



EXTRACTIVE INDUSTRY GEOLOGY

CONFERENCE 1989

**INCORPORATING A ONE DAY PROGRAMME ON
GEOPHYSICS AND THE EXTRACTIVE INDUSTRY**

**16TH TO 19TH APRIL 1989
UNIVERSITY OF BIRMINGHAM
ENGLAND**

Co-sponsored by:

**THE INSTITUTION OF GEOLOGISTS
THE GEOLOGICAL SOCIETY
THE INSTITUTION OF MINING AND METALLURGY
MINERAL INDUSTRY RESEARCH ORGANISATION**

EXTRACTIVE INDUSTRY GEOLOGY CONFERENCE

GENERAL INFORMATION

The 1989 Extractive Industry Conference has been sponsored by the Institution of Geologists, the Geological Society, the Institution of Mining and Metallurgy and the Mineral Industry Research Organisation and was organised by a joint committee. As in previous years, one of the sponsors has undertaken an executive role in the Conference organisation and this time it has been the turn of IG.

The Organising Committee would like to thank Tarmac for their support.

TRADE EXHIBITION

There is a trade exhibition associated with the Conference which will be held in the two rooms where tea and coffee is served, and in the foyer outside the Haworth Lecture Theatre. Please consult the list of Exhibitors for further information. There is also a Poster Exhibition, details of which appear with the list of Exhibitors

CAR PARKING

Car parking facilities are available on the campus and delegates are asked to use the designated areas. Car parking is also available at Lake Hall of Residence.

BADGES

All delegates to the Conference will be issued with badges when they register.

Members of the organising committee will have red stickers on their badges and will be pleased to answer any queries you may have.

MEALS AND REFRESHMENTS

Morning coffee and afternoon tea will be served during conference breaks in areas adjacent to the Haworth lecture theatre. Luncheon will be served in the cafeteria at University Centre.

Delegates will be issued with lunch tickets on registration. These are to be handed in at the cafeteria. Each day has been given a different colour lunch ticket as follows:

Monday	-	Pink
Tuesday	-	Blue
Wednesday	-	Yellow

PROGRAMME OF MEETINGS

Session 1 - Chairman: Dr W L Barrett

Welcoming speech by Prof D D Hawkes (Birmingham University)

0930 - 1000	The ballymoney lignite development hydrogeological and geotechnical studies	D M Finlayson and D W Hight
1000 - 1030	Geological and geotechnical controls on operational planning at Ingleton Quarry	A Sloan, A C Lumsden, S R Hencher and R I Onions
1030 - 1100	Applications of modern rock mechanics principles to the design and analysis of large open pits and associated structures	J P Harrison and J A Hudson

1100 - 1130 COFFEE

Session 2 - Chairman: Dr E L Boardman

1130 - 1200	The supply and training of professionals for industry	R Harrison
1200 - 1230	Coal in Ayrshire - an opencast future	P A Dryburgh and P I Watkinson
1230 - 1300	The outlook for opencast coal mining	R Proctor

1300 - 1415 LUNCH

Session 3 - Chairman: Dr J D Mather

1415 - 1445	A hydrogeological survey to investigate the influence of a proposed quarry extension on ground water levels in an adjacent marshland designated as an SSSI	J P Dumble, A C D Groves and Q G Palmer
1445 - 1515	A hydrogeological assessment of the impact of proposed sand and gravel extraction on an adjacent ecologically sensitive floodplain environment - a case study	A J Dixon, R B Bradford, D M Cooper, C R Reeve and D K Tucker
1515 - 1545	The application of geostatistics to optimise borehole spacing	M K G Whateley

1545 - 1615 TEA

Session 4 - Chairman: Prof A Dunham

1615 - 1645	The durability of the Bath building stone	J H F Sedman and S L Barlow
1645 - 1715	Laboratory evaluation of aggregates - a review of recent changes in specifications	A H Marsh, B J Brown, P Mellon and S A S Smart
1715 - 1745	Compositional uniformity of some UK sand and gravel aggregates for concrete	I Sims and B Miglio

Session 5 - Chairman: Dr B D'Olier

<u>0900 - 0930</u>	Dredging of marine sand and gravel - the industry's contribution	R A Fox
<u>0930 - 1000</u>	Dredging of marine sand and gravel - Crown Estate Contribution	F G Parrish
<u>1000 - 1030</u>	Geological investigations for marine aggregates offshore East Anglia	D J Harrison and D A Ardus
<u>1030 - 1100</u>	Marine dredged aggregates - the public sector role	P Bide
1100 - 1130	<u>COFFEE</u>	

Session 6 - Chairman: Prof G R Davis

<u>1130 - 1200</u>	Selection of aggregate resources and production for the construction of Mount Pleasant Airport, East Falkland	D R Roberts and G C O'Hara
1200 - 1230	Outburst prediction and prevention - a multi-disciplinary approach	P Styles, S Emsley and E A McInairnie
<u>1230 - 1300</u>	A combination of cross-impact, economic and financial assessments of sand and gravel extraction	P Holroyd, J C Mullett and J S Halliday
1300 - 1415	<u>LUNCH</u>	

Session 7 - Chairman: Mr D R Parry

<u>1415 - 1445</u>	Environmental assessment - the geological perspective	J M Boldon
1445 - 1515	A geographic information system toolkit for geological applications and mineral extraction environmental impact assessment	T E Beaumont and P Sobczynski
<u>1515 - 1545</u>	Hydrogeological and geotechnical aspects of environmental impact assessment	P M Collison, A C Vosper and S J M Forson
1545 - 1615	<u>TEA</u>	

Session 8 - Chairman: Dr G Walton

1615 - 1640	The stability of backfill at a South Wales opencast coal site: a case study	G I Jones
<u>1640 - 1705</u>	A quarry face design in Etruria Marl	J H Whittle
<u>1705 - 1730</u>	The design of rock slopes in a structurally complex opencast coal mine	C P Nathanail, D A Earle and B F Miglio
<u>1730 - 1755</u>	Development of New Cliffe Hall Quarry - a geotechnical case study	M A Croxall and D I Harris

ONE DAY PROGRAMME ON GEOPHYSICS AND
THE EXTRACTIVE INDUSTRY

Session 1 - Chairman: Dr B Doody

0930 - 0950	Inter-borehole resistivity and IP studies at the massive Cu-Zn-Au sulphide deposit at Gairloch, NW Scotland	A Bowker and T Evans
<u>0950 - 1010</u>	Application of geophysical methods to sand and gravel assessment	J D Cornwell, B Cannell and D M McCann
1010 - 1030	Investigations of industrial mineral deposits using Ground Probing Radar	J M Glover, P J Leggo and A J Wright
<u>1030 - 1050</u>	The detection of problematic cavities in a hard rock quarry	S Penn
1050 - 1120	<u>COFFEE</u>	

Session 2 - Chairman: Dr A Mussett

<u>1120 - 1140</u>	Shallow reflection surveys and examples	K Davies
1140 - 1200	A shallow reflection seismic survey over a lignite deposit in Northern Ireland	I A Hill, S Mansbridge and D Morris
<u>1200 - 1220</u>	Electrical imaging and examples of its application	D H Griffiths and R D Barker
1220 - 1240	The measurement and interpretation of complex impedance data	H Holstein and B Williams
<u>1240 - 1300</u>	Limestone quality control using EM and resistivity surveys	D A Hopkins
1300 - 1400	<u>LUNCH</u>	
1400 - 1700	<u>Demonstrations of the following geophysical techniques:</u> Ground conductivity (Geonics, HM31, EM34) Shallow seismic reflection <u>Electrical imaging</u> Offset sounding RAS-1 Resonance Analysis System Ground radar	

ABSTRACTS OF PAPERS

Session 1 - Chairman: Dr W L Barrett

THE BALLYMONEY LIGNITE DEVELOPMENT - HYDROGEOLOGICAL AND GEOTECHNICAL STUDIES by D M Finlayson (Hydrotechnica) and D W Hight (GCG)

This paper describes the field investigations and studies carried out to assess the hydrological and geotechnical aspects of a large opencast lignite mine at Ballymoney, Co Antrim, Northern Ireland.

The planned development is to extract 120 Mt of brown coal from an excavation to depths of greater than 200 metres. Slopes will be constructed through boulder clay and tertiary sequences of the Lough Neagh Clay series.

The paper describes investigations into surface water hydrology, hydrogeology and the geotechnical properties of materials. Extensive water pressure control measures were allowed for, and the relationship between groundwater control and slope stability is discussed in detail. Limit equilibrium analyses are presented using the "Residual Factor" to allow for progressive failure, and the implications for factors of safety discussed.

The paper also deals with the impact of the dewatering on the adjacent Ballymoney township.

GEOLOGICAL AND GEOTECHNICAL CONTROLS ON OPERATIONAL PLANNING AT INGLETON QUARRY

by A Sloan (Golder Associates), S R Hencher (University of Leeds)
and R I Onions (ARC Ltd)

Production from Ingleton greywacke of high quality aggregate suitable for wearing course is restricted by a combination of unfavourable geological and geotechnical conditions at Ingleton quarry. The greywacke is interbedded with slate and isoclinally folded. Working along the strike is restricted by the location between river and main road, and relocation of the quarry up-valley to a nearby area of greywacke outcrop would be both expensive and difficult because of the situation within a National Park. The alternative is to work deeper but this increases the likelihood of discontinuities daylighting in the slopes with the consequence of large scale slope failure.

Detailed geotechnical investigations of the complex discontinuity pattern at the quarry and determinations of shear strength by a combination of field study and sophisticated laboratory testing are discussed. These data are used to assess stability in different parts of the quarry so that operational planning can be optimised to enable economic extraction of proven reserves within the present quarry boundaries. In particular, the stability assessment is shown to be crucial to the design and location of haul roads and the location of quarry plant.