

CONFERENCE OFFICIALS

Organised by the National Building Research Institute of the Council for Scientific and Industrial Research under the guidance of the Organising Committee for the Conference on Alkali-Aggregate Reaction in Concrete.

Conference Chairmen:

A E Jubber	(Session 1)
W Schrämlí	(Session 2)
J P Skalny	(Session 3)
P A Myburgh	(Session 4)
R E Oberholster	(Session 5)
M A Vasarhelyi	(Session 7)
C P Marais	(Session 8)
C Liebenberg	(Session 9)
P E Grattan-Bellew	(Session 10)
S Diamond	(Session 11)
J E Gillott	(Session 12)

Conference Secretary: R E Oberholster

Conference Secretariat: Mrs M Swart

Organising Committee:

D E Davis (Chairman)
A Hemp
A E Jubber
D le Sar
P Loudon
C P Marais
L R Marais
M F Mitchell
R E Oberholster
M A Vasarhelyi

Editor: R E Oberholster

Rapporteurs:

M P Brandt
J E Krüger
J A P Laurie
J H P van Aardt

Excursion commentators:

J C Flanagan
K E Putterill
R E Oberholster
C J Semmclink

Discussion panel members:

C Liebenberg (Chairman)
G E Blight
D E Davis
J C Flanagan
C R Freeme
H E Vivian
R E Oberholster

Sponsors:

Cape Provincial Administration, Department of Roads.
Darling and Hodgson Industrial Holdings Ltd.
Hippo Quarries Ltd
Murray and Roberts Ltd
National Building Research Institute
National Transport Commission
South African Cement Producers Association
Slagment Ltd

Paper 11	A contribution to the determination of the potential alkali reactivity of aggregates from the Tygerberg Formation	S252/11
Paper 12	A review of thirty years of investigation of the alkali-aggregate reaction in New Zealand	S252/12
Paper 13	The application and reliability of standard testing procedures for potential alkali reactivity	S252/13
Session 6:	Excursion : visit to affected structures	EX 1-3
	Commentators: J C Flanagan, PCI, Cape Town K E Putterill, NBRI, Cape Town R E Oberholster, NBRI, Pretoria C J Semmelink, NITRR, Pretoria	
Session 7:	Appraisal, prevention and rehabilitation	
Paper 14	A working appraisal of alkali-aggregate reaction in concrete	S252/14
Paper 15	The effects of alkali-aggregate reaction in reinforced concrete structures made with Witwatersrand Quartzite aggregate	S252/15
Paper 16	The relevance of research on alkali-aggregate reactions to precautions in contemporary engineering practice	S252/16
Paper 17	Alkali-aggregate reaction : practical preventive and remedial measures	S252/17
Paper 18	Alkali-silica reaction in Great Britain - a review	S252/18
Paper 19	Field survey of the extent of cracking and other details of concrete structures showing deterioration due to alkali-aggregate reaction in the South Western Cape Province	S252/19
Session 8:	Alkali-aggregate reaction in concrete pavements	
Paper 20	Evaluation of a concrete pavement affected by the alkali-aggregate reaction using a heavy vehicle simulator	S252/20
Paper 21	Rehabilitation analysis of a road pavement cracked by alkali-aggregate reaction	S252/21

CONTENTS

	Page
Introduction (on yellow paper)	
List of Authors	viii-xviii
List of Delegates	xviii-xxix
Session 1: Opening	
Address of welcome Prof V L Granger	xxviii
Opening address Prof T L Webb	xix-xxvii
NOTE: Written papers on white paper : recorded discussion on yellow paper.	
Keynote address Dr D E Davis	S252
Session 2: Role of alkalis in cement manufacturing	
Paper 1 Alkalis in clinker : origin, chemistry, effects	S252/1
J P Skalny and W Klemm.	
Paper 2 Alkali reduction in cement kilns	S252/2
J Svendsen.	
Paper 3 The implications of producing a low alkali ordinary Portland cement in the South Western Cape	S252/3
D E Damp.	
Session 3: Influence of alkalis on the properties of cement and concrete	
Paper 4 Alkalies in clinker: Influence on cement and concrete properties	S252/4
J Gebauer*	
Paper 5 Alkalies in cement	S252/5
H E Vivian.	
Session 4: Alkali-aggregate reaction in concrete : occurrence and manifestation	
Paper 6 Canadian experience of alkali expansivity in concrete	S252/6
P E Grattan-Bellew.	
Paper 7 Reaction between cement and artificial glass in concrete	S252/7
J W Figg.	
Paper 8 Alkali-aggregate reaction in South Africa - a review	S252/8
R E Oberholster.	
Session 5: Testing for potential reactivity of aggregates and cements	
Paper 9 A review of test methods for alkali-aggregate expansivity of concrete aggregates	S252/9
P E Grattan-Bellew.	
Paper 10 The alkali-aggregate reaction : a contribution concerning the determination of the reactivity of Portland cements	S252/10
M P Brandt, R E Oberholster and W B Westra.	

* This symbol after an author's name indicates that a substantial amendment of, or amplification to, the written paper has been included in the discussion.

Session 12: Petrographic and electron microscopic examination of aggregates and concrete

Paper 34	Alkali-carbonate reactions in concrete A B Poole.	S252/34
Paper 35	The alkali-aggregate reaction - concrete microstructural evolution M Regourd, H Hornain and P Poitevin.	S252/35
Paper 36	Undulatory extinction in quartz used for identifying potential alkali-reactive rocks L Dolar-Mantuani*. Statistical evaluation of minimum sample number for thin section analysis Dr A Vander Voet	S252/36
Paper 37	Characteristics and service record of commonly used South African aggregates W Coull.	S252/37
Closure:	Prof T L Webb	C 1-5
Paper 32	The use of fly ash and granulated blastfurnace slag to reduce expansion due to alkali-aggregate reaction P J Nixon and M E Gaze. (This paper was not read at the Conference.)	S252/32

Session 9: Panel discussion: Practical applications of research findings

Chairman: Dr C Liebenberg
 Panel: Prof G E Blight
 Dr D E Davis
 J C Flanagan
 Dr C R Freeme
 H E Vivian
 Dr R E Oberholster

PD 1-6

Session 10: Alkali-aggregate reaction mechanisms

Paper 22	On the physics and chemistry of alkali-silica reactions S Diamond, R S Barneyback Jr and L J Struble.	S252/22
Paper 23	The chemistry of alkali-aggregate reactions L S D Glasser and N Kataoka.*	S252/23
Paper 24	Theoretical and practical research on the alkali-silica reaction U Ludwig.*	S252/24
Paper 25	Continuing studies of alkali-aggregate reactions in concrete J E Gillott and R J Beddoes.	S252/25
Paper 26	Influence of the amount of mixing water on the alkali-silica reaction D Lenzner.	S252/26
Paper 27	Pop-outs due to alkali-silica reaction - a moisture problem? L-O Nilsson.	S252/27
Paper 28	The effect of drying on reactive aggregate and mortar expansions H E Vivian.	S252/28

Session 11: Mineral admixtures and the prevention of alkali-aggregate reaction

Paper 29	About the cause of the resistance of blastfurnace cement concrete to the alkali-silica reaction R F M Bakker.	S252/29
Paper 30	Expansion due to alkali-silica reaction and the influence of pulverised fuel ash D W Hobbs.*	S252/30
Paper 31	The effectiveness of mineral admixtures in reducing expansion due to alkali-aggregate reaction with Malmsbury Group aggregates R E Oberholster and W B Westra.	S252/31
Paper 38	Studies on the rate and extent of reaction between calcium hydroxide and pulverised fuel ash F G Buttler, S R Morgan and E J Walker.*	S252/38
Paper 33	The use of flyash in Cape Town RMC operations B D C Johnson.	S252/33

Special discussion session (including contribution from Haraldur Asgeirsson)

SD 1,2

Chairman: Prof S Diamond, Purdue University, USA.

**ALPHABETICAL LIST OF
PARTICIPANTS**

ALLEN, R T L
M A (Cantab), Queens College, Cambridge; FICE; FIHE; FIOB.

Chief Advisory Engineer, South West Region, Cement and Concrete Association, Great Britain, since 1964.

1946-64 Worked with various engineers and contractors, on sites and in design offices.



BAKKER, R F M
D Sc (Organic Chemistry), Groningen (NL), 1961; MICT, London, 1972; D Sc (Physical Science), Aachen (W Germany), 1980.

Researcher, Stichting Betonresearch van de Nederlandse Cementindustriën (BNC).

1963-65 Research at Centrale Suikermatschappij, Amsterdam.

1965-70 Research in paint industry, Ten Horn, Maastricht.

1970 Research in applications of cement and concrete.



BLIGHT, G E
Ph D, London, 1961; D Sc (Eng) 1974.

Professor of Construction Materials, University of the Witwatersrand, Johannesburg.



BRANDT, M P
B Sc (Physics) (Hons), Wedel, 1963.

Researcher, Inorganic Materials Division, National Building Research Institute, CSIR, Pretoria since 1971.

1963-71 Researcher at the National Physical Research Laboratory, CSIR.

1971 Joined the National Building Research Institute.



**ALFABETIESE LYS VAN
DEELNEMERS**

ALLEN, R T L
M A (Cantab), Queens College, Cambridge; FICE; FIHE; FIOB.

Sedert 1964 adviserende hoofingenieur, Suidwestelike Streek, Sement- en Betongenootskap, Groot Brittannie.

1946-64 Saam met verskeie ingenieurs en kontrakteurs gewerk, sowel op boupersele as in ontwerp kantore.

BAKKER, R F M
D Sc (Organiese Chemie), Groningen (Nederland), 1961; MICT, Londen, 1972; D Sc (Natuurwetenskap), Aken (Wes-Duitsland), 1980.

Navorsing, Stigting vir Betonnavorsing van die Nederlandse Sementnywerhede.

1963-65 Navorsing by die Sentrale Suikermatskappy, Amsterdam.

1965-70 Navorsing in die verfnywerheid, Ten Horn, Maastricht.

1970 Begin met huidige navorsing oor die aanwending van sement en beton.

BLIGHT, G E
Ph D, Londen, 1961; D Sc (Ing) 1974.

Professor in Konstruksiemateriale, Universiteit van die Witwatersrand, Johannesburg.

BRANDT, M P
B Sc (Fisika) (Hons), Wedel, 1963.

Navorsing; Afdeling Anorganiese Materiale, Nasionale Bounavorsingsinstituut, WNNR, Pretoria sedert 1971.

1963-71 Navorsing, Nasionale Fisiese Navorsingslaboratorium, WNNR.

1971 Sluit aan by die Nasionale Bounavorsingsinstituut.

ALPHABETICAL LIST OF AUTHORS/ALFABETIESE LYS VAN OUTEURS

Name/Naam	Paper/Referaat	Name/Naam	Paper/Referaat
Allen, R T L	18	Ludwig, Prof U	24
Bakker, Dr R F M	29	McIver, Prof J R	15
Barneyback, R S	22	Morgan, S R	38
Beddoes, R J	25	Nillson, Prof L O	27
Blight, Prof G E	15	Nixon, P J	32
Brandt, M P	10 & 11	Oberholster, Dr R E	8, 10, 11 & 31
Buttler, Dr F G	38	Poitevin, P	35
Coull, W	37	Poole, Dr A B	34
Damp, D E	3	Regourd, Dr M	35
Davis, Dr D E	Keynote address/Hoofrede	Rimmer, R	15
Diamond, Prof S	22	Shackel, B	20
Dolar-Mantuani, Dr L	36	Schnitter, S O	21
Figg, J W	7	Schutte, W R	15
Flanagan, J C	17	Semmelink, C J	19
Freeme, Dr C R	20	Sims, Dr I	13
Gaze, M E	31	Skalny, Dr J P	1
Gebauer, Dr J	4	Smith, L M	12
Gillott, Prof J E	25	St John, D A	12
Glasser, Dr L S D	23	Strauss, Dr P J	21
Granger, Prof V L	Welcome/Verwelkoming	Struble, L J	22
Grattan-Bellew, Dr P E	6 & 9	Svendsen, J	2
Hobbs, Dr D W	30	Van der Walt, N	21
Hornain, H	35	Vivian, H E	5, 14 & 28
Idorn, Dr G M	16	Walker, E J	38
Johnson, B D C	33	Webb, Prof T L	Opening address/Openingsrede Closure/Afsluiting
Kataoka, N	23	Westra, W B	10, 11 & 31
Kennerley, R A	12		
Klemm, W	1		
Lenzner, D	26		

DAVIS, D E

B Sc (Civil Eng), University of the Witwatersrand, 1947; Ph D (Eng), University of the Witwatersrand, 1976.

Director, Portland Cement Institute, Johannesburg.

- 1947 In municipal service.
- 1955 Worked as a civil engineering contractor.
- 1957 Did civil engineering work at AECI.
- 1959 Joined PCI.
- 1970 Director PCI.

**DAVIS, D E**

B Sc (Siviele Ing), Universiteit van die Witwatersrand, 1947; Ph D (Ing), Universiteit van die Witwatersrand, 1976.

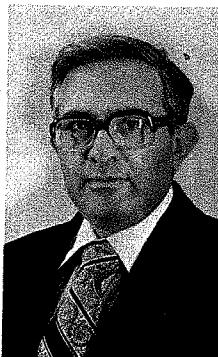
Direkteur, Portlandsementinstituut, Johannesburg.

- 1947 In diens van plaaslike owerhede.
- 1955 Werksaam as kontrakteur vir siviele ingenieurswerke.
- 1957 Het siviele ingenieurswerke by AECI onderneem.
- 1959 Sluit by die Portlandsementinstituut aan.
- 1970 Direkteur van die Instituut.

DIAMOND, S

Ph D, Purdue University, 1963.

Professor of Engineering Materials, Purdue University, U S A.

**DIAMOND, S**

Ph D, Universiteit Purdue, 1963.

Professor in Ingenieursmateriale, Universiteit Purdue, V S A.

DOLAR-MANTUANI, L

Dipl Ph; Ph D, University of Ljubljana, Yugoslavia, 1935; P Eng of Ontario, 1966; Specialist - Construction Materials, Ass Prof (Eng), Ontario, 1976.

Consultant petrographer, Toronto.

- 1937-40 Lecturer in Petrography, University of Ljubljana.
- 1940-45 Assistant professor, University of Ljubljana.
- 1949-50 Research Fellow, University of British Columbia.
- 1950-52 Consultant Petrographer, Vancouver, BC.
- 1952-71 Petrographer at Structural Research Department, Research Division of Hydro Electric Power Commission of Ontario, Toronto.
- 1971 Consultant Petrographer, Ministry of Natural Resources, Toronto, Ontario; National Research Council of Canada.

**DOLAR-MANTUANI, L**

Dipl Ph; Ph D, Universiteit van Ljoebljana, Joego-Slawië, 1935; P Ing van Ontario, 1966. Spesialiseer in konstruksiemateriale, Medeprofessor (Ing), Ontario, 1976.

Raadgewende petrograaf, Toronto.

- 1937-40 Lektor in petrografie, Universiteit van Ljoebljana.
- 1940-45 Assistent-professor, Universiteit van Ljoebljana.
- 1949-50 Navorsingsbeurshouer, Universiteit van Brits-Columbia.
- 1950-52 Raadgewende petrograaf, Vancouver, BC.
- 1952-71 Petrograaf by die Departement Strukturele Navorsing, Afdeling Navorsing van die Kommissie vir Hidroëlektriese Krag van Ontario, Toronto.
- 1971 Raadgewende Petrograaf, Ministerie van Natuurlike Hulpbronne, Toronto, Ontario; Nasionale Navorsingsraad van Kanada.

BUTTLER, F G

Ph D, Aberdeen, 1958; MRIC, 1954.

Principal lecturer, Teesside Polytechnic, Middlesbrough, Cleveland, England.

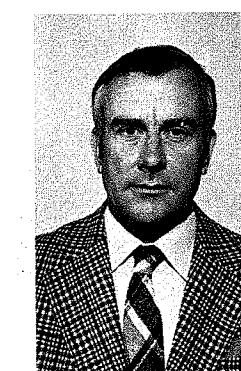
- 1948-52 Fuel Research Station.
- 1952-54 Agricultural Research Council.
- 1954-56 English Clays Lovering Pochin & Co Ltd.
- 1956-60 Aberdeen University.
- 1960-80 Teesside Polytechnic.

**BUTTLER, F G**

Ph D, Aberdeen, 1958; MRIC, 1954.

Hooflektor, Teesside Polytechnic, Middlesbrough, Cleveland, Engeland.

- 1948-52 Brandstofnavorsingstasie.
- 1952-54 Landbounavorsingsraad.
- 1954-56 English Clays Lovering Pochin & Co Ltd.
- 1956-60 Die Universiteit van Aberdeen.
- 1960-80 Teesside Polytechnic.

**COULL, W A**

B Sc (Geologie), Universiteit van die Witwatersrand, 1962.

Betrokke by die ontwikkeling van produkte, Hippo Quarries Bpk, Johannesburg.

- 1964-66 Mynbougeoog in die goudmynbedryf.
- 1966-78 Geoloog in die sement- en klipbreekbedryf.
- 1978-81 Betrokke by die ontwikkeling van produkte in die klipbreekbedryf.

**DAMP, D E**

B Sc (Chemistry), University of Cape Town, 1951; MSACI.

Manager, Technical Services, Cape Portland Cement Co, Cape Town.

- 1952-56 Chemical Works Superintendent, AECI, Somerset West.
- 1956-57 Chemist, Roan Antelope Copper Mines, Luanshya, Zambia.
- 1957-59 Chemist.
- 1959-64 Works Chemist.
- 1965-70 Works Manager.
- 1971-74 Assistant Manager, Technical Services and Development.
- 1974-80 Manager, Chemical Services.
- 1980 Manager, Technical Services.

Bestuurder, Tegniese Dienste, Cape Portland Cement Maatskappy, Kaapstad.

- 1952-56 Superintendant, Chemiese Werke, AECI, Somerset-Wes.
- 1956-57 Chemikus, Kopermyn Roan Antelope, Luanshya, Zambia.
- 1957-59 Chemikus.
- 1959-64 Bedryfschemikus.
- 1965-70 Bedryfsleier.
- 1971-74 Assistant-bestuurder, Tegniese Dienste en Ontwikkeling.
- 1974-80 Bestuurder, Chemiese Dienste.
- 1980 Bestuurder, Tegniese Dienste.

GILLOTT, J E

B Sc, 1951; Ph D, University of Liverpool, 1954; M Sc, 1956; D Sc (Eng), University of London, 1977.

Professor at University of Calgary, Canada.

1954-57 H M Geological Survey, London.
1958-70 National Research Council of Canada.
1970 University of Calgary.

**GILLOTT, J E**

B Sc, 1951; Ph D, Universiteit van Liverpool, 1954; M Sc, 1956; D Sc (Ing), Universiteit van Londen, 1977.

Professor by Universiteit van Calgary, Kanada.

1954-57 H M Geologiese Opmame, Londen.
1958-70 Nasionale Navorsingsraad van Kanada.
1970 Universiteit van Calgary.

GLASSER, L S D

B A (Cantab), 1953; Ph D, Aberdeen, 1957;
D Sc, Aberdeen, 1972.

Reader, Department of Chemistry, University of Aberdeen, Scotland.

1953-54 Scientist, J Lyons & Co.
1954-57 Assistant, Aberdeen University.
1957-59 Post Doctoral Fellow, Pennsylvania State University.
1959-65 Research Fellow, University of Aberdeen.
1965-80 Lecturer, Senior Lecturer.
1980 Reader, Department of Chemistry, University of Aberdeen.

**GLASSER, L S D**

B A (Cantab), 1953; Ph D, Aberdeen, 1957;
D Sc, Aberdeen, 1972.

Dosent, Departement van Chemie, Universiteit van Aberdeen, Skotland.

1953-54 Wetenskaplike, J Lyons & Kie.
1954-57 Assistant, Universiteit van Aberdeen.
1957-59 Post-doktorale genoot, Universiteit van Pennsilvanië.
1959-65 Navorsingsbeurshouer, Universiteit van Aberdeen.
1965-80 Lektor, Senior Lektor.
1980 Dosent, Departement van Chemie, Universiteit van Aberdeen.

GRANGER, V L

B Sc (Eng), Cape Town, 1938; Ph D, Cape Town, 1949; Pr Eng; FICE; F I Mun E; FSAICE; F Inst H E; F Zwe I E.

Dean of the Faculty of Engineering, University of Cape Town.

Consulting Engineer, Rhodesia.
Founded first Materials testing laboratory which later formed the nucleus of the Standards Laboratories - Rhodesia.
1963-64 First Scientific Adviser to the Southern Rhodesian Government.
First Chairman of the Rhodesian National Housing Advisory Council.
Founder member and Chairman of the Central African Standards Association.
1964 Left Rhodesia for Cape Town as Senior Assistant City Engineer.

**GRANGER, V L**

B Sc (Ing), Kaapstad, 1938; Ph D, Kaapstad, 1949; Pr Ing; GICI; GI Mun W; GSAIC; GIHI; F Zwe I E.

Dekaan van die Fakulteit Ingenieurswese, Universiteit van Kaapstad.

Raadgewende Ingenieur, Rhodesiës.
Stig die eerste laboratorium vir materiaaltoetsing wat later die kern geword het van die Laboratorium vir Standaarde van Rhodesië.
1963-64 Eerste wetenskaplike radgewer van die regering van Suid-Rhodesië.
Eerste voor sitter van die Nasionale Behuisingsadviesraad van Rhodesië.
Stigterslid en voor sitter van die Standaardevereniging van Sentral-Afrika.
1964 Vertrek uit Rhodesië na Kaapstad om senior assistent-stadsingenieur te word.

FIGG, J W

C Chem FRSC, 1973; MICT, 1979; FI Ceram, 1979; F I Corr T, 1980.

Head of Chemical Department, Harry Stanger Ltd, England.

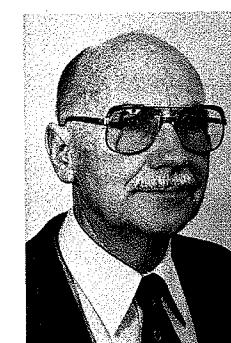
Senior Scientific Officer, Building Research Station, England.
Senior Advisory Chemist, Cement and Concrete Association, Great Britain.

**FIGG, J W**

C Chem FRSC, 1973; MICT, 1979; FI Ceram, 1979; F I Corr T, 1980.

Hoof van die Departement Chemie, Harry Stanger Bpk, Engeland.

Senior Wetenskaplike Beampte, Building Research Station, Engeland.
Senior Raadgewende Chemikus, Sement- en Betongenootskap, Groot Brittannie.

**FLANAGAN, J C**

Pr Ing; LICI; LSAICL.

Streekdirekteur, Wes-Kaaplandse, Portland cementinstituut.

Konstruksie van die Lughawe D F Malan, Kaapstad.
Tegniese Assistent, Eiendomsmaatskappy, Vanderbijlpark.
Assistent-ingenieur, Stadsraad van Germiston.
Assistent-ingenieur by die Assistent-stadsingenieur.

**FREEME, C R**

B Sc (Hons), University of Cape Town, 1963;
Ph D (Civil Eng) University of Natal, 1972;
Pr (Eng), 1972; Fellow of EASA.

Head, Pavement Engineering Group, National Institute for Transport and Road Research, CSIR, Pretoria.

1962 Research Officer, NITRR, CSIR, Pretoria.
1973 Head, Bituminous Materials Group, NITRR, CSIR, Pretoria.
1978 Head, Pavement Engineering Group, NITRR, CSIR, Pretoria.

FREEME, C R

B Sc (Hons), Universiteit van Kaapstad, 1963;
Ph D (Siviele Ing), Universiteit van Natal, 1972; Pr Ing (1972); Genoot van EASA.

Hoof van die Plaveiselingenieursgroep, Nasionale Instituut vir Vervoer- en Padnavorsing, WNNR, Pretoria.

1962 Navorsingsbeampte, NIVPN, WNNR, Pretoria.
1973 Hoof van die Bitumenmaterialegroep, NIVPN, WNNR, Pretoria.
1978 Hoof van die Plaveiselingenieursgroep, NIVPN, WNNR, Pretoria.

**GEBAUER, J**

M Sc (Analytical Chemistry), Komensky University, 1958; Ph D, Slovak Academy, 1965.

Head of Cement Application Group, 'Holderbank' Management and Consulting Ltd, Switzerland.

1965 Institute for Technical Testing in Civil Engineering for Building Materials, Czechoslovakia.
1971 Physical Ceramics Laboratory at Lehigh University, U.S.A.
1972 With 'Holderbank' Management and Consulting Ltd.

GEBAUER, J

M Sc (Analitiese Chemie), Universiteit Komensky, 1958; Ph D, Slowaakse Akademie, 1965.

Hoof van die Sementtoepassingsgroep, 'Holderbank' Management & Consulting Ltd, Switzerland.

1965 Instituut vir die Toets van Boumateriale in die Siviele Ingenieurswese, Tsjecko-Slowakye.
1971 Laboratorium vir Fisiiese Keramiek, Universiteit Lehigh, V.S.A.
1972 By 'Holderbank' Management & Consulting Ltd.

JOHNSON, B D G

B Sc (Civil Eng), University of Western Australia, 1948; Pr Ing.

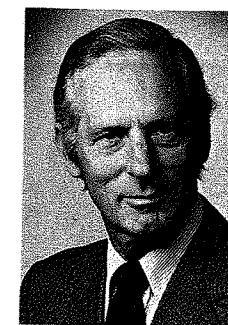
Managing Director, Ready Mixed Concrete (Cape) (Pty) Ltd.

1952-54 Hydrological Survey, New Guinea, Senior Engineer.

1954-56 Concrete Laboratory and RMC Plant Operation and Erection Engineer.

1956-61 Civil Engineering Construction and Maintenance, AE and CI; Modderfontein Dynamite Factory, Head of Civil Department.

1961 Design Erection and Maintenance of RMC Plants; Management of RMC Company - Manager, Director and then Managing Director.

**JOHNSON, B D G**

B Sc (Siviele Ing), Universiteit van West-Australië, 1948; Pr Ing.

Besturende Direkteur, Ready Mixed Concrete (Cape) (Edms) Bpk.

1952-54 Hidrologiese Opname, Nieu-Guinee, Senior Ingenieur.

1954-56 Betonlaboratorium en Bedryfs- en Oprigtingsingenieur, RMC-aanleg.

1956-61 Siviele Ingenieurskonstruksie en onderhoud, AE en CI; Ploffstoffabriek Modderfontein, Hoof Afdeling Siviele Ingenieurswese.

1961 Ontwerp, oprigting en onderhoud van RMC-aanlēe; Bestuur van die RMC-maatkappy - Bestuurder, Direkteur en later Besturende Direkteur.

GRATTAN-BELLEW, P E

B Sc, University College, Dublin, 1957; MSc, McGill University, Montreal, 1963; Ph D, Cambridge University, 1969.

Associate Research Officer in Materials Science, Division of Building Research, National Research Council, Canada.

1957-60 Diamond Exploration Geologist, De Beers, South West Africa.

1963-64 Diamond Exploration, Liberian Swiss Mining Corporation, Liberia.

1964-65 Diamond Exploration Selection Trust, London and Mali.

1969 SELCO of Toronto, diamond exploration.

1970 Cochenour Williams Gold Mines base Metal Exploration.

1971 Division of Building Research, National Research Council of Canada.

GRATTAN-BELLEW, P E

B Sc, University College, Dublin, 1957; M Sc, Universiteit McGill, Montreal, 1963; Ph D, Universiteit Cambridge, 1969.

Mede-navorsingsbeampte in Materialeer, Afdeling Bounavorsing, Nasionale Navorsingsraad van Kanada.

1957-60 Diamanteksporasiegeoloog, De Beers, Suidwes-Afrika.

1963-64 Diamanteksporasie vir die Liberian Swiss Mining Corporation, Liberië.

1964-65 Diamanteksporasie, Selection Trust, Londen en Mali.

1969 SELCO van Toronto, diamanteksporasie.

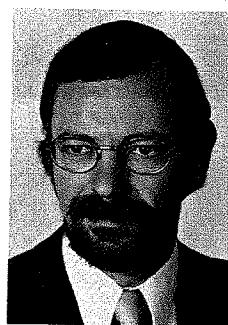
1970 Eksplorasie vir basismetale, Cochenour Williams Gold Mines.

1971 Afdeling Bounavorsing, Nasionale Navorsingsraad van Kanada.

**LENZNER, D**

Dipl Phys, Rheinisch-Westfälische Technische Hochschule, Aachen, 1972.

Research Officer at Rheinisch-Westfälische Technische Hochschule.

**LENZNER, D**

Dipl Fisika, Rheinisch-Westfälische Technische Hochschule, Aachen, 1972.

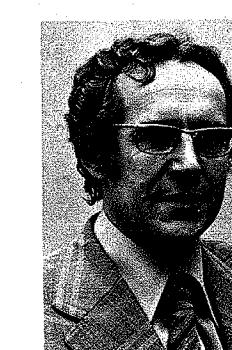
Navorsingsbeampte by die Rheinisch-Westfälische Technische Hochschule.

HOBBS, D W

B Sc (Physics), University of Southampton, 1958; Ph D, University of Surrey, 1973; F Inst P, 1967.

Principal Research Scientist, Cement and Concrete Association, Great Britain.

1958-68 Rock mechanics research, Mining Research Establishment, National Coal Board.

**HOBBS, D W**

B Sc (Fisika), Universiteit van Southampton, 1958; Ph D, Universiteit van Surrey, 1973; F Inst P, 1967.

Hoofnavorsingsbeampte, Sement- en Betongenoootskap, Groot Brittannie.

1958-68 Navorsing in rotsmeganika, Stigting vir Mynnavorsing, Nasionale Steenkoolraad.

LUDWIG, U

Dipl Ing, 1956; Dr Ing, 1961; habil 1967.

Professor at Rheinisch-Westfälische Technische Hochschule, Aachen.

Field of study covers cement, lime, gypsum, building ceramics, raw materials - recovery and application.

**LUDWIG, U**

Dipl Ing 1956; Dr Ing 1961; habil 1967.

Professor by Rheinisch-Westfälische Technische Hochschule, Aachen, 1972.

Studieveld dek sement, kalk, gips, boukeramiek, grondstowwe - herstel en aanwending.

IDORN, G M

M Sc (Civil Eng), Technical University of Denmark, 1943; D Sc, Technical University of Denmark, 1967.

President, G M Idorn Consult ApS.

1945-53 Chief Residential Engineer at sites in W Jutland Maritime Works of Danish government.

1953-60 Research and senior research officer, Danish National Building Research Institute, Denmark.

1957-61 Lecturer, Materials Technology, Danish Academy of Engineers.

1960-72 Director of Research, Concrete Research Laboratory Karlstrup, Aalborg Portland.

1972-76 Director of Research and Development, Aalborg Portland.

1976-79 Manager of new ventures, Aalborg Portland.

1979 Consultant, Research and Development, affiliation: G M Idorn Consult ApS, President.

**IDORN, G M**

M Sc (Siviele Ing), Tegniese Universiteit van Denemarke, 1943; D Sc, Tegniese Universiteit van Denemarke, 1967.

Hoof, G M Idorn Consult ApS

1945-53 Hoof-resident-ingenieur by seewerke van die Deense regering in Wes-Jutland.

1953-60 Navorsings- en Senior Navorsingsbeampte, Deense Nasionale Bounavorsingsinstituut.

1957-61 Dosent in Materialeteknologie, Deense Ingenieursakademie.

1960-72 Direkteur van Navorsing, Betonnavorsingslaboratorium, Karlstrup, Aalborg Portland.

1972-76 Direkteur van Navorsing en Ontwikkeling, Aalborg Portland.

1976-79 Bestuurder van nuwe ondernemings, Aalborg Portland.

1979 Hoof van die konsultfirma G M Idorn Consult ApS, wat raad gee oor navorsing en ontwikkeling.

NILSSON, L-O

M Sc, Lund Institute of Technology, 1972; Ph D, Lund Institute of Technology, 1980.

Research Assistant, Division of Building Materials, University of Lund, Sweden.

**NILSSON, L-O**

M Sc, Instituut vir Tegnologie, Lund, 1972; Ph D, Instituut vir Tegnologie, Lund, 1980.

Navorsingsassistent, Afdeling Boumateriale, Universiteit van Lund, Swede.

SIMS, I
B Sc, London, 1972; Ph D, London, 1977;
C Eng, 1979; M IM M, 1979; FGS, 1972.

Assistant-controller of Laboratory Services,
Messrs Sandberg, London.

1975-76 Graduate Assistant, Messrs Sandberg.
1976-80 Industrial Geologist, Messrs Sandberg.



SKALNY, J P
Dipl Ing, Prague, 1958; Dr Technical Science,
Krakow, 1965.

Assoc Director, Construction Materials, Martin
Marietta Laboratories, Baltimore, U S A.

1972-73 Research Scientist.
1973-74 Senior Research Scientist.
1974-76 Head of the Cement Group Chemistry
Department.
1976-78 Manager, Cement Department.
1978 Associate Director.



ST JOHN, D A
Associateship of New Zealand Institute of
Chemistry, 1966.

Scientist, Chemistry Division, DSIR, New
Zealand.

Chemist and petrographer with the Chemistry
Division, Inorganic Materials Section on
cementitious materials.



SVENDSEN, J
M Sc, Technical University of Denmark, 1967.

Process Engineer, F L Smidh & Co, Denmark.
1967-80 Chemical research, cement plant
operation, commissioning and process engineering
at F L Smidh & Co.



SIMS, I
B Sc, Londen, 1972; Ph D, Londen, 1977;
C Ing, 1979; M IM M, 1979; FGS, 1972.

Assistent-kontroleur van laboratoriumdienste,
Mnre Sandberg, Londen.

1975-76 Nagraadse assistent, Mnre Sandberg.
1976-80 Nywerheidsgeoloog, Mnre Sandberg.

SKALNY, J P
Dipl Ing, Praag, 1958; Dr Tegniese Wetenskap,
Krakow, 1965.

Mededirekteur Konstruksiemateriale, Martin
Marietta-laboratoriums, Baltimore, V S A.

1972-73 Navorsingsbeampte.
1973-74 Senior navorsingsbeampte.
1974-76 Hoof van die Departement Chemie se
Sementgroep.
1976-78 Bestuurder, Sementdepartement.
1978 Mededirekteur.

POOLE, A B
B Sc, Nottingham, 1959; D Phil, Oxford,
1962.

Senior Lecturer, Queen Mary College, Uni-
versity of London.

1962-63 Research Demonstrator, University
College of Wales, Swansea.
1963 Lecturer and Senior Lecturer, Queen
Mary College, University of London.

REGOURD, M
D Sc (Physical Science), University of Paris,
1964.

Head of Microstructures Department, CERILH,
Paris, France.

Attached to the Laboratory of Physics of
Solids, University of Paris, till 1976.
1976 Centre d'Etudes et de Recherches de
l'Industrie des Licens Hydrauliques.
1978 Associate Professor of Building Ma-
terials, National School of Roads and Bridges,
Paris.

SEMMLINK, C J
B Sc (Agric Eng), Pretoria University, 1964;
B Sc (Civil Eng) (Hons), Pretoria University,
1967; M Sc (Civil Eng), Pretoria University,
1976; MBA, Pretoria University, 1979; Pr Eng.

Senior Chief Research Officer, National Insti-
tute for Transport and Road Research, CSIR,
Pretoria.

Engineering Assistant in Bridge Design Section
at consulting engineers.
Engineer in Department of National Roads
(Department of Transport).
Engineer in Road Design Division at consult-
ing engineers.
Lecturer in Civil Engineering, Engineering
Faculty, University of Pretoria.
Researcher at NITRR, CSIR, Pretoria.

OBERHOLSTER, R E
B Sc (Landbou), Universiteit van Pretoria,
1956; M Sc (Landbou), Universiteit van
Pretoria, 1958; D Sc (Landbou), Universi-
teit van Pretoria, 1966.



OBERHOLSTER, R E
B Sc (Landbou), Universiteit van Pretoria,
1956; M Sc (Landbou), Universiteit van
Pretoria, 1958; D Sc (Landbou), Universi-
teit van Pretoria, 1966.

Senior Hoofnavorsingsbeampte, Nasionale Bou-
navorsingsinstituut van die WNNR, Pretoria.

1956-58 Assistentbeampte vakkundig, De-
partement van Landbou, Pretoria.
1958-60 Dosent, Departement Grondkunde,
Universiteit van Pretoria.
1960-69 Senior Lektor, Departement Grond-
kunde, Universiteit van Pretoria.
1976 Ereprofessor, Departement Grond-
kunde, Universiteit van Pretoria.



POOLE, A B
B Sc, Nottingham, 1959; D Phil, Oxford, 1962.

Senior lektor, Queen Mary College, Universiteit
van Londen.

1962-63 Laboratoriumassistent, Universiteits-
kollege van Wallis, Swansea.
1963 Lektor en senior lektor, Queen Mary
College, Universiteit van Londen.



REGOURD, M
D Sc (Natuurwetenskap), Universiteit van
Parys, 1964.

Hoof van die Departement Mikrostrukture,
CERILH, Parys, Frankryk.

Verbonde aan die Laboratorium vir die Fisika
van Vastestowwe, Universiteit van Parys, tot
1976.

1976 Centre d'Etudes et de Recherches de
l'Industrie des Licens Hydrauliques.
1978 Associate Professor in boumateriale, Na-
sionale Skool vir Paaie en Brûe, Parys.



SEMMLINK, C J
B Sc (Agric Eng), Universiteit van Pretoria,
1964; B Sc (Ing Siviel) (Hons), Universiteit van
Pretoria, 1967; M Sc (Ing Siviel), Universiteit
van Pretoria, 1976; MBA, Universiteit van
Pretoria, 1979; Pr Ing.

Senior Hoofnavorsingsbeampte, Nasionale Insti-
tuit vir Vervoer- en Padnavorsing, WNNR,
Pretoria.

Ingenieursassistent in brugontwerpseksie by
raadgewende ingenieurs.
Ingenieur in Afdeling Nasionale Paaie (De-
partement van Vervoer).
Ingenieur in padontwerpafdeling by raad-
gewende ingenieurs.
Dosent in siviele ingenieurswese in die Fakul-
teit Ingenieurswese van die Universiteit van
Pretoria.
Navorser by NIVPN, WNNR, Pretoria.

LIST OF DELEGATES

Mr R T L ALLEN
(Author)
Chief Advisory Engineer
S W Region
Cement and Concrete Association
67 Park Place
CARDIFF CF1 3AS
United Kingdom

Mr P J ASHER
Darling & Hodgson
P O Box 4682
DURBAN
4000

Mr W H ASHFORD
Slagment Limited
P O Box 31157
BRAAMFONTEIN
2017

Dr R F M BAKKER
(Author)
Stichting B N C
P O Box 3231
5203 DE 's-HERTOGENBOSCH
The Netherlands

Mr W R BARKER
Darling & Hodgson
P O Box 41104
CRAIGHALL
2024

Mr C O BARNES
Cape Provincial Administration
Roads Department
P O Box 2603
CAPE TOWN
8000

Mr P G BARR
P G Barr & Partners
45 United Bldg
Lady Grey Street
PAARL
7646

Mr V De BENEDICTUS
Assistant Director
Canfarge R & D
8300 PIE IX Blvd
Montreal
QUEBEC
Canada
H17 3T6

Mr M BENN
Slagment Ltd
P O Box 31157
BRAAMFONTEIN
2017

Mr I M BENNIE
S A B S
Private Bag X191
PRETORIA
0001

Mr A E BERRINGTON
Anglo Alpha Limited
P O Box 6810
JOHANNESBURG
2000

Mr G J BICKLEY
ESCOM
P O Box 1091
JOHANNESBURG
2000

Mr C D BILLETT
D & H Ash Resources
P O Box 41104
CRAIGHALL
2024

Prof G E BLIGHT
(Author)
University of the Witwatersrand
1 Jan Smuts Ave
JOHANNESBURG
2001

Mnr M P BRANDT
(Rapporteur en Outeur)
NBNI
Posbus 395
PRETORIA
0001

Mr T BRINDLE
W R Grace
9 Fountain Road
Eastleigh
EDENVALE
1610

Mr L BRUYN
Anglo Alpha Limited
P O Box 6810
JOHANNESBURG
2000

VAN DER WALT, N
B Sc (Civil Eng), University of Stellenbosch.

Assistant Chief Engineer (Materials), Department of Transport, Pretoria.

1960-65 South West Africa Roads Department: Windhoek, Okahandja and Otjiwarongo.
1965-70 Regional Engineer, Orange Free State Roads Department: Kroonstad.
1970-73 Materials Engineer, Roads Department, Bloemfontein.
1973-76 Consulting Engineer, Johannesburg.
1976 Assistant Chief Engineer (Materials), Department of Transport, Pretoria.



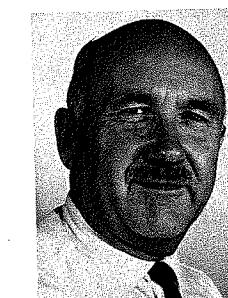
VAN DER WALT, N
B Sc (Siviele Ing), Universiteit van Stellenbosch.

Assistent-hoofingenieur (Materiale), Departement van Vervoer, Pretoria.

1960-65 Paaiedepartement van Suidwes-Afrika: Windhoek, Okahandja en Otjiwarongo.
1965-70 Streekingenieur, Paaiedepartement van die Oranje-Vrystaat: Kroonstad.
1970-73 Materiale-ingenieur, Paaiedepartement, Bloemfontein.
1973-76 Konsultingenieur, Johannesburg.
1976 Assistent-hoofingenieur (Materiale), Departement van Vervoer, Pretoria.

VIVIAN, H E
B Sc (Landbou), Universiteit van Sydney, 1941.

Senior Hoofnavorsingsbeampte, CSIRO, Australië. (Afgetree op 1/2/80.)

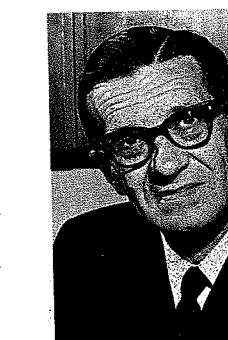


VIVIAN, H E
B Sc (Agric), University of Sydney, 1941.

Senior Principal Research Scientist, CSIRO, Australia. (Retired on 1/2/80.)

Assistant Chief Chemist, Standard Portland Cement Co Ltd, Charbon, New South Wales. Chemist, Small Arms Factory, Lithgow, New South Wales.

Assistent-hoofchemikus, Standard Portland Cement, Charbon, Nieu-Suid-Wallis. Chemikus, Kleingeweerfabriek, Lithgow, Nieu-Suid-Wallis.



WEBB, T L
B Sc, Universiteit Rhodes; D Sc (cum laude), Universiteit van Pretoria.

Professor Extraordinarius, UNISA, Pretoria.

Navorsingsbeampte, verskillende range, Nasionale Bounavorsingsinstituut van die WNNR, Pretoria.

1959-80 Direkteur, NBNI, WNNR, Pretoria.

Dr C R FREEME
 (Author)
 NITRR
 P O Box 395
 PRETORIA
 0001

Dr J GEBAUER
 (Author)
 'Holderbank' Management & Consulting Ltd
 CH-5113 Holderbank
 SWITZERLAND

Mr H B GENADE
 Cape Provincial Administration
 Roads Department
 P O Box 2603
 CAPE TOWN
 8000

Prof J E GILLOTT
 (Author & Chairman: Session 12)
 University of Calgary
 Calgary
 ALBERTA
 Canada
 T2N 1N4

Dr L S DENT GLASSER
 (Author)
 Univ of Aberdeen
 Dept of Chemistry
 OLD ABERDEEN AB9 2UE
 Scotland

Mr S GOERTZEN
 Concor Construction
 P O Box 8259
 JOHANNESBURG
 2000

Mr A D GRAHAM
 Hippo Quarries
 P O Box 60
 MILNERTON
 7435

Mr K B GRAHAM
 Quarryman (Pty) Ltd
 P O Box 7124
 PORT ELIZABETH
 6000

Prof V L GRANGER
 (Author)
 University of Cape Town
 Private Bag
 RONDEBOSCH
 7700

Dr P E GRATTAN-BELLEW
 (Author)
 Div of Building Research
 NRC Montreal Rd
 OTTAWA
 Canada

Mnr C GROBBELAAR
 Direktoraat Waterwese
 Privaatsak x313
 PRETORIA
 0001

Mr P GROBBELAAR
 VISKOR
 P O Box 539
 CAPE TOWN
 8000

Mr J E GUY
 S A Piled Foundations (Pty) Ltd
 P O Box 720
 ISANDO
 1600

Mr A J HAY
 c/o Design Branch
 City Engineer's Department
 P O Box 4323
 JOHANNESBURG
 2000

Mr A HEMP
 (Organising Committee)
 Murray & Roberts Quarries
 P O Box 34
 EERSTERIVIER
 7100

Mr J S HIGH
 Escom
 P O Box 1091
 JOHANNESBURG
 2000

Dr D W HOBBS
 (Author)
 Cement & Concrete Association
 Wexham Springs
 SLOUGH
 UK SL3 6PL

Mr J HORSFIELD
 Ready Mixed Concrete (Cape)
 P O Box 139
 PAARDEN EILAND
 7420

Mr E J BULLOCK
 Cape Quarries Associated
 P O Box 98
 MILNERTON
 7435

Mr W R BURKE
 D & H Ash Resources
 P O Box 41104
 CRAIGHALL
 2024

Dr F G BUTTLER
 (Author)
 Teesside Polytechnic
 Middlesbrough
 CLEVELAND TS1 3BA
 England

Mnr W D CLAASSEN
 Direktoraat Landvervoer
 Dept van Vervoer
 Posbus 415
 PRETORIA
 0001

Mr W A COULL
 (Author)
 Hippo Quarries Limited
 P O Box 6810
 JOHANNESBURG
 2000

Mr D E DAMP
 (Author)
 Cape Portland Cement Co
 P O Box 1067
 CAPE TOWN
 8000

Dr D E DAVIS
 (Author and Chairman of
 Organising Committee)
 Portland Cement Institute
 P O Box 168
 HALFWAY HOUSE
 1685

Mr A G DELL
 Steffen Robertson & Kirsten
 P O Box 6824
 ROGGEBAAI
 8012

Prof S DIAMOND
 (Author & Chairman: Session 11)
 Purdue University
 School of Civil Engineering
 LAFAYETTE IN 47907
 USA

Dr L DOLAR-MANTUANI
 (Author)
 1442 Lawrence Avenue
 W Apt 1214
 TORONTO Ont M6L 1B5
 Canada

Mr D B DU PLESSIS
 VISKOR
 P O Box 539
 CAPE TOWN
 8000

Mr G A DU TOIT
 K F D Wilkinson & Partners
 7th Floor, United House
 Heerengracht
 CAPE TOWN
 8001

Mr D M EGAN
 Cement Sales (Pty) Ltd
 P O Box 2802
 CAPE TOWN
 8000

Mr W ELLIS
 Jones & Wagener Inc
 P O Box 1434
 RIVONIA
 2178

Mr S J W FERREIRA
 LTA Civil Engineering
 P O Box 551
 KEMPTON PARK
 1620

Mr J W FIGG
 (Author)
 Harry Stanger Ltd
 Fortune Lane
 ELSTREE WD6 3HQ
 England

Mr J C FLANAGAN
 (Author & Commentator)
 Portland Cement Institute
 P O Box 12
 VRIJZEE
 7495

Mr M G FRARA
 Hippo Quarries Ltd
 P O Box 6810
 JOHANNESBURG
 2000

Dr D Le SAR
 (Organising Committee)
 Pretoria Portland Cement
 P O Box 31181
BRAAMFONTEIN
 2017

Mr D LENZNER
 (Author)
 Institut für Gesteinshüttenkunde
 RWTH Aachen
 Mauerstr 5
 5100 AACHEN
 West Germany

Mr D R LESTER
 Vianini Pipes
 P O Box 127
 KUILSRIVER
 7580

Mr G LEVY
 Anglo Alpha Group
 P O Box 6810
JOHANNESBURG
 2000

Dr A C LIEBENBERG
 (Voorsitter: Sessie 9)
 Liebenberg & Stander
 Posbus 4733
KAAPSTAD
 8000

Mr Z LIMBADA
 E P Cement Co
 P O Box 2016
PORT ELIZABETH
 6000

Mr E G LINDSAY
 Squirrels Nook
 78 Newlands Ave
NEWLANDS
 7700

Mnr G F LOEDOLFF
 Universiteit Stellenbosch
 Fakulteit van Ingenieurswese
STELLENBOSCH
 7600

Mr T D LONGRIGG
 K F D Wilkinson & Partners
 7th Floor
 United House
 Heerengracht
CAPE TOWN
 8001

Dr P A LOUDON
 (Organising Committee)
 Van Niekerk, Kleyn & Edwards
 ICL House
 Hertzog Boulevard
CAPE TOWN
 8001

Prof U LUDWIG
 (Author)
 Institut für Gesteinshüttenkunde
 RWTH Aachen
 Mauerstr 5
 5100 AACHEN
 West Germany

Mr A A MACKENZIE
 Pretoria Portland Cement
 P O Box 7
SLURRY
 Western Transvaal
 2895

Mr S MAKOVY
 Pretoria Portland Cement Co Ltd
 P O Box 40073
CLEVELAND
 JOHANNESBURG
 2022

Dr C P MARAIS
 (Organising Committee & Chairman: Session 8)
 NITRR
 P O Box 395
PRETORIA
 0001

Mr J MATEJKA
 Anglo Alpha Ltd
 P O Box 6810
JOHANNESBURG
 2000

Prof J R McIVER
 (Author)
 Witwatersrand University
 Geology Dept
 1 Jan Smuts Ave
JOHANNESBURG
 2001

Mr C B MITCHELL
 Mitchell, du Plessis Associates
 P O Box 6241
ROGGEBAAI
 8012

Mr T J MORGAN
 Watermeyer, Legge, Piesold & Uhlmann
 P O Box 31176
BRAAMFONTEIN
 2017

Mr F Le R HUGO
 VISKOR
 P O Box 539
CAPE TOWN
 8000

Dr G M IDORN
 (Author)
 G M Idorn Consult Aps
 Tovesvej 1413
NAERUM
 Denmark

Mr B JELLEY
 Sales Manager
 Ready Mixed Concrete (Cape)
 P O Box 139
PAARDEN EILAND
 7420

Mr J JOANNOU
 Jeffares & Green
 P O Box 31043
BRAAMFONTEIN
 2017

Mr B D G JOHNSON
 (Author)
 Ready Mixed Concrete
 (Cape) (Pty) Ltd
 P O Box 139
PAARDEN EILAND
 7420

Mr C F JONES
 Pretoria Portland Cement
 P O Box 405
PRETORIA
 0001

Mr A E JUBBER
 (Organising Committee)
 Hippo Quarries Ltd
 P O Box 6810
JOHANNESBURG
 2000

Mr J G C KELLY
 Cape Portland Cement Co
 P O Box 1067
CAPE TOWN
 8000

Dr R J KELLY
 Blue Circle Cement (Pty) Ltd
 P O Box 2484
JOHANNESBURG
 2000

Mnr D A KENNEDY
 Direktoraat Landvervoer
 Dept van Vervoer
 Posbus 415
PRETORIA
 0001

Mr J KIMMEL
 Dept of Post & Telecommunications
 Private Bag X74
PRETORIA
 0001

Mr S B KIPPS
 Van Niekerk, Kleyn & Edwards
 ICL House
 Hertzog Boulevard
CAPE TOWN
 8001

Mr J J KIRKNESS
 C M O (Pty) Ltd
 Private Bag 31336
BRAAMFONTEIN
 2017

Mr C N J KLEYNHANS
 Van Niekerk, Kleyn & Edwards
 ICL House
 Hertzog Boulevard
CAPE TOWN
 8001

Mr A KOK
 Hippo Quarries Ltd
 P O Box 6810
JOHANNESBURG
 2000

Dr J E KRUGER
 (Rapporteur)
 NBNI WNNR
 Posbus 395
PRETORIA
 0001

Mr R KRUGER
 CSP
 CSIR
 P O Box 395
PRETORIA
 0001

Mnr J A P LAURIE
 (Rapporteur)
 Ass Directeur
 NBNI WNNR
 Posbus 395
PRETORIA
 0001

Mr C M REDELINGHUYSEN
Anglo Alpha Cement
P O Box 6810
JOHANNESBURG
2000

Dr M REGOURD
(Author)
C E R I L H
23 Rue de Gronstadt
75015 PARIS
France

Mr A RIDGE
Geustyn, Forsyth & Joubert
P O Box 413
STELLENBOSCH
7600

Mr R RIMMER
(Author)
City Health Dept
c/o Laboratory & Technical Services
P O Box 1477
JOHANNESBURG
2000

Mr E W ROSENKRANZ
Anglo-Alpha Ltd
P O Box 6810
JOHANNESBURG
2000

Dr A J ROSSOUW
Pretoria Portland Cement Co Ltd
P O Box 40073
CLEVELAND
JOHANNESBURG
2022

Mr P ROSSOUW
Chief Civil Engineer
S A R & H
Room 504
Huis Vrystaat
JOHANNESBURG
2001

Mr E F P ROWE
Slagment Ltd
P O Box 31157
BRAAMFONTEIN
2017

Mr F E SCHIE
Anglo Alpha Technical Services
P O Box 6810
JOHANNESBURG
2000

Mr O SCHNITTER
(Author)
Bruinette, Kruger & Stoffberg
P O Box 3173
PRETORIA
0001

Mr W A SCHOON
Liebenberg & Stander Consulting
Engineers
P O Box 4733
CAPE TOWN
8000

Dr W SCHRÄMLI
(Chairman : Session 2)
Holderbank Management & Consulting Ltd
5113 HOLDERBANK
Switzerland

Mr W K SCHUTTE
(Author)
Soderlund & Schutte Inc
Consulting Engineers
5th Floor, Kine Centre
141 Commissioner Street
JOHANNESBURG
2001

Mr W R SCURR
Palment
P O Box 9730
JOHANNESBURG
2000

Mr R F SEARLE
Anglo Alpha Cement
P O Box 6810
JOHANNESBURG
2000

Mr C V SEDDON
Ninham Shand Inc
P O Box 1347
CAPE TOWN
8000

Mr C J SEMMELINK
(Author & Commentator)
NITRR
P O Box 395
PRETORIA
0001

Mr A C SHEARMAN
D & H Quarries
P O Box 1
HONEYDEW
Transvaal
2040

Mr A R MORRIS
City Engineer's Department
c/o Roads and Works
P O Box 4323
JOHANNESBURG
2000

Mnr E M MORRISON
Kantoor van die Eerste Minister
Privaatsak X213
PRETORIA
0001

Mr M J MOUNTAIN
M J Mountain & Associates
Vineyard Centre
Vineyard Road
CLAREMONT
7700

Dr R J MURRAY
Blue Circle Research Industries Ltd
Research Division
305 London Road
Greenhithe
KENT
DA9 9JQ ENGLAND

Mr P A MYBURGH
(Chairman - Session 4)
Cape Provincial Administration
Roads Department
P O Box 2603
CAPE TOWN
8000

Mr T M NEMETH
Murray & Roberts Ltd
M & R Research & Development
P O Box 8218
ELANDSFONTEIN
1406

Dr L-O NILSSON
(Author)
Univ of Lund
Lund Inst of Technology
Div of Build Materials
P O Box 725
S-220 07 LUND
Sweden

Dr R E OBERHOLSTER
(Outeur, Voorsitter: Sessie 5
en Kommentator)
NBNI
Posbus 395
PRETORIA
0001

Dr E OTTE
Van Wyk & Louw
Posbus 905
PRETORIA
0001

Mr E F B PAARMAN
Cement Sales (Pty) Ltd
P O Box 2802
CAPE TOWN
8000

Dr J D PARKINSON
New Civil Engineer
Institution of Civil Engineers
LONDON England

Mr H C PAROLIS
Jeffares & Green
201 Shell Court
Main Road
MOWBRAY
7700

Mr G V PATERSON
Ove Arup
P O Box 3228
CAPE TOWN
8000

Mr H G PETERS
Hippo Quarries Ltd
P O Box 6810
JOHANNESBURG
2000

Mr P POITEVIN
(Author)
Spie-Batignolles
13, av Morane-Saulnier
78140 VELIZY
France

Dr A B POOLE
(Author)
University of London
Queen Mary College
Mile End Road
LONDON E1 4NS
England

Mr K E PUTTERILL
(Commentator)
NBRI Regional Officer
601 Saambou Building
Castle Street
CAPE TOWN
8001

Mr A D VAN DOORNUM
Pretoria Portland Cement
P O Box 40073
CLEVELAND
2022

Mr E H J VAN RENSBURG
Murray & Roberts
P O Box 4853
CAPE TOWN
8000

Mr M A VASARHELYI
Murray & Roberts
P O Box 1000
BEDFORDVIEW
2008

Mr H E VIVIAN
7 Dewrang Crescent
Blackburn
VICTORIA
Australia
3130

Mr H WALKER
Clifford Harris (Pty) Ltd
P O Box 3622
CAPE TOWN
8000

Mr R K WALKER
NBRI, CSIR
P O Box 395
PRETORIA
0001

Prof T L WEBB
(Author)
School of Business Leadership
Unisa
P O Box 392
PRETORIA
0001

Mr R W E WEBER
General Manager
Hippo Quarries
P O Box 3861
DURBAN
4000

Dr B L WIID
Steffen, Robertson & Kirsten
20 Anderson Street
P O Box 8856
JOHANNESBURG
2000

Mr E V A WISE
B S Bergman & Partners Inc
P O Box 6458
ROGGEBAAI
8012

Mr K WOOD
Slagment Ltd
P O Box 31157
BRAAMFONTEIN
2017

Mr J R C YATES
Steffen, Robertson & Kirsten Inc
20 Anderson Street
JOHANNESBURG
2001

Mr J D YOUNG
Slagment Ltd
P O Box 31157
BRAAMFONTEIN
2017

Dr I SIMS
(Author)
Messrs Sandberg
40 Grosvenor Gardens
LONDON SW1W 0LB
UK

Dr J P SKALNY
(Author and Chairman: Session 3)
Martin Marietta Laboratories
1450 S Rolling Road
BALTIMORE
MD 21227
USA

Mr C J SMETHERHAM
Embecon S A (Pty) Ltd
P O Box 338
CLAREMONT
7735

Mr D A St JOHN
(Author)
D S I R - N Z
Chemistry Div
Private Bag
PETONE
New Zealand

Mr R J STALLEBRASS
Concor
P O Box 186
KUILS RIVER
7580

Mr P J STRAUSS
(Author)
Bruinette, Kruger & Stoffberg Inc
P O Box 3173
PRETORIA
0001

Mr P K STRAUSS
Blue Circle Products (Pty) Ltd
P O Box 231
HENNEMAN
9945

Mr J SVENDSEN
(Author)
F L Smidt
Vigerslev Alle 77
DK-2500 VALBY
DENMARK

Mev A M SWART
(Konferensiesekretariesc)
NBNI
Posbus 395
PRETORIA
0001

Mr B K TURNER
Dept of Civil Engineering
University of Natal
King George V Ave
DURBAN
4001

Mnr J H P VAN AARDT
(Ere-Afgevaardigde)
NBNI
Posbus 395
PRETORIA
0001

Mr G H VAN ALPHEN
Hawkins, Hawkins & Osborn
P O Box 6503
ROGGEBAAI
8012

Mr G M VAN DEN BERG
Rossway Quarries
P O Box 214
HALFWAY HOUSE
1685

Mr A M VAN DER COLFF
Murray & Roberts
P O Box 1000
BEDFORDVIEW
2008

Mr C P VAN DER MERWE
Uhlmann, Witthaus & Prins
P O Box 6433
ROGGEBAAI
8012

Dr D H VAN DER MERWE
Bruinette, Kruger & Stoffberg
Posbus 3173
PRETORIA
0001

Mr W J VAN DER MERWE
Kantey & Templer
P O Box 3132
CAPE TOWN
8000

Mr G J R VAN DER MEULEN
Robert Leslie & Partners
P O Box 4585
CAPE TOWN
8000

Mr N VAN DER WALT
(Author)
Dept of Transport
P O Box 415
PRETORIA
0001