

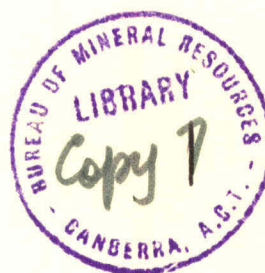
1970/73
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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record No. 1970 / 73



Mineral Resources Branch
Summary of Activities
1970

The information contained in this report has been obtained by the Department of National Development as part of the policy of the Commonwealth Government to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology & Geophysics.



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HEADQUARTERS

The staff position remained fairly satisfactory throughout the year although little progress eventuated during the period in relation to the proposed expansion of the Mineral Economics and Mining Engineering Sections. The year began with two professional vacancies in the Branch and finished with three; a Petroleum Technologist and a Chemist at the beginning and two Petroleum Technologists and a Mineral Economist at the end. During the year the Branch lost one Mineral Economist, one Petroleum Technologist and one Mining Engineer, but recruited a Chemist and a Mineral Economist; in addition, one Mineral Economist transferred as a Mining Engineer to the Mining Engineering Section.

With further expansion of the mineral industry in Australia the workload on the Mineral Economics Section increased and a reduction of effective staff to five during the middle of the year made more exacting the production of the Annual for 1969. However, the Annual was further improved by additional coverage in Part 1, the General Review, and wider use of photographs as illustrations and the system of providing pre-prints of chapters was extended to include nine chapters plus the General Review. Quarterly Reviews appeared fairly well on time throughout the year. Production of the Petroleum Newsletter and Petroleum Titles Map and notes produced by the Petroleum Technology Section continued throughout the year. With the appointment of the second Chemist, the laboratory group dealing with petroleum chemistry is now fully staffed, the backlog of analyses of cores and gases is being reduced and two lines of research on the genesis of petroleum are well under way.

Special projects by ad hoc teams within the Branch continued satisfactorily and Branch commitments in the investigation of possible production of zirconium in Australia were completed. Work on mineral processing in Australia continued during the year and data on this subject will now appear regularly in the Annual Review. Of particular interest during the year was the commencement of the inventories of Australian mineral resources, designed as a long-term project to cover all major mineral resources in Australia. The first inventory, that of black coal, should be completed about the end of the year by a team consisting of a Mining Engineer and a Mineral Economist and a similar inventory on tin resources features in the 1971 programme.

Important matters dealt with during the year included discussions with the Bureau of Census and Statistics and with State Mines Departments on problems of the new integrated census and particularly of those involved in the continued collection of ex-mine values. With good cooperation by the Bureau of Census and Statistics, problems arising from changes in the census are gradually being solved or ameliorated so that the Bureau can continue fairly satisfactorily to document the mineral industry of Australia on a calendar year basis.

A number of inter-departmental committees were attended during the year, particularly those dealing with mineral processing, the McArthur River project, mining legislation both in the Northern Territory and that dealing with minerals other than petroleum offshore; a series of meetings was held on the subject of the offshore boundary between Australia and Indonesia and preliminary negotiations between the two countries were attended in Canberra. The Assistant Director continued as Secretary of the Technical Committee on Oceanography and of the Inter-departmental Committee on Oceanography. He also continued as departmental delegate to the committee set up to advise the Department of Foreign Affairs on international aspects of oceanography.

During the year the Assistant Director visited oil and gas production centres in Bass Strait and gas installations in the Gidgealpa/Moomba area of South Australia, visited Tasmania, Queensland and New South Wales.

Advice to Foreign Affairs in current aid projects continued throughout the year and related principally to the East Pakistan mineral sand project and to the series of similar projects mounted through the ECAFE Committee dealing with joint prospecting for mineral resources in Asian offshore areas. The Assistant Director attended a meeting of this Committee in Saigon in May as a Special Advisor on detrital minerals and concluded this visit with a reconnaissance assessment of beach sand deposits in the Hue region, South Viet Nam; a report on this reconnaissance awaits completion of sample analysis by AMDEL.

A number of lectures on facets of the mineral industry in Australia was delivered throughout the year including lectures on mineral resources to Industrial Mobilization groups in Sydney and Melbourne; papers written, or contributed to, during the year included Mineral Resources of Australia 1970, Mineral Resources Offshore, Developments in the Australian Opal Industry, the Role of the Mineral Industry in the Australian Economy, and Major Developments in the Australian Mineral Industry 1960-70.

MINING ENGINEERING SECTION1. STAFF

G.F. Mead, Engineer Class V, was in charge of the Section.

R.W.L. King, Engineer Class III, resigned as from close of business 4 March.

W.G.B. Phillips was appointed as Engineer Class III on 9 July, having acted in the position since 5 March.

2. OPERATIONS(i) Gold Mining Assistance

G.F. Mead visited all major gold mines in Australia, wrote a review of gold mines operations, commented on the cases for increased assistance by The Chambers of Mines and the Western Australian Government and made proposals for renewal of the Assistance Act.

(ii) Export Control

R.W.L. King made an estimate of the iron ore reserves of Paraburdoo and Mount Tom Price in connection with applications by Hamersley Iron Ltd.

(iii) Wire Rope Research

Meetings of the Wire Rope Research Committee were held at four-monthly intervals. Although the original goal of the research, i.e. to design an instrument which could replace destructive testing for wire ropes, appears to be as far away as ever, some unofficial proposals have been put forward to widen the scope of the Committee's work to other forms of mining research.

(iv) Conference of Chief Inspectors of Mines

A Conference was held in Melbourne in April at which new sections on electrical rules and safety in dredging were accepted for inclusion in the basic code of safety rules. Working groups were formed to make recommendations for some other new sections. Mr. Mead is the convenor of the working group on noise in mining.

Mr. Mead is also engaged on and has partly completed rewriting the basic code in a new format, including the new sections accepted at the 1970 conference.

(v) Standards Association of Australia

Several meetings were held at the S.A.A. iron ore committee, the iron ore sampling sub-committee and a provisional new committee on aluminium ores. These committees and sub-committees are for the purpose of providing liaison between industry and the International Standards Organization. The Bureau is also represented on the S.A.A. Coal and Coke Committee, which met once during the year, and circulated a number of documents for comment and, in some cases, voting.

(vi) Inventory of Black Coal Resources

The first of a series of inventories of mineral resources in Australia, that dealing with black coal, commenced during the year for completion in December. Particular emphasis was placed on resources of coking coal, principally in New South Wales and Queensland, although resources of black coal in all States will be included in the inventory.

(vii) Review of Coking Coal Resources

Visits were made to Sydney, Newcastle and Brisbane to make arrangements for a review of coking coal resources and to gather information for it. Although the Queensland section of this review was straightforward, some difficulties have been met in the New South Wales section which will delay completion of the project. This work is being done in collaboration with R.Z. de Ferranti of the Mineral Economics Section.

(viii) Working Group on Radio-active Protection

This working group, which was formed for the purpose of adopting an I.L.O. manual on radiation protection in the mining and milling of radio-active ores to Australian conditions and rewriting it in the form of an N.H.M.R.C. code, met several times during the year. It was hoped to have this adaptation completed by the end of 1970 but apart from the actual work of changing the format entirely, the I.L.O. manual does not touch on such important matters as disposal of tailings, and treatment of radio-active ores other than uranium.

(ix) Other Work

Other work, mostly produced at short notice as it was referred to the Section included the following:-

- (1) Report on drilling operations of the Endurance Mining Company.

- (2) Comments on proposals for tailings and waste disposal by Bougainville Copper.
- (3) Comments on C.R.A.'s proposals for the development of Brown's Deposits at Rum Jungle.
- (4) Comments on the A.M.C. Advisory Committee's paper on mine safety.
- (5) Comments on the A.P.E.A. proposal for the adoption of the American system of depletion to Australian petroleum industry.
- (6) A five-year forecast of royalties from minerals (except petroleum).
- (7) Participation in departmental and inter-departmental discussions on the proposed offshore mineral legislation, proposals for the development of the oil shale of Julia Creek, Queensland, and the A.M.I.C. paper on mineral exploration tenures.

MINERAL ECONOMICS SECTION

1. STAFF

Seven positions are established for professional officers in the Mineral Economics Section; with the exception of one Class 2 position, all positions were occupied at the beginning of January 1970. During July 1970, one Class 3 officer transferred to the Mining Engineering Section, and the resulting vacancy was filled in an acting capacity by the promotion of a Class 2 officer from within the Section. Confirmation of this appointment was recommended in November, 1970.

The following summarizes the personnel changes within the Section during the year -

- Mr. W.G.B. Phillips, Mineral Economist Class 3, transferred as Mining Engineer Class 3 as from 9 July;
- Mr. R.Z. de Ferranti, Mineral Economist Class 2, provisionally promoted to Mineral Economist Class 3 (Acting) in August; confirmation recommended on 2 November 1970.
- Mr. G. Hillier (ex Patents Office, Canberra) appointed to position of Mineral Economist Class 2, to commence duty on 17 December 1970.

Staff movements among personnel of the Commonwealth Bureau of Census and Statistics, attached to the Mineral Economics Section, during the year were as follows:-

- Mr. F.J. Gibbons, Statistical Officer (Mining), transferred to C.B.C.S., ceased duty with the Section on 13 May;
- Mr. S.J. Storm, Clerk Class 8, commenced duty with the Section (vice F.J. Gibbons) on 4 May;
- Mr. J. Berzins, Clerk Class 4, commenced duty on 6 July (vice Mr. B. Gyurky);
- Mr. R.S. Berners, Clerk Class 1, commenced duty on 31 July.

2. OPERATIONS

The broad function of the Mineral Economics Section is to maintain a continuing review of all aspects of Australian mineral resources with the object of advising on their utilization and of assisting in the formation of Government policy relating to their development. As the study of mineral commodities requires a consideration of international as well as domestic factors, such aspects as their extraction and processing, transportation, utilization and marketing must be treated in the context of world requirements.

Members of the Section continued to be occupied with international commodity consideration. In March, Dr. Z. Kalix, Chief Mineral Economist, prepared a report for the Tariff Board on the future demand and supply position for sulphur. He was also engaged on work dealing with the future world market trend for vanadium, in connection with the Julia Creek project, Queensland.

Mr. J. Ward continued duties associated with inter-departmental committees on tin, tungsten, titanium and zirconium. He attended inter-departmental meetings in February and April between the Departments of Trade and Industry and National Development concerning preparation of brief for the 4th International Tin Agreement. He also had discussions with companies and with the Department of Trade and Industry in connection with collection of data for briefing for the Agreement. A post-session meeting was attended in June with members of the Departments of Trade and Industry, Treasury, External Affairs and National Development, following the meeting of the International Tin Council in Geneva. In September, Mr. Ward had discussion with National Development and Bureau of Census and Statistics, concerning the collection of data for the I.T.C. He attended an inter-departmental discussion in October between Customs and Excise, Trade and Industry and National Development concerning the proposed raising of Australia's contribution to the I.T.C.'s buffer stock. During April and May, Mr. Ward prepared a reply to a Questionnaire circulated by the United Nations Tungsten Committee, relating to the consumption of tungsten products.

Mr. Ward also assisted in the preparation of statistical data for inclusion in a publication of the Rutile-Zircon Development Association.

Mr. W.G.B. Phillips continued his study of the lead and zinc industries, following his transfer to the Mining Engineering Section in July. He assisted in the preparation of the brief for the Australian delegation to and attended the 14th Session of the International Lead and Zinc Study Group, held in Geneva in November 1970.

Apart from the assessment of information contained in world literature on mineral resources, including that from various unpublished sources, information on current developments in Australia is obtained by maintaining contacts with members of the domestic mining industry, by attendance at conventions and by visiting areas of particular interest. Much of the information so obtained provides the basis of the Australian Mineral Industry Annual and Quarterly Reviews.

A comprehensive inventory of Australian mineral resources was initiated by the Mineral Economics Section in collaboration with the Mining Engineering Section. In this connection, Mr. Ward attended several meetings with officers of the A.A.E.C. regarding the present position and future possible trends in the supply/demand position of zirconium minerals. A confidential report on this subject was prepared. As part of the same programme, Mr. de Ferranti was engaged throughout the year in research into domestic coking coal reserves.

Dr. Kalix had discussions throughout the year with Commonwealth and State Government Departments, C.S.I.R.O., other authorities and private companies on fertilizer materials, phosphate, sulphur, ceramics, refractories and various other industrial minerals.

In February, he visited Melbourne, Sydney and Newcastle for discussions with officers of C.S.I.R.O. and representatives of mining companies on current and future domestic and overseas demand for alumina refractories and fertilizer materials. Further visits were made to Sydney and Melbourne in April for discussions with various authorities and companies. In May, Dr. Kalix was in Adelaide and Perth for discussions with C.S.I.R.O., AMDEL, State Mines Departments, Departments of Industrial Development and Public Works in Perth, and several companies. Accompanied by Mr. A.J. Gourlay, he inspected opal occurrence and mining operations at Coober Pedy, S.A.

In June, he made a field inspection of phosphate rock deposits held by International Minerals and Chemicals Corp. Ltd at Yerwontoft, Queensland, the Hilton lead-zinc mine of Mount Isa Mines Ltd and the Gibson Island fertilizer plant of Austral Pacific Fertilizers Ltd. He also discussed progress of exploration and new developmental projects with companies in Brisbane and Sydney.

Dr. Kalix was in Melbourne for a short period in September to collect information for Part 1 of the A.M.I. 1969 Review. Further visits were made to Melbourne, Sydney and Brisbane on the same subject during November 1970.

Mr. J. Ward visited Brisbane and mineral-sand operations on the East Coast in March and July, for discussion and inspection of developments in Northern New South Wales and South-eastern Queensland. In June, Mr. Ward inspected mining developments in mineral sands and tin, and a titanium dioxide plant in south-western Western Australia. During this tour, he visited Perth, Bunbury and the Greenbushes area with particular reference to mineral pigments (including titanium pigments), tin and tantalite. While in Brisbane in July, he had discussions with representatives of the Mines Department and the Australian Tin Producers' Association.

In August, in company with I.A.E.E. Fellow, Mr. M. Aslam of the Pakistan Atomic Energy Commission, Mr. Ward inspected hard rock and alluvial tin mining operations at Ardlethan and Gibsonvale, N.S.W.

Mr. Ward attended a Mineral Sands Seminar on 7 September at Latrobe University, Melbourne, where he delivered a lecture to Honours Economics students on economic aspects of the Australian mineral sands industry.

As part of the study of the utilization of zirconium sponge in nuclear reactors, Mr. Ward visited Sydney during April for discussions with officers of the A.A.E.C. at Lucas Heights, and with companies relative to aspects of zirconium sponge production.

Mr. A.J. Gourlay visited Perth during May for discussions with Department of Mines, Geological Survey of Western Australia and companies on progress in bauxite and copper exploration and developmental projects. He also called on companies with reference to talc mining and export operations at Three Springs and concerning various other industrial minerals. From Adelaide, he travelled to Coober Pedy with Dr. Kalix and on return to Adelaide he had discussions with Department of Mines, mining companies and opal dealers.

Mr. Gourlay attended a symposium held in Sydney on 8 June, entitled "Bauxite, alumina and aluminium", organized by the Royal Australian Chemical Institute. He later had discussions with companies on current and proposed developments in aluminium, bauxite, alumina and copper production, and obtained some data for an article on opal.

In July, he visited Melbourne chiefly to obtain information for the A.M.I. 1969 Review and for use in production and exports projections. He returned to Canberra via Sydney, from whence he travelled to Kurri Kurri, N.S.W., in company with representatives of Alcan Australia Ltd for an inspection of aluminium production facilities. A short visit was made to Sydney in early November to obtain essential data on New South Wales mineral production for A.M.I. Review chapters.

Mr. R.Z. de Ferranti visited nickel mining and exploration projects in the Kalgoorlie area during February. He had discussions with representatives of various companies operating in the area. In Perth, he discussed aspects of nickel exploration and future developments with members of the Geological Survey of Western Australia. En-route to Canberra, he visited the head office of the Broken Hill Proprietary Co. Ltd in Melbourne. In March, he visited exploration companies in Sydney, and O.T. Lempriere and Co. Ltd, concerning the current market situation for antimony and bismuth.

In April, Mr. de Ferranti inspected a nickel occurrence near Kiandra, in company with Mr. D.J. Forman of the Geological Branch. He attended a symposium on the geology of the Sydney Basin at the University of Newcastle. While in Newcastle, he visited the Coal Geology office of the B.H.P. Co. Ltd in connection with the B.M.R. survey of coking coal reserves. A visit was made to Central Queensland in July to obtain data for the coal resources survey; Mr. de Ferranti called on Utah Development Company at Mackay and Blackwater, and on Thiess-Peabody-Mitsui Coal Pty Ltd at Moura.

From 7 to 9 October, Mr. de Ferranti attended a symposium on the Bowen Basin, organized by the Geological Survey of Queensland in Brisbane.

Mr. R. Pratt visited Perth and areas in the north-west of Western Australia during July on a commodity study tour of manganese, iron ore and tantalite mining operations. While in Perth, Mr. Pratt called on the Director, Geological Survey of Western Australia, and discussions were had on mining plans with representatives of companies - namely Bell Bros. Pty Ltd, Hawkestone Minerals Ltd and Sentinel Mining Co. Inc.

In the Pilbara district, Mr. Pratt visited operations of Longreach Manganese Pty Ltd at Woodie Woodie and Ripon Hills, Goldsworthy Mining Ltd iron ore operations at Mount Goldsworthy, tantalite prospects of A.C.A. Howe Australia Pty Ltd (Consulting Geologists and Field Managers for Goldrim Mining) at Strelley, Pilgangoora and Tappa Tappa, and Bell Bros. Pty Ltd manganese operations at Woodie Woodie and Port Hedland.

3. ENQUIRIES AND VISITORS

In recent years, a growing interest in developments in the mining industry has resulted in an increasing number of enquiries from government and private sources. Mineral commodities of particular interest in this regard have been alumina, bauxite, black coal, copper, iron ore, manganese, nickel, phosphate, tin, titanium and uranium. There has also been an increase in the number of enquiries concerning industrial minerals such as asbestos, high alumina refractories, barite, fluorspar, gemstones, magnesite and talc, particularly, in respect of some of these, as the result of the growing pressure of world demand on steadily diminishing reserves.

Visitors to the Section during the year totalled about 150 and included representatives of local and overseas companies and of governmental and other authorities. The more noteworthy visitors from overseas included representatives of Atlas Minerals Ltd (U.S.A.), Engineering and Mining Journal (N.Y., U.S.A.), De Havilland Corporation (U.K.), Hanna Mining Co. (U.S.A.), Bureau de Recherches Geologiques et Mineraux (France), Swiss Aluminium Ltd (Switzerland), Mitsui Company (Japan), Ocean Ventures Pty Ltd (Fla., U.S.A.), Steetley Sales Ltd (U.K.), D.S.I.R. (N.Z.), United States Atomic Energy Commission, Mr. Baxter Holland, Solicitor (N.Y., U.S.A.), Mackay and Schnellmann (U.K.) and American Metal Climax Inc. (N.Y., U.S.A.).

4. PUBLICATIONS

The Australian Mineral Industry 1969 Review was prepared and four issues of the Quarterly Review - Vol. 22, Nos. 3 and 4, and Vol. 23, Nos. 1 and 2, were published. Articles appeared in the Quarterly Reviews on the following topics:

"Sillimanite and related refractory minerals in Australia" - Z. Kalix, D.J. Forman and G.M. Derrick;

"Nickel industry developments in Australia and Overseas" - R.Z. de Ferranti;

"Developments in the Australian opal industry" - A.J. Gourlay and L.C. Noakes;

"Mineral Resources Offshore" - L.C. Noakes

Eleven chapters of major interest in the A.M.I. Annual Review were published as pre-prints in 1970. The "Petroleum" chapter in the 1970 Review was compiled by the Petroleum Technology Section from the material prepared by the Geological, Geophysical and Petroleum Exploration Branches and the Petroleum Technology Section of the Mineral Resources Branch (Exploration and Development), and by the Fuel Branch, Department of National Development (Trade, Production, Consumption, Prices). Chapters of the 1969 Review released in this form during the year in order of printing were "Aluminium", "Zinc", "Copper", "Black Coal", "Iron Ore", "Lead", "Titanium", "Petroleum", "Nickel", "Tin", and "Part I - General Review".

PETROLEUM TECHNOLOGY SECTION1. STAFF(i) Occupied Positions

- 1 Chief Petroleum Technologist (Class V) (Position No. 62)
- 1 Supervising Petroleum Technologist (Class IV)
(Position No. 63)
- 2 Petroleum Technologists (Class III) (Positions Nos. 64, 482)
- 1 Engineer Class III (Position No. 70)
- 1 Chemist Class II (Position No. 81)
- 1 Chemist Class I (held against Position No. 45)
- 1 Boring Supervisor (Position No. 71)
- 2 Drillers Grade II (Positions Nos. 72, 505)
- 5 Drillers Grade I (Positions Nos. 73, 74, 506, 507, 648)
- 4 Drill Assistants (Position Nos. 75, 76, 508, 509)
- 2 Technical Officers, Grade I (Positions Nos. 499, 683)
- 1 Technical Assistant, Grade II (Position No. 684)
- 1 Clerk, Class 5 (Position No. 682) } Seconded from
- 1 Clerical Assistant (Position No. 68) } Operations Branch

(ii) Unoccupied Positions

Position No. 67, Petroleum Technologist Class II became vacant with the resignation of Mr. K. Blair on 6 October 1970. Action has been initiated to fill this position and to re-classify it to Class III.

Position No. 66, Petroleum Technologist Class II, has been vacant since September 1968 when Mr. B.A. McKay was appointed to Position No. 482 (Petroleum Technologist, Class III). Efforts to fill this position have been unsuccessful and re-advertising has been arranged.

(iii) Staff Changes

Mr. J.V. Fuchel, Chemist Class I, was killed in a motor accident on 12 July.

Mr. K. Blair, Petroleum Technologist Class II, resigned on 6 October.

Mr. D.M. McKirdy joined the Section on 31 August as Chemist Class I (held against Position No. 45, Chemist Class II).

Mr. R.E. Moon joined the Section as Technical Officer Class I on 5 January.

Mr. L.T. Hodgins joined the Section as Boring Supervisor on 5 January.

2. TECHNICAL AND SCIENTIFIC VISITS, COURSES, CONFERENCES, FIELD VISITS ETC.

(i) H.S. Taylor-Rogers attended:-

Nine meetings of the Oil Advisory Committee and prepared correspondence relating thereto.

29 January - discussions with Arco Ltd and Petroleum Exploration Branch on drilling programme for Petrel 1A.

27 February - Brisbane. Meeting with the Minister, Departmental representatives and representatives of Magellan Petroleum (N.T.) Pty Ltd, and Exoil N.L. to discuss the proposal for a refinery in Alice Springs based on the crude oil from the Mereenie field.

10 April - Inter-departmental meeting (Interior, National Development) and company consultants - new power station at Alice Springs.

17 April - Inter-departmental meeting (National Development, Interior, Treasury) and Exoil N.L. to discuss Alice Springs refinery project.

20 and 27 May - Inter-departmental Meetings (National Development, Prime Minister's, Treasury, Trade, Customs) regarding Julia Creek oil shale project.

(ii) M.C. Konecki attended:-

1 - 10 November 1969 - 4th ECAFE Petroleum Symposium.

23 April - discussions with the Minerals Officer (C.B.C.S.) on collection of quarterly drilling and production statistics.

3 - 20 June - 11th International Gas Congress, Moscow.

27 May - discussions with Fuel Branch and Head Office on the submission of information by Victoria for purposes of royalty calculations on petroleum production.

(iii) J.M. Henry attended:-

12 November 1969 - B.M.R. Computer Committee Meeting.

16 - 19 March - Darwin - discussions with officers of the Department of Mines concerning the issue of "directives" under the Petroleum (Submerged Lands) Act 1968.

26 March - Sydney - discussions with officers of the Department of Mines.

7 - 8 April - "Management and Safety" course sponsored by the Oilwell Drilling Contractors Association of Australia.

J.M. Henry (Cont'd.)

10 April - Supervisors Meeting.

21 May - discussion with Canberra College of Advanced Education and B.M.R. Branches on courses on geology beyond 1st year.

29 May - Supervisors' meeting to discuss "Government Assistance to the Mining Industry 1970-1980".

9 June - discussions with Branch representatives and the N.I.B. Film Unit concerning the production of a film on 25th Anniversary of the B.M.R.

16 June - meeting with Office of Aboriginal Affairs concerning training of aboriginals as water well drillers.

10 - 11 August - Australian Marine Sciences Association Symposium, Melbourne to read paper by H.S. Taylor-Rogers on "The Control of Blowouts"; also had discussions with officers of some of oil companies.

15 - 18 September - Department of Mines, Brisbane, ODCAA Symposium and visit to the Moonie and Roma oil and gas fields.

(iv) K. Blair attended:-

3 - 4 May - discussions with Hematite Petroleum Pty Ltd, Melbourne on reserves and reservoir engineering.

11 - 12 May - discussions with Esso Exploration and production Inc. Sydney on reserves and reservoir engineering.

24 - 25 May - discussions with Santos Ltd, Adelaide on reserves.

12 - 23 July - course on Well Testing in Melbourne by Dr. van Poolen and Associates.

(v) A.T. Churchill attended:-

16 - June - Meeting with office of Aboriginal Affairs concerning training of aboriginals as water well drillers.

19 - 20 July - International Engineering Exhibition, the Department of Supply and engineering companies in Sydney.

(vi) Dr. T.G. Powell attended:-

November 11 1969 - The Australian-French Technical Cooperative Symposium, Sydney, N.S.W.

March 4 - visit to the C.S.I.R.O., Mineral Chemistry Division, Sydney to discuss the field of organic geochemistry with Mr. Brooks, and inspect the research being conducted at that establishment.

Dr. T.G. Powell (Cont'd.)

March 15 to March 19 - APEA Conference, Surfers Paradise, Queensland.

June 8 - 10 - A visit to Adelaide with Dr. Bubela to inspect methods of gas chromatography of amino acids as carried out at the Institute of Medical and Veterinary Science.

3. MOVEMENTS

- (i) Mr. H.S. Taylor-Rogers resumed duties as Chief Petroleum Technologist on 11 November 1969 following leave of absence to E.C.A.F.E. He attended the 4th E.C.A.F.E. Symposium on the Developments of Petroleum Resources of Asia and the Far East as a member of the E.C.A.F.E. staff.

25 - 27 November - attended the Bureau Programme Meeting.

29 January - 6 February - visited drilling, and completion and testing of Palm Valley No. 2.

6 - 22 October - visited, with L.T. Hodgins, drilling parties operating at Marree, South Australia, Curtin Springs, Tennant Creek and Rum Jungle, Northern Territory.

He acted as Assistant Director (Mineral Resources) vice Mr. L.C. Noakes during the following periods:-

5 - 14 December 1969 - Mr. Noakes on leave.

22 December 1969 - 9 January 1970 - Mr. Noakes, Acting Director.

19 January - 29 January 1970 - Mr. Noakes on leave.

12 March - 27 April 1970 - Mr. Noakes, Acting Director.

11 May - 2 June 1970 - Mr. Noakes overseas.

11 July - 24 July 1970 - Mr. Noakes, Acting Director.

(ii) Higher Duties

During the above periods Mr. M.C. Konecki acted as Chief Petroleum Technologist, Mr. J.M. Henry acted as Petroleum Technologist, Class IV, vice Mr. Konecki and Mr. K. Blair acted as Petroleum Technologist, Class III vice Mr. Henry.

(iii) M.C. Konecki

15 April - visited B.M.R. drilling operation at Falls Creek, new Nowra (Wollongong No. 2A).

(iv) B.A. McKay

29 January - 6 February - visit to Palm Valley area, Northern Territory in company with Mr. H.S. Taylor-Rogers to witness drilling, testing and completion of a gas well, Palm Valley No. 2.

26 February - Sydney - Visit to Selbys Pty Ltd, and Esso Exploration to respectively discuss equipment purchase and the possibility of obtaining core samples for geo-chemical studies.

(v) Dr. T.G. Powell

17 - 27 August - Visit to the Estuary Study Project, Broad Sound, Queensland to witness sample taking procedures and material collection.

(vi) A.T. Churchill

3 - 10 December 1969 - Sydney, Alice Springs and Brisbane to arrange the annual overhaul of drilling units.

18 - 19 April - B.M.R. drilling operations at Wollongong No. 2A.

(vii) L.T. Hodgins

11 March - attended symposium in Sydney on Water Well Drilling by Johnson Screens, Inc.

16 - 17 March - visited operations of the Nowra drilling party.

3 - 8 July - Visited the Carpentaria drilling party at Richmond, Queensland.

24 - 28 August - visited the Amadeus Basin drilling party.

6 - 22 October - visited, with Mr. Taylor-Rogers, all drilling parties at Maree, South Australia, Curtin Springs, Tennant Creek and Rum Jungle, Northern Territory.

4. PETROLEUM LEGISLATION

During the year, the Chief Petroleum Technologist and/or the Acting Chief Petroleum Technologist attended 10 Oil Advisory Committee meetings which they convened and recorded in their capacity of Secretary/Convenor.

The Chief Petroleum Technologist prepared a paper on the Draft Instructions to the Parliamentary Draftsman on the Operating and Safety Regulations under the Petroleum (Submerged Lands) Act 1968-69, which will be presented as evidence to the Great Barrier Reef Petroleum Drilling Royal Commission. He attended two meetings in Brisbane with Commonwealth Council assisting the Commission.

5. INFORMATION AND STATISTICS

The Section prepared for publication and distribution the following:-

- (i) Petroleum Exploration and Development Titles Map and Key. (half yearly, 30 June and 31 December.)
- (ii) The Petroleum Newsletter - quarterly. (Nos. 39, 40, 41, 42.)
- (iii) Rig Activity - fortnightly.
- (iv) Wells and Footage Drilled - monthly and quarterly.
- (v) Breakdown of Petroleum Exploration and Development Activity and Expenditure - annually.
- (vi) List of Petroleum Exploration companies and addresses - half-yearly.
- (vii) List of Petroleum Exploration Contractors, Service Companies and Consultants in Australia - revisions as required, about half-yearly.
- (viii) Statistics on petroleum exploration, development and production in Australia for various publications, e.g. World Oil, Oil and Gas Journal, Australian Mineral Industries Review, Australia in Facts and Figures, various yearbooks and pamphlets etc.

All reports submitted to the Commonwealth under the provisions of the Petroleum (Submerged Lands) Act 1967-68 are checked, indexed, recorded and acknowledged. The problems of the space requirements for the storage and ready access of the large amount of material which is being and will continue to be received, are receiving attention.

6. PETROLEUM AND RESERVOIR ENGINEERING

(i) Office Studies

(a) Estimation of Petroleum Reserves

The most time consuming activity under this sub-heading was the gathering, verification and processing of reservoir engineering data leading to the estimation of crude oil, natural gas and natural gas liquids in Australia and Papua, both

on and offshore. Various internal reports and answers were prepared on this topic, and the general review and tabulation of Australia's petroleum reserves and resources was presented by Messrs. M.C. Konecki, K. Blair and J.M. Henry in a paper for the Biennial Conference of the Institute of Fuel in Brisbane 4 - 6 November 1970. A tabulated summary of petroleum reserves will be published in every issue of Petroleum Newsletter starting with No. 42.

(b) Compilation of Production Histories

Statistics on crude oil, natural gas and natural gas liquids production from individual fields was initiated during the year, and is being continued in a tabulated and graphical form.

(c) Natural Gas Analyses

Compilation of the analyses of natural gas samples obtained from formation tests in exploration wells and some development wells in Australia and Papua was completed by Messrs. M.C. Konecki and K. Blair and is being issued as a B.M.R. Open File Record. The compilation contains 725 analyses carried out by various laboratories including those of the B.M.R., State Mines Departments, refineries, research and commercial.

(d) A study of the "success ratio" in the Australian exploration drilling has been undertaken by Messrs. M.C. Konecki and K. Blair. It is being prepared for issue as a B.M.R. Open File Record.

(e) Crude Oil Evaluation

Graphs of distillation curves of Australian crude oils and their lube distillates and residue content vs. their API gravities and pour points were prepared by Messrs. M.C. Konecki and K. Blair.

(f) Review of Petroleum Developments and Statistics

A review of developments in the Australian Petroleum Industry in the period 1965-1969 was presented by Messrs. M.C. Konecki, J.M. Henry and K. Blair to the Fourth E.C.A.F.E. Petroleum Symposium in Canberra in 1969. The paper has been since issued as a B.M.R. Open File Record.

- (g) A study was made and report prepared on the proposal by Exoil N.L. and associated companies for development drilling and production of crude oil from the Mereenie field; the crude to be refined at the proposed small refinery in Alice Springs.

(ii) Laboratory Investigations

(a) Core Analyses

During the year, core analyses were carried out on rock samples from a number of sources. These included core samples from wells drilled under the Petroleum Search Subsidy Act, from B.M.R. and State Mines Departments drilling parties, and outcrop samples from B.M.R. field survey parties and private sources. The analyses made included absolute permeability, effective porosity, dry bulk and apparent grain density, fluid saturation determinations and in cases of preserved core samples, water salinity.

Special core analyses carried out during the year were performed in connection with the investigations of:-

The controlling effects of overburden pressure in reservoir fluid permeability, and -

The evaluation of oil recovery in the Mereenie Field by water drive and gas drive.

The total number of samples examined during the year was 3113. This was made up of 1624 complete conventional analyses, 1441 bulk density tests, 14 whole-core tests and 34 for special core analysis.

(b) Formation Fluid Analyses

Analyses of formation water samples from wells drilled under subsidy agreement were continued during the year. These included the measurement of chlorides, salinity, pH, electrical resistivity and total dissolved solids. A total of 66 new samples from 32 wells was examined. Data for B.M.R. Record 1970/78 on formation waters required supplementary analyses on 124 wells and compilation of additional data on 49 wells from subsidy well completion reports.

The installation and calibration of a new thermal conductivity type gas chromatograph for use in evaluation of components in gases derived from exploration and development drilling in Australia, has been completed.

(c) Drilling Fluids Investigations

A total of 22 samples of native barytes and 7 samples of processed bentonite was examined during the year. All samples originated from supply and mining organisations, excepting 5 baryte samples which were submitted by a prospecting group.

Baryte samples sent in for evaluation by a mining concern from a deposit near Dorisvale, Northern Territory, were found to be of a very high quality and quite suitable for use in rotary drilling operations.

(d) Petroleum Geochemistry

The initial stages of operations in this group involved ordering, installation and calibration of equipment, in addition to checkout of procedures for commencing investigations. A considerable amount of time was also spent in reviewing available literature in the petroleum geochemical field, so that a course of action could be discussed with a steering committee.

As a result, it was decided to start at basic principles and study the diagenetic changes which organic matter of marine origin might undergo. Five wells, Borabi No. 1, Iviri No. 1, Ashmore Reef No. 1, Nautilus No. 1, and Orokolo No. 1 were selected for study because of their extensive carbonate sections. At the end of the year, 60 samples from these wells had been used in the investigations, which are continuing.

A study was also instigated with the Baas-Becking Geobiological Laboratory, whereby amino acids from bacteria cell walls grown in the laboratory were examined by gas chromatography. Being a somewhat new field, this required development of glass columns and examination of various suitable liquid phases for the work at hand. The study is progressing favourably; a joint paper on the project is planned by the two groups involved in the coming year.

A further co-operative study with the Geological Branch, the Estuarine Study Project, Broad Sound, Queensland was commenced. It is planned to investigate the organic material which has been deposited in Broad Sound, as a potential petroleum source sediment. The investigations to be carried out include the

determination of total organic carbon content, and
hydrocarbon distribution.

This study will be pertinent to current work in the geochemical laboratory, in the sense that it is a continuation of the study of the relative importance of marine and terrestrial matter in the formation of petroleum.

(e) Other Research Projects

- (1) A new chromatographic (glass) column liquid phase has been found for use in analyses of certain amino acids. This column phase has enabled the chemists to perform analyses of some amino acids by gas chromatography which hitherto could not be carried out.
- (2) A new eight-port valve block was designed by Dr. Powell for use with the thermal conductivity gas chromatograph. This integrated valve system, manufactured of teflon and brass, is superior to commercially available types, being less bulky and less expensive.
- (3) Four new transducerized pressure recorders have been adapted for various instruments used in the petrophysical testing of core samples. This has made it possible to make precise measurement of calibrated differential pressures from 0.1 psi to 2000 psi at up to 5,000 psi mean pressure, in carrying out such tests as water-flooding, relative permeability, overburden pressure, etc.

7. DRILLING ENGINEERING

(i) Drilling Operations

Drilling programmes were widespread and a variety of conditions were encountered. The work required conventional rotary drilling and coring, rotary percussion drilling, diamond coring and drive sampling. The Section is now in a position to undertake diamond coring and drilling operations with all its drill units viz. Fox Mobile B40L and Mayhew 1000.

Air was used as a circulating medium wherever possible. The use of polymer muds was introduced and these were found very satisfactory. The Section also changed to using high-yield bentonitic clay muds which are more economic in shallow drilling operations. An investigation was made of a core-orientation instrument being developed by the Joint Coal Board of N.S.W. Application has been made to the Joint Coal Board for permission to further develop and use this tool.

Table 1 summarises the results of drilling for the period 1.11.69 to 31.10.1970.

(ii) Drilling Workshops, Stores and Vehicles

Mr. K. Suehle, Field Hand Grade II, arranged for the supply of equipment to Drill Parties and for the repair of equipment returned from the field. He inspected supplies received and liaised with equipment suppliers following up progress on work in hand. He also advised of stock deficiencies to 28.2.70 when he was transferred to the Stores staff.

Three drills were overhauled in Canberra, one in Brisbane and three in Alice Springs. The overhaul of three compressors was undertaken under contract by James N. Kirby Automotive Pty Ltd.

Difficulty has been experienced in processing supplies for field drilling operations which have had to be shut down on occasion in the field as requisitioned supplies were not available. Other operations have had to be changed or curtailed to meet the supply position.

Camping equipment supplied from Adelaide was in a bad state of repair. A Land Rover overhauled by the Department of Supply and transported to Brisbane on a low loader had to be completely overhauled in Brisbane before issue to our party. A kitchen caravan had to be sent from Marree to Port Augusta to repair the motor on the refrigerator compressor and re-wire the electrical system. This caravan had not been modified according to recommended specifications and the Administrative Officer was advised. This year the Department of Supply, Brisbane, advised that the axle loading of the vehicles carrying our Drill Rigs was above the load limit allowed by the Queensland Department of Main Roads and that the Bureau was required to obtain permits to travel in Queensland. The Operations Branch was requested to have this matter referred to the Director, Automotive Engineering, Department of Supply for his recommendations and to see that more suitable

vehicles were supplied to meet the requirements of the Queensland Department of Main Roads before the 1971 field season, or that action is taken to obtain permits.

Difficulty was experienced in getting traction in sandy country with the Leyland Comet Vehicles. This matter is being investigated.

(iii) Designs and Outline

Specifications were prepared and submitted for a new Drilling Workshop and Compound at Fyshwick.

Dust extractors were received and fitted to two drill rigs. These will allow fine samples to be obtained and protect the driller and equipment from dust when drilling with air.

Diamond drilling equipment was ordered for use with our present drills. Auxiliary wire line winches were fitted to the Mayhew drills. Extensions were fitted to the masts on the Foxmobile drills.

8. PAPERS, REPORTS, RECORDS (PUBLISHED AND UNPUBLISHED)

(i) Papers:

- (1) M.C. Konecki, J.M. Henry and K. Blair:-
 "Review of Developments in the Australian Petroleum Industry Since the Third E.C.A.F.E. Petroleum Symposium".
 Presented at the Fourth E.C.A.F.E. Petroleum Symposium, 27 October - 10 November 1969, Canberra, A.C.T.
- (2) M.C. Konecki, K. Blair and J.M. Henry:-
 "Reserves, Resources and Statistics of Liquid and Gaseous Fuels in Australia".
 Prepared for the Institute of Fuel Symposium, 4 - 6 November 1970, Brisbane Queensland.
- (3) H.S. Taylor-Rogers:-
 "The Control of Blowouts".
 Presented at the Australian Marine Science Association Symposium, 10 August 1970, Melbourne, Victoria.
- (4) H.S. Taylor-Rogers:-
 "Off-Shore Petroleum Regulations".
 (Under the Petroleum (Submerged Lands) Act 1968-1969).
 Prepared for presentation as evidence to the Great Barrier Reef Petroleum Drilling Royal Commission, Brisbane, Queensland.

- (5) T.G. Powell:-
 "Geochemical Aspects of Petroleum Genesis".
 Submitted to the Publications Committee of
 the Geological Society of Australia.

(ii) B.M.R. Open File Records

- (1) B.M.R. Record 1969/132 -
 "Review of Developments in the Australian
 Petroleum Industry Since the Third E.C.A.F.E.
 Petroleum Symposium - by M.C. Konecki,
 J.M. Henry and K. Blair.
- (2) B.M.R. Record 1970/43 -
 "A Study of the Relationship Between
 Overburden Pressure and Fluid Permeability
 in Some Hydrocarbon Rocks in Australia" -
 by B.A. McKay.
- (3) B.M.R. Record 1970/76 -
 "Preliminary Analyses of Natural Gases
 Encountered in Exploration and Development
 Drilling in Australia and Papua and New
 Guinea" - by M.C. Konecki and K. Blair.
- (4) B.M.R. Record 1970/77 -
 "Geochemical Aspects of Petroleum Genesis" -
 by T.G. Powell.
- (5) B.M.R. Record 1970/78 -
 "Some Characteristics of Formation Waters
 Produced During Petroleum Exploration
 Drilling and Production in Australia, Papua
 and the Continental Shelf" - by B.A. McKay
 and V. Laban.
- (6) B.M.R. Record 1970/99 -
 "Report on the 1970 Overseas Visit to the 11th
 International Gas Conference in Moscow and the
 Technical Visit to Natural Gas Fields of
 Western Siberia" - by M.C. Konecki.

9. VISITORS

During the period under review, 160 visitors were received in
 the Section.

TABLE I

B.M.R. DRILLING OPERATIONS 1.11.69 - 31.10.70

| TYPE OF OPERATION | AREA | LOCATION | PERIOD | | DRILLED "Feet" | NO OF HOLES | HOURS | | RATE FT/HRS | | DEPTH Average | TOTAL Footage cored | AVERAGE Core recovery |
|--|---------------------------------|---|----------|----------|-------------------|-------------|----------|--------|-------------|--------|------------------|---------------------------|-----------------------------|
| | | | From | To | | | Drilling | Coring | Drilling | Coring | | | |
| Drilling Seismic Shot Oil Search | Ngalia Basin N.T. | | 1.11.69 | 4.11.69 | 4560' | 38 | 22½ | NIL | 209.9 | NIL | 120' | NIL | NIL |
| Sedimentary Mapping Section | Surat Basin | Dirranbandi | 1.11.69 | 13.11.69 | 1000' | 3 | 24½ | 10 | 40.8 | 6' | 333 | 60' | 78.3% |
| Sedimentary Mapping Section | Eromanga Basin | Eulo | 15.11.69 | 29.11.69 | 889' | 3 | 20½ | 10 | 43.3 | 12.1' | 336 | 121' | 85.6% |
| Basin Study Group | Sydney Basin | Nowra N.S.W. | 12.3.70 | 4.5.70 | 2253' | 3 | 557.5 | 25.75 | 4.04 | 3.7' | 783.3' | 97' | 97.8% |
| Sedimentary Mapping Section | Carpentaria Basin | Bourketown Chudleigh Park Richmond Normanton. | 16.6.70 | 30.7.70 | 3210' | 8 | 121.5 | 198.75 | 26.4' | 4.9' | 524.5' | 986' | 91.5% |
| Sedimentary Mapping Section | South West Eromanga Basin | Gason / Pandie Pandie area | 15.9.70 | 5.10.70 | 2460' | 15 | 55.0 | 9.0 | 44.7' | 11.1' | 161.6' | 100' | 78.0% |
| Basin Study Group | Ngalia Basin | Napperby/ Mt Doreen | 31.7.70 | 16.9.70 | 2381' | 4 | 100.0 | 21.0 | 23.8' | 7.2' | 633.2' | 153' | 77.5% |

TABLE 1

B.M.R. DRILLING OPERATIONS 1.11.69 - 31.10.70

| TYPE OF OPERATION | AREA | LOCATION | PERIOD from. to | DRILLED "Feet" | NO OF HOLES | HOURS | | RATE FT/HRS | | DEPTH Average | TOTAL Footage cored | AVERAGE core recovery |
|--|------------------|---|--------------------------------|-------------------|-------------|----------|--------|-------------|--------|------------------|---------------------------|-----------------------------|
| | | | | | | Drilling | Coring | Drilling | Coring | | | |
| Seismic Sub Section | W.A. | Kalgoorlie, W.A. | 1.11.69 - 28.11.69 | 14,090' | 206 | 100.0 | N11 | 140.9' | N11 | 63.5' | N11 | N11 |
| Engineering Geophysics | Bowen Basin | Moura Coal Fields | 10.4.70 - 29.5.70 | 17,154' | 274 | 156.5 | N11 | 109.6' | N11 | 62.6' | N11 | N11 |
| Sedimentary Mapping Section | Amadeus Basin | Hermannsburg Lake Amadeus Mt Liebig | 18.7.70 - 31.10.70 Drilling | 341 | 5 | 6.0 | 154.75 | 68.2' | 10.2' | 386.4' | 1,591' | 85.2% |
| Metalliferous Section | N.T. | Tennant Creek | 23.9.70 - 14.10.70 | 179 | 2 | 75.5' | 46.5 | 2.3' | 2.5' | 148.5' | 118' | 77.5% |
| Darwin Uranium Group | N.T. | Rum Jungle | 26.8.70 - 31.10.70 Drilling | 1,946 | 13 | 76.5' | 11.0' | 25.4' | 6.0' | 149.6' | 6' | 100% |
| Engineering, Hydrology & Geophysics Sub Section | A.C.T. | A.C.T. | 18.3.70 - 27.4.70 | 1,182 | 9 | 238.25 | 11.75 | 40.9' | 1.3' | 131.3' | 15' | 97.0% |
| <u>TOTALS:-</u> | | | 1.11.69 - 31.10.70 | 51,645' | 583 | 1,554.00 | 488.50 | | | | 3,247' | 86.84 |

Total footage drilled - all surveys = 51,645' Feet.

Total Number of holes drilled = 583

Total footage cored - all surveys = 3,247' Feet.

Average percentage recovery - all coring = 86.84%

Total footage drilled & cored - all
surveys = 54,892' Feet.