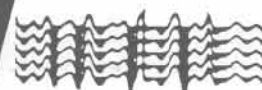




PREVIEW



AUSTRALIAN SOCIETY OF EXPLORATION GEOPHYSICISTS

A.C.N. 000 876 040

April 1991, Issue # 31

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Introduction

The Federal Executive Committee for this year has been elected in with Dr Norm Uren as President. Membership response in Preview has been very good this month. It is a bi-monthly newsletter and to ensure publication, your letters should reach us by the 15th of the month of issue.

Recently Greenpeace have made attempts to stop offshore oil exploration in Australia using a survey in the Otway Basin, or its alleged interference with whales as a start for a campaign. The seismic cable of the survey ship Western Odyssey was interfered with. It is disturbing that this controversy may be cited as an example to restrict other exploration and development.

The present economic climate has ended hopes for government finance to build Australia's first \$50 million gravity wave observatory in W.A.

On a personal level, the administration of the Society has been made more difficult by the large number of members who have failed to pay their dues this year. Colleagues who have not renewed their membership by 30 June 1991 will have their names removed from the ASEG mailing list.

Mount Isa has become the mining geophysical capital of Australia, the boom town of geophysics, as it were. I'm reliably told that there are some ten to twelve geophysicists from companies like Carpentaria Exploration, Placer, CRA, Aerodata, etc in Isa at the moment. Monthly technical meetings are held in the Irish Club. Visitors are welcome.

Editor.

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Branch News

QUEENSLAND

The Queensland Branch AGM was held on 13 March 1991 in Brisbane. The well-attended meeting heard the outgoing President, Henk van Paridon, summarise the activities of the Branch in 1990. Highlights included two very successful workshops on Seismic Stratigraphy by Rob Kirk of BHP, and Aeromagnetism in Hard Rock Applications by David Isles of Aerodata.

The sponsorship of these and other Branch activities by the following organisations was acknowledged:

BHP	AGL
Crusader	Qld Survey and Drawing
Aerodata	Qld Dpt of Resource Industries

The Treasurer's report outlined a healthy balance of Branch funds, most of which are attributable to the workshops. A short report on the recent Sydney ASEG/GSA Conference, and preparations for the October 1992 Conference to be hosted by the Queensland Branch, was presented by Co-Chairman Barry Long.

The appointment of the following office-bearers for the 1991 Branch Committee was approved:

President:	Andrew Mutton	CRAE
Vice-President:	Henk van Paridon	Crusader
Secretary:	Voya Kissitch	CRAE
Treasurer:	Mike Barlow	Comalco

The efforts throughout 1990 of outgoing President Henk van Paridon and Secretary/Treasurer Danny Burns were acknowledged.

The AGM was followed with technical presentations by Nigel Fisher of Digicon on "Application of refraction methods and replacement dynamics to seismic data over irregular sea floor surfaces", and by Malcolm Hobson of Digicon on "Full pre-stack time migration".

The strategy for Branch activities in 1991 is to provide a wide range of technical meetings and workshops designed to involve all Branch members and members of other Professional societies. In particular we welcome Interstate and Overseas visitors to Brisbane who may be able to address the Branch on their area of expertise. Such meetings can be arranged at short notice,

and we invite you to contact the Branch Committee, (that is Andrew Mutton or Voya Kissitch on Tel no: (07)854 1488 or Fax no: (07)257 1561) to make the appropriate arrangements.

V. Kissitch
Secretary.

WESTERN AUSTRALIA

The W.A. branch AGM was held following the Federal Executive AGM, at the Raffles Hotel in Perth on 27th March 1991. The newly elected committee is:

POSITION	1990	1991
President:	Euan Clarke	Kim Francombe
Vice-President:	Norm Uren	Iain Edwards
Treasurer:	Mike Brumby	Mike Brumby
Secretary:	Kim Francombe	Andie Lambourne
Committee:	Brian Evans	Norm Uren
	Gary Fallon	Phil Harman
	Richard Williams	Graham Bubner
	Phil Harman	Richard Williams
	Roger Clifton	Euan Clarke
	Terry Walker	Marcus Fils
	Iain Edwards	Guy Paterson
	Danny Burns	

The Committee donated \$1,000 to the ASEG Research Foundation. Gary Fallon has left Perth to join Nick Sheard at Mt Isa with CEG-MIM. Brian Evans has taken sabbatical leave in Houston and will be back later this year.

Following on the success of last year's beer tasting night, the Committee has decided to have another. It is likely that it will be held in mid May.

Andie Lambourne
Secretary.

VICTORIA

The Committee for 1991 is as follows:

President:	Rob Singh
Vice President:	John Sumpton
Secretary:	David Gamble
Treasurer:	Lindsay Thomas
Committee:	Rob Harms Paul MacDonald
	Richard Smith Koya Suto

The April meeting was addressed by Mr Eddie Kostlin, Chief Geophysicist of De Beers, who discussed "Triaxial 4-Sensor Magnetic Gradiometer description and examples."

David Gamble
Secretary

NEW SOUTH WALES

The March meeting for the NSW Branch was held at the Lord Nelson Hotel in The Rocks where two talks were presented.

Fernando Della Pasqua, a student from Macquarie University described his stay in the USA during the "Summer of Applied Geophysical Experience" - this is a 3-week university course of instruction in the methods of modern geophysical exploration. These include seismic reflection and refraction, gravity, magnetics, electrical resistivity and magnetotellurics. The NSW Branch helped fund Fernando's attendance.

The second talk was presented by Mr Lu Linsheng from the Ministry of Geology and Mineral Resources in Beijing, China. His talk was entitled "Airborne Geophysics in China for Petroleum and Minerals". Mr Lu outlined technical developments which have taken place in China in recent years and described involved describing the use of airborne magnetics for petroleum exploration, including the possibility of direct detection of hydrocarbons.

*Scott Gagen
Secretary*

SOUTH AUSTRALIA

Following a quiet period the SA Branch held its first evening meeting, since the AGM in February, on Wednesday 24 April. The meeting was held in the newly revamped staff amenities area of 101 Grenfell St (Santos). The 1991 Committee were stunned with the unexpected large turnout and a supply run of extra consumables was required early in the evening. Fifty-three people signed in and there were others present who did not! The meeting was a series of short presentations by representatives of various local organisations bringing the attendees up to date on their organisations current activities, new structure, or proposed future developments. The organisations represented were:

SADME	T Crabb/D Cockshell
Santos Ltd	E Tadiar
Sagasco	D Roberts
CRA	G Mackie
Dynamic Satellite	W Hedditch
Normandy Poseidon	G Boyd
Placer Pacific	C Anderson
Elliot Geophysics	P Elliot
HGS	M Symmonds
SSL	M Tyminski
WMC	P Fullagar

As no report of the AGM appeared previously here is a brief update. The AGM was held at the College Arms on 13 February. A pleasant evening was had by the forty-four people who attended. The annual elections resulted in appointment of:

President:	Terry Crabb
Secretary:	Nick Fitzgerald
Treasurer:	Peter Dunne
Membership Secretary:	Jim Allender
Committee Members	
Doug Roberts	Ashley Duckett
Alan Appleton	Robin Gerdes
Mark Flynn	Neil Gibbins
John Iredale	Craig Cumbley
Murray Symmonds	Peter Hopgood
Phil McBride	

The first Committee meeting was held on 4 April at the British Hotel and resulted in the appointment of the 1991 Wine Committee and the Melbourne Cup Lunch Committee.

Dates fixed were:

Next Meeting:	29 May
Melbourne Cup Lunch:	5 November
Students' Night:	November
Christmas BBQ:	4 December
1991 AGM:	6 February 1992

The next evening meeting will be a presentation by Mark Tyminski who has recently rejoined SSL after a period out in the financial world. Mark will be giving a talk on personal financial planning.

*Nick Fitzgerald
Secretary*

ACT

The ACT Branch held a monthly meeting in April with a very interesting talk by Mr Lu Linsheng, the Chief of International Operations, Aero Geophysical Surveys, Ministry of Geology and Mineral Resources, Beijing. Mr Lu provided a rare insight into geophysical operations in China, particularly in aeromagnetic surveys. Following the meeting an enjoyable dinner was consumed at the Boardroom.

The ACT Branch AGM will be held sometime in May (a date yet to be decided) and is having problems in coercing 'new blood' into the ACT Executive. Nominations will be called for in the next Branch newsletter.

*Kevin Wake-Dyster
Secretary*

Airborne Triaxial Magnetic Gradiometer System

A Major Boost For Minerals Exploration In Southern Africa

*By Shelagh Blackman
Anglo American Corporation
42 Marshall Street, Johannesburg 2001*

The search for minerals is being revolutionised in southern Africa through the development of an airborne four sensor triaxial magnetic gradiometer system - probably the first of its kind in the world - for conducting airborne magnetic surveys.

Financed and commissioned by Anglo American Corporation, the system was configured and installed by Poseidon Geophysics (Pty) Ltd and Aerial Surveys Botswana (Pty) Ltd.

The use of airborne magnetometers to record complex variations in the earth's magnetic field to map lithologies and to locate ore bodies hidden beneath the earth's surface, is a well established technique. Geophysicists at Anglo recognised that with modern technological advances it was possible to upgrade existing data acquisition systems and to augment the recording of total magnetic field data with vertical and horizontal field gradient measurements. This would then yield valuable additional information about the mineral potential of the prospecting area.

To achieve this, the designers have installed into a Cessna Titan 404 aircraft, four optically pumped cesium vapour magnetometer sensors, with one mounted on the end of each wing tip and two situated 2 metres vertically apart on a tail stinger.



An engineer operates the surveying equipment aboard the Cessna Titan 404.

This gradiometer configuration represents a significant advance on the standard airborne systems, where a single sensor in a bird is either towed from a cable behind and below the survey plane or is rigidly mounted in the extended tail section of the plane. It necessitated careful investigation into the technical specifications, performances and compatibility of various commercially available electronic devices and most of all into the newly developed RMS 27 term automatic dynamic compensator which eliminates the magnetic effects inherent in aircraft manoeuvres. This constitutes a revolutionary development in the world of airborne geophysics.

In survey mode the plane flies between 80 and 100 metres above the ground and collects almost 2000 bytes of data every second. At the prevailing survey speed this relates to one reading every 14 metres on the ground.

With this triaxial gradiometer system it is hoped to achieve more definitive results from airborne magnetic surveying. The Quality of interpretations is improved and greater accuracy in the determination of the depths and geometries of orebodies is ensured. The development of this system represents a powerful prospecting tool.



Anglo American Corporation geophysicist, Eddie Kostlin, inspects the vertical sensor mounting on the Cessna Titan 404.

The 1991 Executive

The ASEG Federal Executive Committee held their Annual General Meeting at the Raffles Hotel in Perth on 27th March 1991. A quorum was present and the new office bearers for 1991 were elected unopposed:

President:	Norm Uren
1st Vice President:	Mike Sayers
2nd Vice President:	Robyn Scott
Treasurer:	Craig Dempsey

The newly elected President, Dr Norm Uren is the Head of the Department of Exploration geophysics, and also Head of the School of Physical Sciences at Curtin University in Perth. Co-director of Exploration Seismology at Curtin, he was responsible for the establishment of the postgraduate geophysics programme there in the late 1970's. He has had various periods of industrial leave, working with exploration companies in Western Australia, (Getty, Shell, Mesa, Layton). His society memberships include ASEG, SEG, EAEG, FAIMM, FAIP, MACE and PESA.



The 1990 office bearers presented their reports to the AGM, some of which had already been published in the February edition of Preview. The outgoing President, Dr Brian Embleton, confirmed that the ASEG Federal Executive is to move to Melbourne in 1992.

Secretary, Andre Lebel, was questioned on the ASEG membership list and was asked for updates to be done through Preview or Committee minutes. A question directed to the Conference Advisory Committee which has yet to be answered was 'Why does the ASEG hold conferences every 18 months if successive Committees have recommended that they be held at intervals of longer than 18 months?'

Brian Embleton, in the name of the ASEG Executive Committee, formally recognised the outstanding contributions of Wes Jamieson, Tim Pippett, Dave Pratt and Pat Hilsdon. The success of the Sydney Conference is owed to them.

Research Foundation



Donations

Further to those names published in previous issues of Preview, the following people or organisations have contributed to the ASEG Research Foundation:

- ◆ Dr B Embleton
- ◆ Mitre Geophysics
- ◆ Shell (\$5,000)
- ◆ Geoinstruments (\$1,000)
- ◆ Seistend
- ◆ CRA Exploration (\$3,000)
- ◆ D W Emerson
- ◆ ASEG (\$10,000)
- ◆ Ampol Exploration (\$1,155.40)
- ◆ Western Mining (\$1,155.40)
- ◆ Shell Dev Aust (\$1,155.40)
- ◆ ASEG WA branch (\$1,000)

Successful Applicants for ASEG Research Foundation Grants

The ASEG Research Foundation formally commenced its function in September 1989. The aim of the ASEG RF is to support research into geophysics via approved research projects at B.Sc.(Hons.) and M.Sc. level in Australian Institutions.

In August 1990, applications for ASEG RF support were requested from Tertiary Institutions. A total of seven research projects were received from six Universities. Three projects were in the Petroleum area, the rest in the Mining area. A further two projects were received after applications closed and could not be considered for the first round.

Two subcommittees were formed to review the applications and make recommendations to the ASEG RF Committee. These subcommittees were: Mining: Peter Fullagar, Steve Mudge and Greg Street. Petroleum: John Denham, Dave King and Joe Cucuzza

Some very good quality proposals were reviewed by the subcommittees. The successful projects are outlined below. The ASEG RF Committee would like to congratulate the successful applicants and acknowledge the work of the subcommittees in what was a very difficult decision.

MINING

Dr. J.H. Stanley, University of Armidale - B.Sc.(Hons.) grant provided for field expenses, laboratory measurements and consumables.

"The Effects of Rock Magnetic Properties, Cultural and Natural High Frequency Pulsations on Base Station Corrections in Airborne Magnetic Survey".

The aim of this project is to answer:

- ◆ How important is the positioning of Base-station magnetometer within or adjacent to a survey area? What sensitivity and sampling rate is required? How significant is 50Hz interference?
- ◆ Should base-station arrays be deployed or are single stations adequate? How do deep and shallow, magnetic and/or conductive bodies effect the base-station record and how does elevation above ground vary these effects?

Dr. M. Dentith, University of Western Australia - B.Sc.(Hons.) grant provided to cover costs of field expenses.

"Three Dimensional Structure of the Southern Cross Greenstone Belt, W.A."

This project is part of a larger investigation by the University of WA and Curtin University of Technology. The aim of the project is to acquire a series of magnetic and gravity traverses over selected areas of the Greenstone Belt. Some geological mapping will be carried out as well. All these data will be integrated with borehole, seismic and other available data. The object is to produce a series of cross-sections and determine the surface structure and the structural history of the Greenstones.

Dr. S. Hearn, University of Queensland - B.Sc.App.(Hons.) grant provided to cover costs of equipment, transport, field consumables and for data processing.

"Combined P Wave/S Wave Seismic Reflection for Coal".

This project is part of an on-going research which is aimed at optimising acquisition and processing methodologies for combined P/S shallow reflection. This project will focus on the recording, processing, and integrated interpretation of P and S Common Mid point (CMP) section over a one kilometre line. An additional component is the enhancement of existing source equipment.

PETROLEUM

Dr. S.A. Greenhalgh, The Flinders University - M.Sc. grant provided for equipment and computer consumables.

"Imaging of Subsurface Faults by Walkaway VSP Waveguiding - Physical Model Experiments".

The primary question to be resolved in this project is whether down going P waves from a surface source (say) 3-4 kilometres away can be mode converted at small faults on a target horizon with the necessary efficiency for the waveguide arrivals to be detected at a borehole geophone. The experiments to be undertaken will resolve this question and open up the possibility of constructing low cost, high resolution fault maps by running VSP surveys over buried low seismic velocity zones.

*Joe Cucuzza
Secretary*

Positions Vacant

GEOTERREX PTY LTD is a leading provider of specialist services in the acquisition, processing and interpretation of geophysical data for the resource exploration industry. In keeping with our substantial commitment to ongoing Research and Development we invite applications for the following positions:



Research & Development Supervisor

This position will involve the following tasks:

- ◆ Co-ordinate all Research and Development activities and budgeting, including liaison with our offices in Canada and France
- ◆ Manage specific projects involving our airborne electromagnetic surveying systems (GEOTEM)
- ◆ Seek out ongoing Research and Development funding from external sources
- ◆ Make technical contributions to the development of new software and/or hardware technology
- ◆ Act as an internal consultant on technical matters

The ideal applicant will hold a degree in Geophysics or a related discipline and will be able to demonstrate proven experience in project management. He/she will also require a superior mathematical understanding of geophysical data, EM and potential field theory in particular.

Interpretation Geophysicist

A geophysicist with up to ten years experience is required to join our interpretation department. The successful applicant will hold a degree in geophysics or related discipline and must be able to demonstrate a working ability to produce geological interpretations from aeromagnetic and airborne EM data. Experience in the use of image processing would be an advantage.

Both positions are Sydney based. Remuneration will be commensurate with qualifications and experience. Applications should be marked "Confidential" and forwarded in writing to:

The Marketing Director
GEOTERREX Pty Ltd
13 Whiting Street
Artarmon NSW 2064

Use of Seismic Geophysics in the Detection of Epithermal Precious Metal Deposits in the Western U.S.

By James W. Cooksley & Peter H. Kendrick
Cooksley Geophysics, Inc.
Redding, California, U.S.A.
Phone 913-241-3167.

Introduction

Seismic geophysical methods can be very useful in the discovery and delineation of the extent of hydrothermal systems which contain precious metals. Some applications of this technique have been in Carlin-type deposits, volcanic environments, and vein type deposits emplaced in sedimentary rocks of Tertiary age. This paper presents observations made near the Carlin mine and at Round Mountain, Nevada.

Other current uses which have not been completely evaluated are exploring decollements in southern California and western Arizona, defining Chainman Shale vs. Joanna Limestone and other shale vs. massive limestone type environments in eastern Nevada, and hot spring deposits of Holocene, Pleistocene, and Pliocene age.

The physical principal involved is that hydrothermal alteration changes the velocity at which the altered host rock transmits seismic waves. During the mineralising process, the rocks in and adjacent to the ore body have been altered significantly.

Furthermore this alteration is commonly superimposed over an area of structural deformation. Carlin is an example of the alteration extending along fractures associated with an apparent thrust faulting. One example of discovery and investigation of a Carlin-type deposit is presented in this paper.

Carlin-Type Deposits

The typical Carlin-type deposit is generally defined as gold mineralisation present locally in a quartz-dominated, epithermal phase of a hydrothermal system emplaced in sedimentary host rocks of early to middle Palaeozoic age. Significant volumes of disseminated pyrite, some of which contains gold, were deposited locally within the hydrothermal system. Host rock lithologies vary from carbonates to chert, siliceous shale and siltstone.

Thrust faults and or detachments have been identified at many of the mines in the district and they are believed to be related to the formation of the ore deposits. The age of mineralisation is thought to be Oligocene (Radtke, 1985).

The ore bodies are contained within a larger mass of hydrothermally altered rock. Commonly, this mass of altered rock is in the form of a stratum or lense which attains a thickness of about 120 feet at the Carlin mine. In discussing the physical properties of the altered zones, it appears that decalcification and other forms of chemical degradation effect the rock more than the more obvious silicification that seems to pervade in these deposits. These lenses, commonly discordant with the attitudes of the host rock strata, were probably, at least in part, developed along fractures and breccias resulting from detachment or thrust faulting. Seismic reflections of anomalously large amplitude are generated at the contacts of the altered rock masses.

The elastic moduli and densities of the rock within the altered lenses have been significantly changed. The greater the difference in elastic moduli and density between the rock units, the larger the reflection originating at their contact.

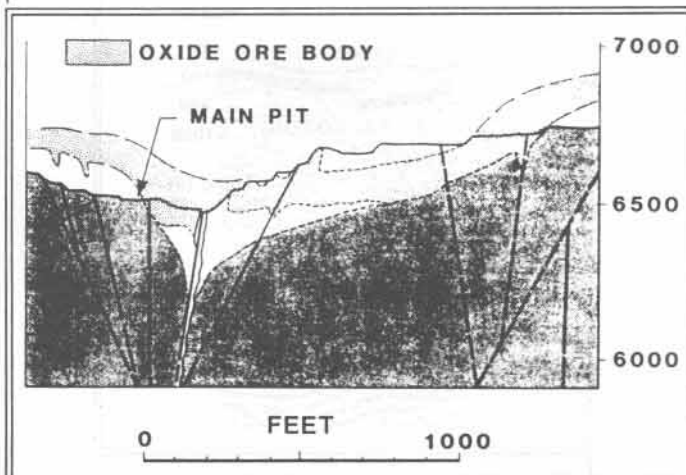


Figure 1: Geologic section at the Carlin Mine (after Radtke, 1985).

Consequently, anomalously large seismic reflections emanate from the upper and lower contacts of the hydrothermally altered rock with their unaltered equivalents. Radtke (1985) depicts the oxide ore zone at the Carlin mine as being 120 feet thick. In this paper the oxide zone of Radtke's is being evaluated with the altered lense. Figure 1 shows a portion of one of Radtke's sections. Figure 2 is a seismic time section located about 1.5 miles to the northwest, and roughly parallel to Radtke's section.

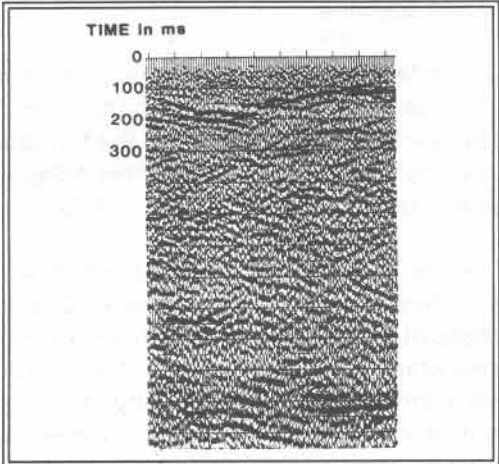


Figure 2: Seismic time section located about 1.5 miles north-west of Fig. 1 and roughly parallel to it.

Figure 3 is an interpreted version of Figure 2. Given a thickness of the lense equal to 120 feet, and a 30 millisecond interval from the top to the base of the lense on the seismic section, the velocity within the lense is $2 \times 120 \text{ feet} / 30 \text{ milliseconds}$ or 8.0 fpm (feet per millisecond). This compares with velocities ranging from 14.0 fpm to 20 fpm measured in unaltered rock of Palaeozoic age in this region.

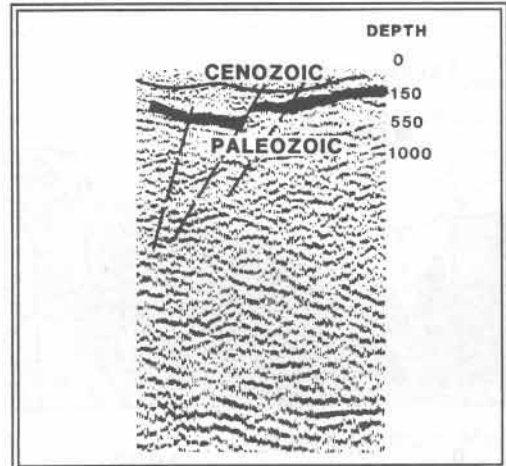


Figure 3: Interpretation of Fig 2, dark areas interpreted as altered lenses.

From these observations it may be concluded that one can expect anomalously high amplitude reflections emanating from the surfaces of the altered lense.

The seismic section also depicts high angle faults and several sections of stratified events. One of the high angle fault offsets the altered lense and appears to have normal movement.

The altered lense is much less affected by the other two faults.

Also shown is the contact between the Carlin Formation (?) of Pliocene age and the Palaeozoic formations.

Figure 4 shows a typical sequence of four traces on a reflection seismic section. The contact of more competent siliceous units over the hydrothermally altered lense is represented by the negatively polarised wavelets. The contact of the less competent altered lense over the very competent carbonate assemblage is represented by a large amplitude, normally polarised wave, the onset of which lies within the large amplitude event about 32 milliseconds below the onset of the negatively polarised wavelet.

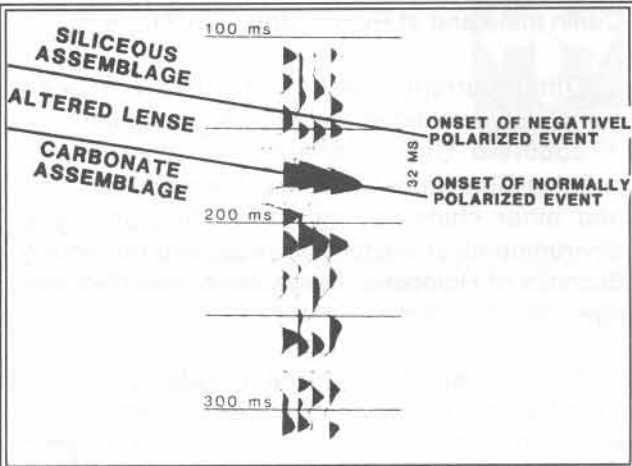


Figure 4: A typical sequence of four traces on a reflection seismic section. The seismic signature which denotes a Carlin-type deposit is shown.

The validity of equating the large amplitude anomalies with the perimeters of the hydrothermally altered rock of Carlin-type deposits is partly substantiated by comparing the seismic sections, approximately one-half mile apart, shown in Figure 5.



1991 Annual General Meeting

Corporate Affairs Committee Report

by
Lindsay N Ingall
Chairman

1990 REVIEW

The State Corporate Affairs Commissions and the National Companies and Securities Commission are no more. The newly formed Australian Securities Commission (ASC) replaced them on 1 January 1991 and an information release from the ASC is presented below.

- ◆ "From 1 January 1991, the Australian Securities Commission (ASC) will become the sole national authority responsible for the administration of companies and securities law throughout Australia.
- ◆ The ASC will replace the National Companies and Securities Commission and state and territory Corporate Affairs Commissions. It will provide a nationwide system for the registration and regulation of companies and securities and future markets.
- ◆ Uniform legislation together with increased resources will enable the ASC to focus on strong enforcement of the corporations law".

Accompanying the commencement of operations of the newly formed ASC each company has been allocated an Australian Company Number (ACN). The ACN for the Australian Society of Exploration Geophysicists is 000 876 040 which must be shown on the Common Seal and on all public documents which are signed, issued or published.

Continued on Page 13

The left section depicts the obvious, strong amplitude waves generated at the top and base of the lenticular mass of hydrothermally altered rock. This section also depicts a possible conduit entering the altered lense from below in the form of diminished amplitude and a downward bending of the lower event.

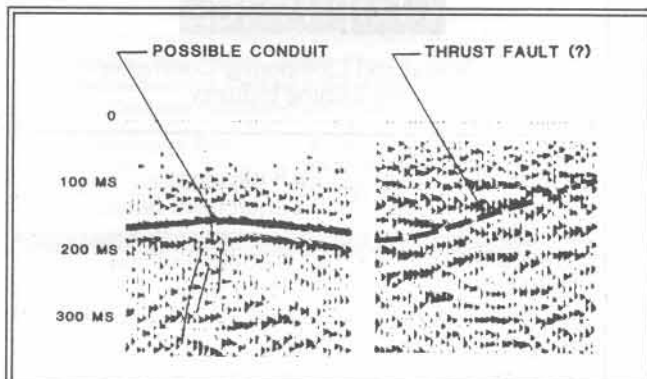


Figure 5: Comparison of seismic section depicting a Carlin-type deposit and a section in which only the thrust fault zone is defined. The sections are about one-half mile apart.

This downward bending suggests lower velocity which equates with less competent rock suggesting more intense alteration. The area of low amplitude signal immediately below the large amplitude events is a function of the AGC (automatic gain control) and is not directly related to the geology. For interpretation purposes, it is useful in comparing this anomaly to others such as the section to the right.

In the left section, the AGC exerted a great deal of suppression to the signals originating from the altered zone, thus the area of low amplitude immediately below the amplitude anomaly. The right section depicts events of much lesser amplitude and coherence in the same region, but without the suppressed signal below the events. The lesser events originate along strata in proximity to an unmineralised portion of the thrust fault. No drilling data have been released at the time this paper was written, however strong circumstantial evidence indicates the above observations to be valid.

References

- Barnes, H.L., 1979, *Geochemistry of hydrothermal ore deposits*, second edition: John Wiley & Sons.
- Bonham, H.F., Jr., Tingley, J.V., eds. 1986, *Sediment-hosted precious metal deposits of northern Nevada*: Nevada Bureau of Mines and Geology, Report 40, 11 authors, 103 pp.
- Radtke, A.S., 1985, *Geology of the Carlin gold deposit*: U.S. Geologic Survey Professional Paper 1267, 124 pp.

Treasurer's Report

by
C Dempsey

As a company limited by guarantee, the ASEG is obliged under the Companies (NSW) Code to prepare audited annual accounts and to present these accounts along with the auditor's report at the Annual General Meeting.

Slee and Stockden Pty Ltd continue to be our accountants and they have prepared the accounts with this report. Unfortunately, as in previous years, the delays incurred in collating the financial data from the Branches has meant the presented accounts are subject to audit by our auditor, Colin Johnson.

The major cause of these delays appears to be the proximity of our balance date, 31 December, to our February AGM and that many of our office bearers are on vacation during this period. I should therefore like to suggest that the incoming Federal Executive consider holding the next and subsequent Annual General Meetings in April which should allow sufficient time for the auditing of the financial statements.

The more significant items apparent from the accounts are:

Profit and Loss: Income of \$180 504.03 in 1990 compares with adjusted income for 1989 (after writing of advertising and membership debtors) of \$216,584.00.

The decrease in income reflects the lack of a conference in 1990 and our new policy with respect to advertisement orders and payments. Also significantly affecting the Society's income was an increase of \$23,646.00 for the Branches income, donations to the Research Foundation and the subscriptions to the VSP Course.

Expenditure was \$172,727.94 compared with an adjusted amount (pre the advertising and subscription writeoffs) of \$120,244.00 for 1990. The main variations in the Society's expenditure is a variation of \$32,436.31 in the costs associated with publishing and \$15,888.20 associated with cost for the VSP Course.

Balance Sheet: Our net assets have increased from \$273,201.00 to \$280,977.09. Of these assets about \$262,000.00 is held as cash mainly in high interest bearing accounts.

General: The accounts for the year reflected the lack of a conference but the Society has still made a modest profit while supporting the VSP Course and a large increase in publication costs.

I wish to thank again, Paula Sinclair of The Chamber of Mines and Energy of WA who, once again, has quietly and efficiently conducted the business of the Secretariat.

Profit and Loss Statement for the Year Ended 31 December 1990

Last Year		This Year
47243.00	Membership Dues	57811.09
	Non-member Subscriptions to	
11491.00	Exploration Geophysicists	10989.19
77344.00	Advertising	8766.57
16460.00	Interest	17314.23
783.00	Misc. Receipts SA "88 Conference"	-
	Profit on Victoria "89	
66844.00	Conference"	653.23
16396.00	South Australia Branch Revenue	25088.07
4379.00	Queensland Branch Revenue	9201.56
5439.00	New South Wales Branch Revenue	7181.82
15.00	Tasmania Branch Revenue	157.58
4624.00	Western Australia Branch Revenue	6088.89
76.00	A.C.T. Branch Revenue	1527.52
5283.00	Victoria Branch Revenue	10769.28
-	Donations	10680.00
-	VSP Course Fees	14275.00
256377.00		180504.03
	EXPENDITURE	
5113.00	Accountancy Fees	2420.00
2599.00	Audit Costs	2620.00
28.00	Awards - Students	-
1209.00	Bank Charges	1107.91
7740.00	Capitation Fees	7360.00
890.00	Computer Expenses	-
-	Taxes	105.53
-	Secretarial Expenses	6006.57
363.00	Depreciation	-
77.00	Filing Fees	-
66.00	Loss on S.A. "88 Conference"	-
3689.00	Loss on Sale of Satchells	-
1595.00	Legal Expenses	-
17395.00	Membership Dues Written Off	-
22434.00	Publication Debtors Written Off	-
5623.00	Postage, Stationery, Etc	2250.02
56431.00	Publication Expenses	88867.31
150.00	Registered Office Fee	-
-	VSP Course Expenses	15888.20
2040.00	Social Function, A.G.M. Costs &	
1355.00	Ties	1754.00
	Subscriptions	1355.00
	South Australia Branch	
13627.00	Expenditure	23022.49
4031.00	Queensland Branch Expenditure	7021.30
5953.00	New South Wales Branch	
	Expenditure	6628.11

Last Year		This Year
3650.00	Western Australia Branch	
	Expenditure	4064.72
457.00	A.C.T. Branch Expenditure	468.30
3558.00	Victoria Branch Expenditure	1788.40
-	Tasmania Branch Expenditure	0.00
160073.00		172727.94
96304.00		7776.09
141893.00	Retained Profits - Beginning of	
	Year	238197.00
238197.00		245973.09

Balance Sheet as at 31 December 1990

AUSTRALIAN SOCIETY OF EXPLORATION GEOPHYSICISTS		
BALANCE SHEET		
AS AT 31ST DECEMBER 1990		
Last Year		This Year
35004.00	RESERVES	
238197.00	Reserves	35004.00
	Unappropriated Profit	245973.09
273201.00	SHARE CAPITAL AND RESERVES	280977.09
	REPRESENTED BY:	
	CURRENT ASSETS	
13666.00	Receivables	19455.00
47188.00	Publication Works in Progress	-
152830.00	Other	-
82734.00	Cash at Bank	261522.09
296418.00		280977.09
	FIXED ASSETS	
-	Plant & Equipment - at Cost	2197.00
-	Less: Accumulated Depreciation	2197.00
	CURRENT LIABILITIES	
23217.00	Trade Creditors & Accruals	-
23217.00		-
23217.00	TOTAL LIABILITIES	-
273201.00	NET ASSETS	280977.09

Depth of Penetration of A VLF-EM Field

Article reprinted from Nuusbrief, the South African Geophysical Association newsletter.

In exploration geophysics, depth of investigation is a criteria often used to determine which prospecting method should be used.

In the case of a VLF-EM survey, a simple rule of thumb can be evaluate this criteria. In the ground, the electrical and magnetic field diminish in amplitude with depth, this is called "skin effect". "Skin depth" quantifies this effect, and is by definition the depth at which the field amplitude is $1/e$ (approx. 33%) of that of the incident field (see Echos geophysiques, vol.4 No.3, March 1987).

A) Conductive Terrain

In this case, field attenuation is very appreciable and is controlled by the skin depth. However, for the wave to reach the target and come back to the surface, the travelled distance must not be greater than $1/2$ of skin depth. In this case, the wave will travel the distance of one skin depth unit when returning to the surface. It is therefore easy to estimate depth of penetration of a VLF-EM field knowing the resistivity of the ground, as illustrated in figure 1.

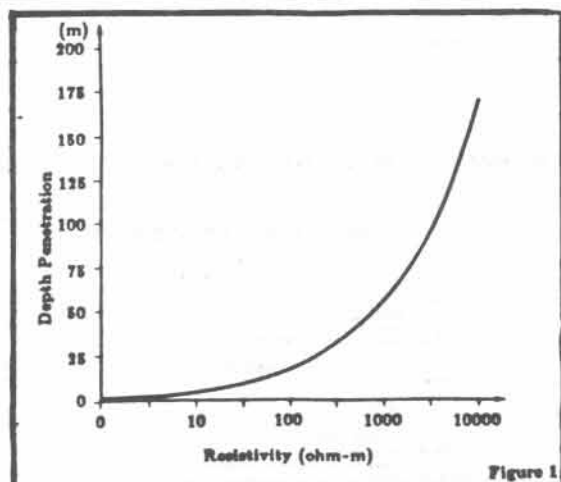


Figure 1: Depth of Penetration of a VLF-EM Field

Depth of penetration of a VLF-EM field is greatly diminished by the presence of conductive overburden. Table 1 illustrates that a conductive

overburden thickness greater than 10 metres renders the VLF-EM method useless.

Table 1: Depth of Penetration of a VLF-EM field (1)

Resistivity	Type of Rock or overburden	Sin depth (max theoretical penetration) (2) D (m)	Effective depth of penetration (3) De (m)
1×10^8	Quartzite	35 000	(4)
1×10^7	Basalt (5)	11 000	(4)
1×10^6	Granite (5)	3 500	(4)
1×10^5	Diorite (5)	1 100	(4)
1×10^4	Peridotite (5)	350	175
1×10^3	Conglomerate	110	55
1×10^2	Overburden (Abitibi) Water + Sediments	35	17
1×10^1	Clays / Water + sediments	10	5
(1)	Frequency = 20 000 Hz		
(2)	$D = 503 (p/f)^{1/2}$		
(3)	$De = D/2$ (in conductive formation)		
(4)	De is related to conductor size (see "B: Resistive terrain")		
(5)	Water saturated rock		

B) Resistive Terrain

In this case, amplitude attenuation is negligible and skin depth is no longer a critical parameter. Another method is therefore used to estimate depth of investigation: a mineralised target will be detected at surface if the average dimension affecting the most of the magnetic field is greater than twice the depth of penetration of the VLF-EM field.

Wanted to Buy

Huntec MK IV I.P. set complete and in excellent order.

Write to:

"The Manager"
21 Greer Street
Hyde Park SA 5061.



Letters

Dear Ms Heath,

Re: AUSTRALIAN COMPANY NUMBER

On the front page of the February issue of Preview, you have shown and mentioned the Society's A.C.N. Please note that the Australian Securities Commission has released guide-lines in relation to the correct display of the A.C.N. In particular, please note that:

1. the correct abbreviation is A.C.N., not ACN as shown on the newsletter,

2. the A.C.N. type must be clearly legible and of a minimum size - the size of the lettering located at the top of the front page immediately below the Society's title should be checked.

You may wish to check these points and issue instructions to your colleagues accordingly.

Yours pedantically,
Guido Staltari
Member.

Dear Mrs Heath

Re: CONTINUING EDUCATION COMMITTEE

At the Council meeting held during the Sydney Conference it was decided that a Continuing Education Committee should be formed. In the ensuing power vacuum I was elected unopposed (I opposed but was out-voted!) as Chairman.

The Committee was set up to deal with any matter relating to the continuing education of practising geophysicists; beyond that, the role of the Committee was left open. Some of my views are expressed below.

Activities For The Committee

- Instigate and co-ordinate workshop and lecture series between conferences
- Instigate a 'Distinguished Lecturer' type series - perhaps annually
- Co-ordinate and assist with conference committees to provide workshops at conferences
- Identify and locate other resources, eg. videos, and advise the Society at large.

Committee Members

- To be the eyes, ears and mouth of their fellow ASEG members
- Identify needs

- Seek out and encourage potential course leaders to make themselves available
- Be representative of our Society members both in a professional and geographic sense.

Funding

- Activities to be self-funding, overruns to carry underruns
- A distinguished lecturer series should be underwritten
- Local branches to seek out sponsorship and support appropriate to their State.

The desirability of Australian-led workshops and courses has been aired in Preview before and I support this view. However, the aim remains quality and relevance. The cost effectiveness of bringing the teacher to the student is not lost on managers.

The purpose of this letter is to solicit ideas, suggestions, directions (not to mention Committee members), from the Society at large. I ask any member who may have some contribution to or interest in this Committee and its activities to contact me directly and/or via Preview. I look forward to hearing from you.

Yours faithfully
Henk van Paridon
Senior Geophysicist
c/o Crusader Limited
PO Box 703
Brisbane QLD 4001
Phone: (07) 221 6516 (B)
(07) 371 0244 (H)
Fax: (07) 221 2068

Dear Editor

Re: ER MAPPER RELEASE 2.0 AND SUN SPARCSTATION 2

Earth Resource Mapping (ERM) and Sun Microsystems are proud to announce the release of ER Mapper release 2.0 on the new Sun SPARCstation 2. The 28.5 MIP SPARCstation 2 is ideally suited to ER Mapper's advanced image processing capabilities for Earth Sciences.

Feature highlights of this powerful combination include:

- ER Mapper 2.0
- 3D OPENLOOK User Interface
- High Performance, 2-10 times faster
- Over 200 new features
- Classification techniques
- Z Profiling
- Full film writer support
- Cost: \$14,000

- Sun SPARCstation 2
- 28.5 Vax MIPS
- 16Mb RAM Standard
- 8, 24 and 32 bit displays
- High speed SCSI Disks
- 200 Mb to 4Gb disk
- Cost: \$30,000 to \$60,000

Should you require more information or if you would like a demonstration, please contact ERM or your local Sun Office.

Yours faithfully
 Stuart Nixon
 Managing Director
 Earth Resource Mapping
 David Kerr
 Partnership Director
 Sun Microsystems Australia Pty Ltd

SEG UPCOMING SEG COURSES...

A Practical Understanding of Migration and Dip Moveout (DMO) April 15-16 New Orleans (SEG Gulf Coast Meeting)	Quality Assurance — Land Seismic Acquisition September 26 Calgary "Quick Look" Well Log Analysis July 23 Tulsa
An Introduction to Reflection Seismic Interpretation April 6-7 Dallas (AAPG Meeting) August 15-16 Tulsa	Reduction, Analysis and Interpretation of Gravity and Magnetic Survey Data May 13-14 Calgary (CSEG Meeting)
AVO: Seismic Lithology September 16-19 Denver	Reservoir Rock Geology September 10-11 Tulsa
Basin Analysis and Sedimentary Geology: A Primer for Geophysicists May 4-5 Houston (OTC) May 13-14 Calgary (CSEG Meeting)	Resistivity and Porosity Basics July 22 Tulsa
Carbonate Seismology September 23-24 Tulsa	Seismic Stratigraphy, Absolute Sea Level Ranges and Causes, Chronostratigraphy August 29 Tulsa
Depth Conversion Techniques June 27 Denver	Seismic Stratigraphy: Geological Systems — Seismic Responses April 6-7 Dallas (AAPG Meeting) April 15-16 New Orleans (SEG Gulf Coast Meeting)
Evaluation of Petroleum Reservoirs July 26 Tulsa	Shear Waves and Anisotropy in Exploration Seismology September 12-13 Tulsa
Fundamentals of Digital Seismic Processing August 12-14 Tulsa	Well Logging: Bridging Seismic Exploration and the Reservoir June 5-7 Houston
In Situ Seismology: Elastic Rock Properties, Crosswell Logging and VSP April 3-5 Tulsa	Well Logs in Shaly Formations July 25 Tulsa
Introduction to Seismic Inversion Methods August 27 Tulsa	Well Logs Vital to Geophysicists July 24 Tulsa

For more information or to enroll, contact the SEG Continuing Education Department at (918) 493-3516 or FAX (918) 493-2074.

Spiker for Electromagnetic Imaging

Dr Richard Smith's programme SPIKER (Exploration Geophysics, vol 22, no 2, pp 363-368) is now available at a cost of \$260 (including airmail postage within Australia). To order a copy, send a cheque to the Foundation for Geophysical Exploration Research. This should be sent to the Foundation at Macquarie University NSW 2109, attention K. Vozoff. The package, written in Fortran, includes sample input and output files. Please specify the disk size required. Proceeds are being used to assist research students at Macquarie University.

Membership

Dues Reminder

Members who have not renewed their membership by 30 June 1991 will be removed from the ASEG mailing list. This could be your last issue of Preview if you do not act now!

Member Whereabouts?

Does anyone have the new address for:

J T FRAZER
 Santos Limited
 GPO Box 2319
 ADELAIDE SA 5001

P R GOURLAY
 PO Box 17
 Bagdad TAS 7030

D ROMPOTES
 Tensor Pacific Pty Ltd
 283 Normanby Rd
 PT MELBOURNE VIC

J L SEARA
 Neue Knochenhauerstr
 3300 Braunschweig
 WEST GERMANY

New Members

We welcome new members to the Society, 31 of which applied during the Sydney Conference:

Member		Category	State
ALLEN	David	Student	NSW
ANGUS	Robert	Student	WA
ARCHER	Grant	Associate	SA
BANCROFT	John	Associate	CANADA
BEARE	Richard	Associate	SA
BRADISH	Lyndon	Active	CANADA
BUSUTTL	Stephen	Associate	QLD
BUTT	Amanda	Associate	QLD
CAO	Shunhua	Associate	SA
CARVER	Peter	Active	NSW
CATSOULIS	David	Active	QLD
DOYLE	John	Active	NSW
HEARTY	David	Active	WA
HILL	Murray	Active	WA
HORTON	Malcolm	Active	WA
JONES	Leonie	Active	NSW
JUHLIN	Christopher	Active	WA
LAMB	Peter	Active	NSW
LOVIBOND	Roderick	Active	SA
MacLEOD	Ian	Associate	CANADA
MILBURN	Darcy	Associate	QLD
MILLER	Lyndon	Student	SA
MUMMERY	Robert	Active	CANADA
NEWLAND	Andrew	Active	NSW
OWERS	Matthew	Associate	NSW
PAUL	Sudhir	Student	SA
RHETER	Horst	Active	Germany
RIGOTI	Augustinho	Student	SA
SCHWARTZ	Tibor	Active	NT

SWEENEY	Denis	Active	QLD
SWIRIDIUK	Peter	Associate	VIC
VOLARIC	John	Associate	NSW
WANSTEDT	Stefan	Student	Sweden
WATKINS	Antony	Student	VIC
WEST	Richard	Active	USA
YU	Gang	Student	NSW
ZIOLKOWSKI	Anton	Active	Nethnds.

All of the above new members should already be recorded on each State Branch database.

New Member Details

The following new members' details need to be added to the relevant State Branch database:

Mr DAVID ANNETTS (Student)
9 San Remo Place
Dural NSW 2158
Tel: (02) 651 1597

DAVID BUSH (Associate)
P.T. Geoservices
Jalan Taman Matraman Timur No 11
Jakarta Pusat 10320

LAURA COCEANCIC (Student)
5 Sybil St
Eastwood
Sydney NSW 2122
Tel: 804 7884

RICHARD COXON (Student)
Hawthorn Vincent Road
Kurrajong NSW 2758

JOHN DONOHUE (Student)
98 Stephen Street
Toowoomba QLD 4350

JULIE FISHER (Student)
15/7 Meadow Crescent
Meadowbank NSW 2114
Tel: 807 2896

SUZANNE GODESAR (Student)
35 Mandolong Rd
Mosman NSW 2088
Tel: 969 3082

DEAN GRAVES (Student)
1163 Old Northern Road
Dural NSW 2158
Tel: (02) 651 1353

RONALD HACKNEY (Student)
62 Hawkins St
COOMA NSW 2630

ROBERT KING (Active)
Santos Limitd
39 Grenfell St
Adelaide SA 5000
Tel: (08) 224 7606

MICHAEL McDONNELL (Active)
BHPR-ML
PO Box 264
Clayton VIC 3168
Tel: (03) 566 7440

DAVID ORMEROD (Associate)
Petrofina Australia SA
Exploration Dpt
Level 2, 476 St Kilda Rd
Melbourne VIC 3004
Tel: (03) 867 7999

RAYMOND SEIKEL
4 Morden Court
Nunawading VIC 3131
Tel: (03) 878 1079

MICHAEL SYLVIA-SHERRIE (Active)
111 Payne Street
Indooroopilly QLD 4068
Tel: 343 2194

Dr RICK VALENTA
c/- Department of Earth Sciences
Monash University
Clayton VIC 3168
Tel: (03) 565 5774

ROBERT WALKER (Active)
19 Carnaby Street
MacGregor QLD 4109
Tel: (07) 343 7974

ALAN WILLOCKS (Active)
Department of Industry
PO Box 173
East Melbourne VIC 3001
Tel: (03) 412 7862

Change of Address

WILLIAM AMANN
From: Billiton Australia
14 Walker Ave, West Perth WA 6005
To: 1 Carruthers Road
Mt Pleasant WA 6153

CHRIS ANDERSON
From: C Anderson & Associates
15 Ising Rd, Crafers SA 5152
To: c/- Placer Exploration Ltd
69 King William Street
Kent Town SA 5067

RONALD ATKINS
From: Works Corporation
58 Buckley Rd
Wellington 3, New Zealand
To: Works Technical Services Ltd
same address

ROBERT COOPER

From: SE Exploration Pty Ltd
Strathpine QLD 4500
To: 41 Knight Street
Rosedale Sth, Brisbane QLD 4123

AMANDA BUTT

From: Newmont Australia
Newmarket QLD 4051
To: Newmont Australia
Level 2, John Oxley Centre South
339 Coronation Drive
Milton QLD 4064

ROBERT ELIOT-LOCKHART

From: 27 Brockway Rd, Graylands WA 6010
To: 1 Spring Street
Melbourne VIC 3000

RENE ENDERS

From: 66 Smith St, Yagoona NSW 2199
To: c/- Aussat
GPO Box 1512
Sydney NSW 2001

GARY FALLON

To: c/- Carpentaria Exploration Co
Star Gully, Mt Isa Mines
Mt Isa QLD 4825

DAVID FARQUHAR-SMITH

From: Geopeko
PO Box 234, Cloverdale WA 6105
To: PO Box 1171
Cloverdale WA 6105

TOM KERR

From: 18 Knebworth Ave, Perth WA 6000
To: 32 Walsley St
Mt Lawley WA 6050

ANDREW McGEE

From: 8 West St, Evandale SA 5069
To: c/- Santos Limited
101 Grenfell St
Adelaide SA 5000

MIKE SEXTON

From: Newmont Australia
339 Coronation Drive, Milton QLD 4064
To: Newcrest Mining Ltd
PO Box 1367
MILTON QLD 4064

M. SHALLEY

To: 1/40 Cambridge Street
Red Hill QLD 4059

N. SHEARD

From: c/- Carpentaria Exploration Company
Star Gully, Mt. Isa Mines, Mt. Isa QLD 4825
To: 4 Barbara Street
Mt Isa QLD 4825

Dr K SUNDARALINGAM

To: 77 Camelot Drive
Glen Waverley VIC 3150

F. LINDEMAN

To: c/- Western Mining Corp
PO Box 157
Preston VIC 3072

Prof. GERARD SUTTON

From: PO Box 123
Wollongong NSW 2500
TO: University of Wollongong
PO Box 1144
Wollongong NSW 2500

ANDREW SUTHERLAND

From: Schlumberger Seaco
North Sydney NSW 2059
To: Level 3, 312 St Kilda Road
Melbourne VIC 3000

DAVID WILSON

From: 6 Read Street, Tullah TAS 7321
To: 112 Strickland Avenue
South Hobart TAS 7004

DAVID JONES

To: 8 High Street
Inverell N.S.W. 2360

ROBERT MAHONY

To: Systems Engineering - R.S.Phys.S.
Australian National University
GPO Box 4
Canberra ACT 2601

BRIAN MINTY

From: 3 Souter Place, Weston ACT 2611
To: 11 Molvig Street
Weston ACT 2611

Dr IAN FERGUSON

From: University of Toronto
To: University of Manitoba - Geological Sciences
Winnipeg Manitoba R3T2N2 CANADA

ROBERT PICKERING

From: Bridge Oil Ltd
60 Margaret St
Sydney NSW 2000
To: 255 Elizabeth St
Sydney NSW 2000

MIKE LONGERGAN

From: Gas & Fuel Exploration
Melbourne VIC 3000
To: c/- Oil Company of Australia
GPO Box 148
Brisbane QLD 4001

LYNDON R MILLER

From: GPO Box 498, Adelaide SA 5001
To: 24 Norbury Crescent
City Beach WA 6015

PAUL O'DONNELL

From: 71-77 Penshurst St, Willoughby NSW 2068
To: 8 Bimbil Avenue
Mt Colah, NSW 2079