training, Extension and Project Cell, R.S.D. No. VI, Centre of Studies in Resources Engineering, I.I.T. Bombay 400 076 or Executive Secretary (Programmes), Training, Extension and Project Cell, R.S.D. No. VI, CSRE, I.I.T. Bomay - 400 076. Tel: 581977; Telex: 011-71385 IITB IN; Gram: TECHNOLOGY, IIT POWAI.

IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY DEPARTMENT OF MINERAL RESOURCES ENGINEERING SHORT COURSES 1985-86

The following short courses are offered during the academic year:

Introduction to Mineral Resources Engineering: 9 October - 11 December 1985
(Wednesday afternoons)

Financial Evaluation of Mining Projects: 10 - 14 February 1986

Mineral Project Management in Developing Countries: 24 - 28 March 1986

Cost of each course: £240.00

In addition, two term-long modules of the M.Sc. course in Mineral Production Management are offered as shorter professional development courses:

Mineral Production Management 30 September-13 December 1985

Mineral Economics and Evaluation 6 January - 21 March 1986

Cost of each course: £1800.00

For further information and application forms please contact Hugh Allen, Department of Mineral Resources Engineering, Royal School of Mines, London SW7 2BP, telephone 01-589 5111 ext. 6421 or 6442; telex: 261 503 IMPCOL. Please quote SCIMMI.

OTHER COURSES

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.

January 1986 - April 1986

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

February 1986

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

February 1986 - March 1986

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

February 1986 - June 1986

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

February 1986 - December 1986

GEO THERMICS (Pisa, Italy). Certificate course organized annually by the Instituto Internazionale per le Ricerche Geotermiche and sponsored by Unesco, UNDP and Italy. Language: Spanish. For information: Istituto Internazionale per le Ricerche Geotermiche, 1, Via Buongusto, 56100 Pisa, Italy.

March 1986 - April 1986

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 1986 - April 1986

STRUCTURAL GEOLOGY (Dehra Dun, India). 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.

March 1986 - November 1986

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

May 1986 - June 1986

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 Latinoamericana de Energia (OLADE), P.O. Box 119, Quito, Ecuador.

KALENDAR (CALENDAR)

October 29 - November 2, 1985

INDONESIAN MINING (International Exhibition), Jakarta, Indonesia. (Overseas Exhibition Services, 11 Manchester Square, London W1M 5AB, UK).

November 1985

PETROLEUM GEOCHEMISTRY AND EXPLORATION IN AFRO-ASIAN REGION (International Conference), Dehradun, India. (Kuldeep Chandra, KDM Institute of Petroleum Exploration, Oil and Natural Gas Commission, 9, Kaulagarh Road, Dehradun - 248195, India).

November 4 - 9, 1985

PHYSICS AND GEODYNAMICS OF DEFORMATIONAL PROCESSES IN EARTHQUAKE FOCAL REGIONS (meeting), Potsdam, G.D.R. (Prof. Knoll, Zentralinstitut für Physik der Erde, DDR-1500 Potsdam, German Democratic Republic).

November 5 - 16, 1985

DRILLING, SAMPLING AND BOREHOLE LOGGING (Workshop), Wuxi, People's Republic of China. (Regional Mineral Resources Development Centre, P.O. Box 19, Bandung, Indonesia).

November 11 - 15, 1985

GEOLOGY OF THE ANDES AND ITS RELATION TO MINERAL AND ENERGY RESOURCES (Symposium), Santiago, Chile. Sponsored by the Circum-Pacific Council for Energy and Mineral Resources. (John A. Reinemund, P.O. Box 890, Leesburg, VA 22075, USA).

November 18 - 23, 1985

MAGMATIC EVOLUTION OF THE ANDES (Final Symposium IGCP-120), Santiago, Chile. (Prof. Francisco Munizaga, Department of Geology, University of Chile, Casilla 13518 Correo 21, Santiago, Chile).

November 26 - 28, 1985

GEOTHERMAL RESEARCH (4th National Meeting during the 35th Annual Meeting of the Venezuelan Association for Advancement of Science), Merida, Venezuela. (Dr. Franco Urbani, Centro Documentacion Geotermica, U.C.V., Apartado 47.028, Caracas 1041-A, Venezuela).

November 26 - 29, 1985

COGEOLOGICAL DATA (III Simposio Sudamericano), Lima, Peru. (Ing. Oscar Miro Quesada, COGEOLOGICAL DATA, Petroperu, Paseo de la Republica 3361, Apartados 3126 y 1081, Lima, Peru).

November 27 - 30, 1985

BEACH EROSION (Meeting), Lome, Togo. Sponsored by the International Geographical Union and University of Benin. (Prof. Georges Rossi, Ecole des Lettres, Universite du Benin, B.P. 1515, Lome, Togo).

December 2 - 12, 1985

ENVIRONMENTAL GEOTECHNICS AND PROBLEMATIC SOILS AND ROCKS (9th Bangkok Geotechnical Symposium), Bangkok, Thailand. (Prof. A.S. Balasubramaniam, Division of Geotechnical & Transportation Engineering, Asian Institute of Technology, P.O. Box 2754, Bangkok 10501, Thailand).

December 9 - 13, 1985

AMERICAN GEOPHYSICAL UNION (Fall Meeting), San Francisco, California, USA. (AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, USA).

1986

January 14 - 15, 1986

COMPUTER APPLICATIONS IN MINERAL EXPLORATION, 1986 - BYTING THE ROCKS (Conference and Exhibition), Toronto, Ontario, Canada. (T.J. Bottrill, CAME '86, 192 Weldon Avenue, Oakville, Ontario, Canada L6K 2H8).

January 26, 1986

GEOTECHNICAL APPLICATIONS OF REMOTE SENSING AND REMOTE DATA TRANSMISSION (International Symposium), Coco Beach, Florida, USA. (A. Ivan Johnson, Woodward-Clyde Consultants, Harlequin Plaza-North, 7600 East Orchard Road, Englewood, Co. 80111, USA).

January 28 - 31, 1986

OFFSHORE SOUTH EAST ASIA (6th Conference), Singapore. Sponsored by SE Asia Petroleum Exploration Society. (Marathon Petroleum Exploration Ltd., P.O. Box 227, Tanglin P.O. Singapore 9124).

February 1 - 9, 1986

INTERNATIONAL VOLCANOLOGICAL CONGRESS, (Including symposia on PHREATO-MAGMATIC ERUPTIONS AND THE ROLE OF WATER IN EXPLOSIVE VOLCANISM and GEO-CHEMISTRY OF ERUPTIVE MAGMAS: TECTONIC CONTROLS ON PETROGENESIS) Auckland, Hamilton, Rotorua, New Zealand. Sponsored by IAVCEI. (Secretary, Organising Committee, Dr. J.A. Gamble, International Volcanological Congress 1986, Department of Geology, Victoria University of Wellington, Private Bag, Wellington, New Zealand).

February 16 - 21, 1986

EARTH RESOURCES IN TIME AND SPACE (8th Australian Geological Convention), Adelaide, Australia. (M.A. Cobb, Convenor, Publicity and Promotion Committee, Box 292, Eastwood, SA 5063, Australia).

February 18 - 21, 1986

NEOTECTONICS IN SOUTH ASIA (International Symposium), Dehra Dun, India. Co-sponsored by ICL. (M.G. Arur, Director, Geodetic and Research Branch, Survey of India, Post Box 77, Dehra Dun, U.P.-248001, India).

February 23 - 28, 1986

ROCK ENGINEERING AND EXCAVATION IN AN URBAN ENVIRONMENT (1st International Conference), Hong Kong. (Conference Office, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK.).

March 31 - April 4, 1986

RIVER SEDIMENTATION (3rd International Symposium), Jackson, Miss., USA. (S.Y. Wang, School of Engineering, University of Mississippi, University, MS 38677, USA).

April 2 - 5, 1986

GEOCHEMISTRY AND MINERALIZATION OF PROTEROZOIC VOLCANIC SUITES (International Symposium), Keyworth, Nottingham, U.K. Co-sponsored by IGCP Project 217 and ILP Working Group 3. (Dr. Tim Pharaoh, Deep Geology Research Group, British Geological Survey, Keyworth, Nottingham NG12 5GG, U.K.).

April 8 - 11, 1986

COAL AND COAL-BEARING STRATA (International Symposium), London, UK. (A.C. Scott, Department of Geology, Chelsea College, 552 King's Road, London SW10 0UA, U.K.).

April 14 - 19, 1986

ENGINEERING GEOLOGY: PROBLEMS IN SEISMIC AREAS (IAEG International

Symposium), Bari, Italy. (Prof. G. Melidoro, Istituto di Geologia Applicata e Geotecnica, Via Re David 200, 70125 Bari, Italy).

April 21 - 24, 1986

ENVIRONMENTAL GEOTECHNOLOGY (International Symposium), Allentown, Penn. USA. (Prof. H.Y. Fang, Symposium Chairman, Geotechnical Engineering Division, Department of Civil Engineering, Lehigh University 13, Bethlehem, PA 18015, USA).

April 21 - 25, 1986

GLOBAL CHANGE IN AFRICA DURING QUATERNARY, PAST-PRESENT-FUTURE (International Symposium), Dakar, Senegal. Sponsored by INQUA, GSA (Africa), AGID, IUGS, IGCP, ILP. Languages: English and French. (INQUA/1986 Dakar Symposium Secretariat, Laboratoire de Geologie du Quaternaire, Faculte des Sciences, LUMINY, Case 907, 13288 Marseille Cedex 9, France).

April 24 - 27, 1986

INDUSTRIAL MINERALS (7th International Congress), Athens, Greece. (G.M. Clarke, Editor, Industrial Minerals, 16 Lower Marsch, London SE1, UK).

May 11 - 16, 1986

MINING AND METALLURGICAL INSTITUTIONS (13th Congress), Canberra, Australia. (Council of Mining and Metallurgical Institutions, c/o The Australian Institute of Mining and Metallurgy, P.O. Box 310, Carlton South, Victoria, Australia 3053).

May 17 - 19, 1986

SEDIMENT-HOSTED STRATIFORM COPPER DEPOSITS (Symposium), Ottawa, Ontario, Canada. Sponsored by GAC/MAC. (Prof. A.J. Naldrett, Department of Geology, University of Toronto, Toronto, Ontario, Canada M5S 1A1).

May 19 - 21, 1986

GEOLOGICAL, MINERALOGICAL ASSOCIATIONS OF CANADA (Joint Annual Meeting with Canadian Geophysical Union), Ottawa, Ontario, Canada. (Dr. J.A. Donaldson, Department of Geology, Carleton University, Ottawa, Ontario, Canada K1S 5B6).

May 19 - 23, 1986

AMERICAN GEOPHYSICAL UNION (Spring Meeting), Baltimore, Maryland, USA. (AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, USA).

June 1 - 6, 1986

GEOSCIENCE INFORMATION (3rd International Conference), Adelaide, South Australia. (Conference Secretariat 31CGL, c/o Australian Mineral Foundation Private Bag 97, Glenside, South Australia 5065, Australia).

June 2 - 5, 1986

DINOSAUR SYSTEMATICS (Symposium), Drumheller, Alberta, Canada. (Kenneth Carpenter, Academy of Natural Sciences, 19th and the Parkway, Philadelphia, PA 19103, USA).

June 15 - 18, 1986

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS (Annual Convention), Atlanta, Georgia, USA. (Howard Cramer, Emory University, Department of Geology, Atlanta, GA 30322, USA)

June 23 - 26, 1986

ARENACEOUS FORAMINIFERA (2nd Workshop), Vienna, Austria. (Dr. Fred Rogl, Naturhistorisches Museum, Burgring 7, A-1014 Wien, Austria).

June 30 - July 4, 1986

GEOCHRONOLOGY, COSMOCHRONOLOGY AND ISOTOPE GEOLOGY (6th International Conference), Cambridge, U.K. Sponsored by IAVCEI. (Organizing Committee, 6th International Conference, Department of Earth Sciences, University of

Cambridge, Downing Street, Cambridge CB2 3EQ, UK.).

July 7 - 11, 1986

GEOCONGRESS '86 (GSSA 21st Biennial Congress: Precambrian gold/uranium deposits), Johannesburg, South Africa. Co-sponsored by IUGS. (The Symposium Secretariat, S.339, CSIR, P.O. Box 395, Pretoria, South Africa 0001).

July 13 - 18, 1986

INTERNATIONAL MINERALOGICAL Association (General Meeting), Stanford, Calif., USA. (Prof. C.T. Prewitt, Department of Earth and Space Sciences, State University of New York, Stony Brook, NY 11794, USA).

July 14 - 17, 1986

THE COMPUTER HANDLING AND DISSEMINATION OF DATA: Numerical Data Processing and Dissemination in the Geosciences (10th International CODATA Conference), Ottawa, Canada. (Mrs. Lois Baignee, Conference Services, National Research Council of Canada, Montreal Road, Ottawa, Ontario, Canada K1A 0R6).

July 15 - 17, 1986

DEEP SEISMIC REFLECTION PROFILING OF THE CONTINENTAL LITHOSPHERE (Meeting), Cambridge, UK. (BIRPS, Bullard Labs, Magingley Road, Cambridge, CB3 0EZ, UK).

July 23 - 26, 1986

ARENACEOUS FORAMINIFERA (2nd Workshop), Vienna, Austria. (Fred. Rogl, Naturhistorisches Museum, Burgring 7, A-1014 Vienna, Austria).

August/September 1986

LANDSCAPES OF THE SOUTHERN HEMISPHERE (International Conference), Adelaide, Australia. (Prof. Jon Firman, S.A. Department of Mines and Energy, P.O. Box 151, Eastwood, S.A. 5063, Australia).

August 4 - 8, 1986

DRAINAGE BASIN SEDIMENT DELIVERY (International Symposium), Albuquerque, New Mexico, USA. (R.F. Hadley, Secretary ICCE, c/o Department of Geography, University of Denver, Denver, Co. 80208-0183, USA).

August 8 - 17, 1986

WATER-ROCK INTERACTION (5th International Symposium), Reykjavik, Iceland. Sponsored by IAGC. (Dr. Haldor Armannsson, Orkustofnun - The National Energy Authority, Grensasvegur 9, 108 Reykjavik, Iceland).

August 11 - 14, 1986

ENERGY RESOURCES IN ASIA (International Conference), Hong Kong. Language: English. (The Co-ordinator, AEMP, Asian Research Service, GPO Box 2232, Hong Kong).

August 11 - 15, 1986

KIMBERLITE (4th International Conference), Perth, Western Australia (Dr. A.F. Trendall, Geological Survey of Western Australia, 66, Adelaide Terrace, Perth, W.A., Australia).

August 13 - 20, 1986

SOIL SCIENCE (13th ISSS International Congress), Bamberg, F.R.G. (Prof. Dr. K.H. Hartge, Inst. fur Bodenkunde, Univ. Hannover, Herrenhaserstrasse 2, D-3000 Hannover 21, F.R.G.).

August 15 - 16, 1986

QUATERNARY SEA LEVELS OF AUSTRALIA (Meeting), Warrnambool, Victoria, Australia. Sponsored by IGCP-200 and INQUA. (Associate Prof. D. Hopley, Department of Geography, James Cook University, Townsville, Queensland, Australia).

August 17 - 22, 1986

CIRCUM-PACIFIC ENERGY AND MINERAL RESOURCES (4th Conference), Singapore. (Circum-Pacific Conference IV, c/o AAPG, P.O. Box 979, Tulsa, Ok 74101, USA).

August 18 - 22, 1986

INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS (7th Symposium), Lulea, Sweden. (Centek Conference, S-951 87 Lulea, Sweden).

August 24 - 30, 1986

INTERNATIONAL ASSOCIATION OF SEDIMENTOLOGISTS (12th International Congress), Canberra, Australia. (Graham Taylor, Department of Geology, School of Applied Sciences, Canberra College of Advanced Education, Box 1, Belconnen, ACT 2616, Australia).

September 1986

ENGINEERING IN COMPLEX ROCK FORMATIONS (International Symposium), Beijing, P.R. China. (Prof. Tan Tjong-Kie, Institute of Geophysics, Academia Sinica, Beijing, People's Republic of China).

September 8 - 12, 1986

PALEOCEANOGRAPHY (2nd International Conference), Woods Hole, USA. (W.A. Berggren, Woods Hole Oceanographic Institute, Woods Hole, MA 02543, USA).

September 22 - 28, 1986

BENTHOS '86 (3rd International Symposium on Benthic Foraminifera), Geneva, Switzerland. (D. Decrouez, Department of Geology and Invertebrate Palaeontology, Museum d'Histoire naturelle de Geneve, CP 434, 1211 Geneve 6, Switzerland).

September 29 - October 1, 1986

GOLD '86 (International Symposium), Toronto, Canada. (E. Craigie, Selco Division of BP Resources Canada Ltd., 55 University Avenue, Suite 1700, Toronto, Ontario, Canada M5J 2H7).

October 5 - 11, 1986

WORLD ENERGY (13th Congress), Cannes, France. (R. Ruttley, World Energy Conference, 34 St. James' Street, London SW1A 1HD, UK).

October 7 - 14, 1986

SEA-LEVEL CHANGES AND APPLICATIONS (Symposium), Qingdao, People's Republic of China. IGCP Project 200. Language: English. (Prof. Zhao Songling, Institute of Oceanology, Academia Sinica, 7 Nan-hai Road, Qingdao, People's Republic of China).

October 20 - 25, 1986

INTERNATIONAL ASSOCIATION OF ENGINEERING GEOLOGY (Meeting), Buenos Aires, Argentina. (John D. Rockaway, Department of Geological Engineering, University of Missouri, Rolla, MO 65401, USA).

November 2 - 6, 1986

SOCIETY OF EXPLORATION GEOPHYSICISTS (56th Annual Meeting), Houston, Texas, USA. (Convention Assistant, Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, Ok. 74101, USA).

November 10 - 13, 1986

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), San Antonio, Texas, USA. (Meetings Department, Geological Society of America, P.O. Box 9140, Boulder, Co. 80301, USA).

December 8 - 12, 1986

AMERICAN GEOPHYSICAL UNION (Fall Meeting), San Francisco, California, USA. (AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, USA.).

1987

January 1987

GRANITES AND ASSOCIATED MINERALIZATIONS (International Symposium), Salvador, Bahai, Brazil. (ISGAM, Augusto J. Pedreira, SME-CPM: Rua Ceara, 3-Pituba, 40,000, Salvador, Bahia, Brazil).

January 19 - 23, 1987

HOW VOLCANOES WORK (Hawaii Symposium), Hilo, Hawaii. (Robert Decker, U.S. Geological Survey, MS-910, 345 Middlefield Road, Menlo Park, Ca. 94025, USA).

April 23 - 26, 1987

INTERNATIONAL GEOCHEMICAL EXPLORATION (12th Symposium) and METHODS OF GEOCHEMICAL PROSPECTING (4th Symposium), Orleans La Source, France. (The Organizing Committee, 12th IGES - 4th SMGP, BRGM, B.P. 6009, 45060 Orleans Cedex, France).

May 3 - 7, 1987

ENGINEERING GEOLOGICAL ENVIRONMENT IN MOUNTAINOUS AREAS (International Symposium), Beijing, P.R. China. (Geological Society of China, Ministry of Geology, Pai Wan Chung, Fuchengmenwai, Beijing, People's Republic of China).

May 18 - 22, 1987

AMERICAN GEOPHYSICAL UNION (Spring Meeting), Baltimore, Maryland, USA. (AGU Meetings, 2000 Florida Avenue, NW, Washington, CD 20009, USA.)

May 25 - 27, 1987

GEOLOGICAL, MINERALOGICAL ASSOCIATIONS OF CANADA (Joint Annual Meeting), Saskatoon, Canada. (Dr. W.O. Kupsch, Department of Geological Sciences, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 0W0).

May 31 - June 5, 1987

WORLD MINING CONGRESS (13th), Stockholm, Sweden. (Organizing Secretary, 13th World Mining Congress, University of Lulea, S-951 87 Lulea, Sweden).

June 1987

AUSTRALIA'S INTERNATIONAL MINING AND EXPLORATION EXHIBITION 87 (Meeting), Sydney, Australia. (Thomson Exhibitions, 47 Chippen Street, Chippendale, NSW 2008, Australia).

June 7 - 10, 1987

AAPG AND SEPM (Annual Meeting), Los Angeles, Calif., USA. (AAPG Headquarters, Box 979, Tulsa, Ok. 74101, USA).

July 31 - August 9, 1987

INTERNATIONAL UNION FOR QUATERNARY RESEARCH (12th Congress), Ottawa, Ontario, Canada. (Dr. Alan V. Morgan, Department of Earth Sciences, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1).

August 1987

PACIFIC NEOGENE PALEOCEANOGRAPHIC AND BIOSTRATIGRAPHIC EVENTS (Meeting), Berkeley, Calif., USA. (Dr. C. Brunner, Department of Paleontology, University of California, Berkeley, Ca. 94720, USA).

August 9 - 22, 1987

IUGG (XIX General Assembly), Vancouver, Canada (R.D. Russell, Department of Geophysics and Astronomy, University of British Columbia, Vancouver, B.C., Canada V6T 1W5)

August 12 - 20, 1987

INTERNATIONAL UNION OF CRYSTALLOGRAPHY (Congress), Perth, Western Australia. (E.N. Maslen, Crystallography Centre, University of Western Australia, Nedlands, 6009, Australia).

August 17 - 20, 1987

DEVONIAN SYSTEM (CSPG 2nd International Symposium), Calgary, Alberta, Canada. (Devonian Symposium, Canadian Society of Petroleum Geologists, 505-206 7th Avenue SW, Calgary, Alberta, Canada T2P 0W7).

August 20 - 30, 1987

PACIFIC SCIENCE ASSOCIATION (16th Congress), Seoul, South Korea, Section B: Solid Earth Sciences (Prof. Bong Kyun Kim, Department of Geological Sciences, College of Natural Sciences, Seoul National University, Seoul, South Korea).

August 30 - September 4, 1987

INTERNATIONAL SOCIETY FOR ROCK MECHANICS (6th International Congress), Montreal, Canada. (Prof. B. Ladanyi, Dept. of Civil Engineering, Ecole Polytechnique, Box 6079, Stn. A. Montreal, Canada H3C 3A7).

August 31 - September 3, 1987

SOIL MECHANICS AND FOUNDATION ENGINEERING (9th European Conference), Dublin, Ireland. Languages: English and French. (Dr. Trevor Orr, Civil Engineering Department, Trinity College, Dublin 2, Ireland).

September 7 - 11, 1987

CARBONIFEROUS STRATIGRAPHY AND GEOLOGY (11th International Congress), Beijing, People's Republic of China. (Prof. Yang Jing-zhi, Nanjing Institute of Geology and Palaeontology, Chi-Ming-Sseu, Nanjing, People's Republic of China).

October 11 - 15, 1987

SOCIETY OF EXPLORATION GEOPHYSICISTS (57th Annual Meeting), New Orleans, La., USA. (Marvin R. Hewitt, Amoco Production Co., Box 591, Tulsa, Ok. 74102, USA).

October 26 - 29, 1987

GEOLOGICAL SOCIETY OF AMERICA (Annual Meeting), Phoenix, Arizona, USA. (Meetings Department, GSA Headquarters, Box 9140, Boulder, Co. 80301, USA).

December 7 - 11, 1987

AMERICAN GEOPHYSICAL UNION (Fall Meeting), San Francisco, California, USA (AGU Meetings, 2000 Florida Avenue, NW, Washington, DC 20009, USA).

1988

March 8 - 11, 1988

ASIAN MINING 88 (3rd International Conference and Exhibition), Kuala Lumpur, Malaysia. (The Conference Office, the Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK).

May 16 - 20, 1988

BICENTENNIAL GOLD 88 (Conference), Melbourne, Australia. Co-sponsored by SEG, (Australian Convention and Travel Services Pty Ltd. (ACTS), GPO Box 1929, Canberra ACT 2601, Australia).

October 1988

COAL RESEARCH (International Conference), Tokyo, Japan. (Dr. W.G. Jensen, International Committee for Coal Research, Bte 11, B-1150, Bruxelles, Belgium).

