

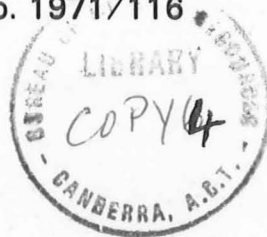
1971/116
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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record No. 1971/116



Mineral Resources Branch

Summary of Activities 1971

**BMR
Record
1971/116
c.4**

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 It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology & Geophysics.

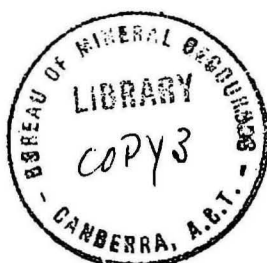


Record No. 1971/116

MINERAL RESOURCES BRANCH

SUMMARY OF ACTIVITIES

1971



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HEADQUARTERS

The staff position in 1971 was satisfactory in that the year began and ended with three vacant positions in the Branch - two Petroleum Technologists and one Mineral Economist in January and one Petroleum Technologist, one Drilling Superintendent and one Mineral Economist in December 1971. In the latter half of the year, slackening demand by industry for professional personnel and increases in the level of professional salaries in the Bureau of Mineral Resources considerably improved the recruitment position; one Petroleum Technologist rejoined the Branch and the number of applications for a position of Mineral Economist suggests that this vacancy should be filled in the new year. Vacant positions of Petroleum Technologist Class 2 and of Drilling Superintendent are under review and will probably be reclassified to positions which can more readily be filled.

The year brought some progress and achievement in all Sections. The 1969 Annual included further improvements in content and presentation and also projections to 1980 of the value of Australian mineral exports at three levels of confidence were featured for the first time. Investigation of possible processing of zircon in Australia was completed with the A.A.E.C. and mineral processing in Australia was kept under constant review. Changing fortunes in the lead and zinc, tin and uranium industries demanded special attention and articles in the Quarterlies dealt with manganese, a group of non-metallic minerals and the future pattern of Australian mineral exports.

The Mining Engineering Section, with assistance from the Mineral Economics Section, completed an inventory of black coal resources in Australia which was published in the June Quarterly as the first of a series designed to provide as much data as possible on both economic and submarginal mineral resources in Australia. An inventory on tin resources is currently underway and will be followed by one dealing with titanium.

Pressure of work on the Petroleum Technology Section increased during the year with new and important discoveries of natural gas in Australia and with the rising quantity of company submissions under the Petroleum (Submerged Lands) Act. The Petroleum Technology Laboratory recorded very satisfactory progress in reducing the back log of oil and gas analyses, and completed additional work on reservoir characteristics particularly in the context of secondary recovery; the petroleum chemistry group completed an investigation of source bed characteristics of limestone and has underway a geochemical study of sediments of the north-west shelf with particular reference to levels of maturation.

During the year the Assistant Director and officers from appropriate Sections were involved in many matters requiring advice on policy and procedure; these ranged from projects like McArthur River, Gove, Mereenie and those of the new uranium provinces, to questions of mining legislation, taxation and incentives, to the coal situation in Australia and to the Gold Mining Assistance Act. Rising emphasis fell on conservation and pollution and these and other aspects of the mineral industry were the subject of draft papers prepared for the Australian Minerals Council during the year.

The Branch's contribution to foreign aid continued to rise as more trainees from developing countries visited appropriate Sections for short periods and training programmes were prepared to assist the Department of Foreign Affairs. The Assistant Director attended a meeting of CCOP (ECAFE) in Manila in July as special adviser in detrital minerals and as Australian representative at a meeting which set up a CCOP for the South Pacific. Field assistance under the auspices of the Colombo Plan and CCOP in exploration for detrital heavy minerals continued this year with a visit to Indonesia by the Assistant Director for two weeks in the July/August when a reconnaissance for detrital heavy minerals other than tin was carried out in part of the Indonesian tin belt; a report was completed and a number of forward projects recommended.

MINING ENGINEERING SECTIONGold Mining Assistance

G.F. Mead visited Western Australian gold mines, commented on several submissions for increased assistance and prepared a review of the prospects of re-employment of gold-miners in base-metal mining.

Summary of Coal Resources

G.F. Mead visited several coal-fields and obtained information from the Joint Coal Board and other sources. The summary was published as an article in the "Quarterly Review of the Australian Mineral Industry".

Inventory of Tin Resources

W.G.B. Phillips commenced on an inventory of Australian tin resources to include estimates of the measured indicated and inferred reserves and mineralisation of tin ore. Visits were made to the major producers and exploration sites in Tasmania and Queensland and information from company, State and Bureau sources was collected. A data storage and retrieval system on magnetic tape using the INFOL system was set up to hold this information.

Analysis of Time Series of Base Metal Prices

W.G.B. Phillips continued econometric studies on the behaviour of the markets for base metals with particular emphasis on the pattern of delays in the process by which the industry adapts itself to changing conditions of supply and demand. A paper was written on the use of filters to describe this behaviour. He also delivered a paper called "A Study in Zinc Prices 1890-1970" at a Seminar on the application of statistical methods to mining which was held at Adelaide University.

Wire Rope Research Committee

Several meetings of the Committee were attended at which the progress of research into non-destructive testing was discussed. It is hoped to establish a better correlation between non-destructive and statutory methods by comparing the results under controlled conditions.

Lead-Zinc Study Group

W.G.B. Phillips attended the 14th Session at Geneva as a member of the Australian delegation and wrote a report on the Session.

Mine Safety

G.F. Mead revised the basic code of safety rules in accordance with the decisions of the 1970 Conference of Chief Inspectors of Mines, issued a draft to the Chief Inspectors for comment and produced a final version of the code.

G.F. Mead also convened a meeting of the working panel on noise standards and control in mining and distributed the conclusions of the working group to the Chief Inspectors for consideration at the 1972 Conference.

Two meetings of the Inter-departmental working group on health standards in radioactive mining were held. It is hoped to have the standard issued by the National Health and Medical Research Council early in 1972.

Other Work

Other work done as occasion arose included the following:

1. Report on Mount Morgan's submission for continued exemption from income tax.
2. Examination of a second feasibility study of Brown's Deposit, Rum Jungle.
3. Examination of a proposal for a capital gains tax on speculative mining shares.
4. Report on proposals for training Indonesian candidates in coal-mining.
5. Preparation of proposals for a revised method of assessing mineral royalties in the Northern Territory.
6. Report on the effect of increased mining costs on tin production.
7. Comments on the late Dr A. Hunter's proposals for revision of the Papua New Guinea mining legislation.
8. Examination of proposals for changes in the International Tin Agreement's price action levels.
9. Report on legislation and policies on environmental problems affecting the mining industry in the U.S.A. and U.K.
10. Participation in meetings on the Woodcutters, Brown's, McArthur River, Nabarlek, Ranger and Jim Jim prospects, coal export, Northern Territory mining legislation, and UNCTAD survey of iron ore and manganese.

MINERAL ECONOMICS SECTION

Seven positions are established for professional officers in the Mineral Economics Section, as follows:-

Mineral Economist Class 5 (1)
Mineral Economist Class 4 (1)
Mineral Economist Class 3 (2)
Mineral Economist Class 2 (3)

With the transfer of a Class 3 officer to the Mining Engineering Section in 1970 and the subsequent promotion of a Class 2 officer from within the Section, a Class 2 position remained vacant throughout the year. Several applicants were interviewed but none was considered completely suitable for the position, which remained unfilled at the end of the year.

The broad function of the Mineral Economics Section is to obtain basic information on and to maintain a continuing review of all aspects of Australian mineral resources and the mineral industry. Information on these subjects is provided in the Australian Mineral Industry Review, published annually and quarterly by the Section. Another important object of these studies is the preparation of advice for the Government on the utilization of Australia's mineral resources, and the provision of assistance in the formulation of Government policy relating to the development of such resources in the national interest. As the study of mineral commodities and the various sectors of the mineral industry requires a consideration of international as well as domestic factors, such aspects as mining, processing, transportation, utilization and marketing must be treated in the context of world requirements. Members of the Section continued to be occupied during 1971 with international commodity considerations.

Mr J. Ward represented the Bureau on interdepartmental committees on tin, tungsten and titanium. This work included the preparation of forward estimates of domestic consumption of tin for the International Tin Council; attendance in April at an interdepartmental meeting concerning statistical requirements on the domestic tin industry, for Australia's role as a producer member of the 4th International Tin Agreement; attendance in May at a meeting of the Tin Advisory Council; preparation of forward estimates of production and exports of tungsten for the United Nations Tungsten Study Group. Mr Ward also attended a meeting on 22 March between an inter-Departmental group and a delegation of West German industrialists. He also took part in intra-B.M.R. discussions on a training course in mineral exploration organized by the Department of Foreign Affairs for developing countries, and delivered lectures for the Symposium arranged as a result of these discussions.

Dr Z. Kalix completed a paper on "Sulphur in Australia" for an international meeting on sulphur held in Vancouver in October.

Mr R.Z. de Ferranti prepared lead-zinc consumption statistics for the International Lead-Zinc Study Group. He also attended a meeting in Melbourne in September between Government representatives and members of the lead-zinc industry, in preparation for the fifteenth meeting of the Group held in Malaga, Spain, in late October. He prepared sections of the brief for this meeting.

Mr R. Pratt attended a meeting at Head Office with representatives of the United Nations Committee on Trade and Development (UNCTAD), concerning the Australian iron ore and manganese industries.

Apart from the continuing study of world developments in the mineral industry, which involves the assessment of information contained in literature, including that from various unpublished sources, close contact is maintained with the Australian mineral industry. Members of the Section frequently attend industry conventions, and also visit areas of particular interest. Much of the information obtained on these occasions provides the basis of the Australian Mineral Industry Annual and Quarterly Reviews.

Mr Ward was in Sydney during February for discussions with companies and attendance at a Symposium on Mining and Conservation, held at Sydney University. He also attended, as official Departmental delegate, the Annual Conference of the Australasian Institute of Mining and Metallurgy, held in New Zealand in March. While in New Zealand, the opportunity was taken to inspect the development of ilmenite mining activities in the Greymouth-Westport area in the north-west of South Island. He visited Brisbane and the Southport area during April for discussions with the Department of Mines, the Australian Tin Producers' Association and mining companies. In May-June, he made an inspection tour of developments in mineral sands and tin mining and treatment in the south-west of Western Australia. A further visit was made to Brisbane in July, for discussions with companies and inspection of mineral sands operations on the East Coast. On 3 August, Mr Ward delivered an Industrial Mobilization Course lecture to services personnel at Elizabeth, S.A.

Dr Kalix visited Sydney in May and August for discussions with companies, Government Departments and the University of Sydney, concerning industrial minerals. He was in Tasmania in May for discussions mainly with the Department of Mines and companies concerning construction materials. He was in Melbourne from 21 to 26 May for discussions with the Department of Mines, C.S.I.R.O. and the Rural and Minerals Division of I.C.I.A.N.Z., in connection with recent developments in the domestic fertilizer industry. In July and August, this subject was further discussed with the British Phosphate Commissioners, State Departments and Deputy Commonwealth Statistician, and companies, and information was collected for the A.M.I. 1970 Review. Further discussions were held, mainly on construction materials and industrial minerals, in Perth and Adelaide from 5 to 14 July, and in Brisbane on 1-5 August, with Departments of Mines and Industrial Development, other authorities and companies. While in Adelaide he gave evidence before the South Australian Industries Development Committee concerning world production and markets for rare earths.

Mr A.J. Gourlay was in Sydney in April and August for discussions with the Aluminium Development Council of Australia Ltd, the Copper and Brass Information Centre and with companies, concerning industry developments. He visited Perth and Adelaide during the period 6-18 June for discussions with companies and Mines Departments. During this period, he inspected bauxite mining and prospecting operations in the Darling Range, the alumina refinery at Kwinana, W.A. and new copper mining and treatment operations at Burra and Kanmantoo, S.A. In July, discussions took place in Melbourne with aluminium and copper producers and dealers in industrial minerals and gemstones.

Mr de Ferranti visited Hobart on 12 January and Brisbane on 9-10 February to collect data from Mines Departments and companies for a coal resources survey. He had discussions in Melbourne on 14 January with major nickel producers, and on industrial minerals. Mr de Ferranti attended a Seminar in Sydney on 29 April with the lead industry on the usage of lead in batteries; he also had discussions with M.I.M. Holdings Ltd on silver and lead. During the period 6-14 May, he visited the operations of the four major lead-zinc mining companies at Broken Hill, and of Broken Hill Associated Smelters Ltd at Port Pirie. A visit was made to the Mount Isa area in August; the operations of Mount Isa Mines Ltd, Queensland Mines Ltd and Mary Kathleen Uranium Ltd were inspected, and discussions had with company representatives.

Mr R. Pratt was in Tasmania from 17 to 21 May, when he visited the Savage River iron ore mine and the Port Latta pellet plant, The Iron Cliffs iron ore mine at Penguin, and the ferro-manganese plant of T.E.M.C.O. at Bell Bay. He visited iron ore operations in the Northern Territory and major iron ore mining and processing operations in Western Australia during the period 13 June-5 July. He also discussed developments with the Mines Department and companies in Perth.

Mr G. Hillier visited Western Australia from 6 to 29 June on a commodity study tour of nickel and gold mining and treatment operations in the Kalgoorlie-Kambalda-Leonora area. He also had discussions with the Mines Department in Perth, and inspected the nickel refinery at Kwinana.

In addition to an increasing commitment over recent years for the provision of data for international commodity studies and for advice on the formulation of government policy relative to mineral developments, a growing interest in the mineral industry has resulted in a marked increase in the number of enquiries from government and private sources. Mineral commodities of particular interest in this regard have been mineral sands (including rutile, ilmenite, zircon, monazite), iron ore, tin, bauxite, alumina, aluminium, copper, black coal, manganese, nickel, uranium, and fluorspar.

Visitors to the Section during 1971 numbered about 200, and included representatives of local and overseas companies and of governmental and other authorities. In particular, visitors from overseas included representatives of the Battelle Geneva Research Centre, Department of Energy, Mines and Resources (Canada), Orissa State Department of Mines (India), Australian Trade Commissioner's Office (Rio de Janeiro, Brazil), E.I. Du Pont de Nemours and Co. Inc. (U.S.A.), Consolidated Murchison (South Africa), Italgas (Genoa, Italy), Nomura Research Institute of Technology and Economics (Japan), Earth Resources Company (U.S.A.), Eldorado Nuclear (Canada), Sonniren (Milan, Italy), Geological Survey of Japan, Chinese Petroleum Corporation, Geological Survey of Taiwan, Seoul National University (South Korea) and Yonsei University (Seoul), Italian Atomic Energy Commission (Rome), and J.M. Huber Corporation (U.S.A.). In addition, representatives of numerous Australian mining, manufacturing and other companies, and State Government authorities visited the Section.

The Australian Mineral Industry 1970 Review was prepared and four issues of the A.M.I. Quarterly Review - Vol. 23, Nos 3 and 4; Vol. 24, Nos 1 and 2 - were published. Articles appeared in the Quarterly Reviews on the following topics:

"Manganese - The Supply-Demand Position" - R. Pratt

"Australian Mineral Exports - Pattern in the 1960's
and Possible Trends" - J. Ward

"Australia's Black Coal Resources" - G.F. Mead and
R.Z. de Ferranti

"Some Recent Developments in Industrial
Minerals" - A.J. Gourlay.

Eleven chapters of major interest in the A.M.I. 1970 Review were published as pre-prints - namely Part I - General Review, Aluminium, Zinc, Copper, Black Coal, Iron Ore, Lead, Titanium, Petroleum, Nickel, and Tin.

PETROLEUM TECHNOLOGY SECTION1. STAFF(i) Occupied Positions (as at 31 October, 1971)

- 1 Chief Petroleum Technologist (Class V - Position No.62)
- 1 Supervising Petroleum Technologist (Class IV - Position No.63)
- 3 Petroleum Technologist - Class III (Position Nos 64, 67 and 482)
- 2 Chemist Class II (Position Nos 81 and 45)
- 1 Boring Supervisor (Position No.71)
- 2 Driller Grade II (Position Nos 72 and 505)
- 5 Driller Grade I (Position Nos 73, 74, 504, 507 and 648)
- 4 Drill Assistant (Position Nos 75, 76, 508 and 509)
- 2 Technical Officer, Grade II (Position Nos 499 and 683)
- 1 Technical Assistant, Grade II (Position No.684)
- *1 Clerk Class 5 (Position No.682 - filled on temporary basis)
- *1 Clerical Assistant (Position No.68)

* These positions are seconded from the Operations Branch.

(ii) Unoccupied Positions (as at 31 October, 1971)

Position No.70, Engineer Class III became vacant on 17 September, 1971, with the resignation of Mr A.T. Churchill. Acting is being taken to reclassify the position.

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 the position above have been unsuccessful, and a recommendation to re-classify it to a Technical Officer Grade 2 has been submitted to the Public Service Board.

(iii) Staff Changes

Mr R.W. Dunn (Clerk Class 5) resigned on 15 September 1971.

Mr M.W. Trevethan joined the Section on 16 September 1971, on a temporary basis, acting Clerk Class 5 vice Mr R.W. Dunn.

Mr K. Blair rejoined the Section on 6 September 1971 as a Petroleum Technologist Class III, Position 67.

Mr A.T. Churchill, Engineer Class III, resigned on 17 September 1971.

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

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

Ten meetings of Oil Advisory Committee and prepared correspondence relating thereto.

November, 1970 - A meeting with Messrs F.L. McCay, D. McAllister, L.C. Noakes, J.N. Casey, E.R. Smith and M.C. Konecki on the benefits to the nation which would result from drilling in the Great Barrier Reef area even if no petroleum was found.

1, 3 and 4 December 1970 - The 1971 Programme Meeting attended by the Director, Heads of Branches and other senior officers.

14 December, 1970 - A meeting at the Department of National Development between Inter-Departmental representatives and representative for Exoil N.L. and Magellan Petroleum (N.T.) Pty Ltd concerning the utilization of Mereenie crude oil.

1st February, 1971 - An Inter-departmental meeting with representatives of the Departments of National Development, Shipping and Transport, Treasury, Defence, Interior (Meteorology), Army, Navy, Attorney-General's, and Primary Industry (Fisheries) concerning measures to be taken and responsibilities in the event of a major oil spill offshore.

23 February, 1971 - A meeting of Government members of the Sub-Committee concerned with drafting of Part III - Geological and Geophysical Regulations under the Petroleum (Submerged Lands) Act 1967-68.

24 February, 1971 - A meeting of the full Government/Industry Sub-Committee concerned with a review of the draft of the suggested Regulations. Mr J.M. Henry also attended the meetings on 23 and 24 February.

21 April, 1971 - An Inter-Departmental meeting at the Department of National Development covering arrangements for the visit of Hon. J.J. Greene, Minister for Energy, Mines and Resources in the Canadian Government.

18-25 October, 1971 - The ECAFE Seminar on Petroleum Legislation with Particular Reference to Offshore Areas which was held in Bangkok, Thailand.

(ii) M.C. Konecki attended:-

Three meetings of the Oil Advisory Committee as alternate for Mr H.S. Taylor-Rogers and prepared correspondence relating thereto.

November, 1970 - Attended a meeting with Messrs F.L. McCay, D. McAllister, L.C. Noakes, J.N. Casey, E.R. Smith and H.S. Taylor-Rogers on the benefits to the nation which would result from drilling in the Great Barrier Reef area even if no petroleum was found.

31 March, 1971 - Visited Sydney for discussion with oil companies participating in petroleum exploration and development in the Cooper and Surat Basins concerning the supply, on a voluntary basis, of cores and reservoir fluids for analysis in the Section's laboratory.

May, 1971 - Had discussions with Messrs Griffith and Carr of the Australian Atomic Energy Commission concerning the utilization of natural gas from Palm Valley and the Gulf of Bonaparte for a project in the Darwin area.

24 June, 1971 - Attended a meeting with the Japanese Natural Gas Association Survey Mission and presented a short paper on the natural gas situation in Australia and Papua New Guinea. Officers from the Departments of National Development, External Territories, Foreign Affairs and Trade also attended.

July, 1971 - Had separate discussions with Mr W. Coleman of West Australian Petroleum Pty Ltd and Dr P.E. Playford of the West Australian Geological Survey concerning natural gas reserves in the Palm Valley and Mereenie fields. Dr Playford's visit was in connection with a feasibility study by the West Australian Government on sources of natural gas for the State.

(iii) J.M. Henry attended:-

November, 1970 - A seminar and lectures on the Glomar Challenger Deep Sea Drilling Project by Dr Von der Borch.

December, 1970 - A meeting at the Department of National Development with Mr F.L. McCay and Mr J.B.R. Livermore concerning farmouts, title holdings and company equities in petroleum titles in the Cooper Basin area.

11 February, 1971 - A meeting between representatives of the Bureau of Mineral Resources and Commonwealth Archives Services on storage and retrieval of material received under Commonwealth petroleum legislation.

23 and 24 February, 1971 - With H.S. Taylor-Rogers two meetings of the Sub-Committee concerned with the drafting of Part III of the suggested regulations under the Petroleum (Submerged Lands) Act 1967-68.

(iv) Dr T.G. Powell:-

17 and 18 December, 1970 - Visited the C.S.I.R.O., Sydney for discussions on techniques for reflected light microscopy in connection with the source rock study.

17 to 21 May, 1971 - Attended the Australian Biochemical Conference in Brisbane and as co-author with Dr Bubela, presented a paper entitled "The Effects of Copper on the Composition of Bacterial Cell Walls".

(v) Mr D. McKirdy attended:-

29-31 March, 1971 - The 1971 A.P.E.A. Conference in Melbourne.

(vi) Mr A.T. Churchill and Mr L.T. Hodgins attended:-

18-19 November, 1970 - The inaugural convention of the Australian Water Well Association (Drill 1970) at Ronville, Victoria.

(vii) Mr L.T. Hodgins visited:-

28 April-7 May, 1971 - Diamond drilling operations at Tennant Creek N.T., also drilling operations in Broadsound, Qld.

8 August-20 August, 1971 - North Queensland Drill Party to assist in the recovery of stuck drill pipe and in killing of an artesian water flow and subsequent well abandonment; also visited the Lake Galilee Seismic Party.

8 September, 1971 - The Joint Coal Board drilling site in Appin, N.S.W., to witness the operation of a new down hole core orientation tool.

3. PETROLEUM LEGISLATION

During the twelve months under review the Chief Petroleum Technologist and/or the Acting Chief Petroleum Technologist attended 13 meetings of the Oil Advisory Committee which they convened and recorded in their capacity of Secretary/Convener.

Chief Petroleum Technologist prepared the following papers for presentation at an ECAFE seminar on petroleum legislation held in Bangkok from 18 to 25 October 1971:-

- (i) Government Revenue from Oil and Gas
- (ii) Summary of Offshore Petroleum Legislation (Australia)
- (iii) Summary of Petroleum Legislation in Australia and Papua New Guinea. This last paper will also be issued as a Record in the Bureau of Mineral Resources "Open File" series.

4. INFORMATION AND STATISTICS

The Section prepared for publication and distribution the following:-

- (i) Petroleum Exploration and Development Titles Map and Key (half yearly as at 30 June and 31 December).
- (ii) Petroleum Newsletters (quarterly (Nos 43, 44, 45 and 46)).
- (iii) Rig Activity - monthly.
- (iv) Wells and Footage Drilled - quarterly.
- (v) Breakdown of Petroleum Exploration, Development and Production Activity and Expenditure - annually.
- (vi) List of Petroleum Exploration companies and addresses (as at July 1971).
- (vii) List of Petroleum Exploration Contractors, Service Companies and Consultants in Australia (as at October 1971).
- (viii) Statistics and information on petroleum exploration, development, production, resources etc. in Australia for various publications, e.g. World Oil, Oil and Gas Journal, the petroleum chapter in Australian Mineral Industry Review, Australia in Facts and Figures, various yearbooks and pamphlets.

5. PETROLEUM AND RESERVOIR ENGINEERING

(i) Office Studies

(a) Inventory of Petroleum Reserves

Australia's petroleum reserves and resources, both on and offshore were recorded throughout the year, and adjustments made relative to the indigenous oil, natural gas liquids and natural gas production statistics received from official sources. The national inventories as at 30 June, 30 September and 31 December 1970 were published in Petroleum Newsletters 42, 43 and 44, and will be published at regular quarterly intervals in subsequent Petroleum Newsletters. Work is in progress to amend the initial petroleum reserves as new discoveries are assessed and added to the originally published estimates.

(b) Compilation of Production Histories

Tabulation and graphical presentation of production figures from individual fields continued throughout the year. These figures are recorded each month, and are broken down into monthly, daily and cumulative productions for each field, and for each hydrocarbon phase. Extraordinary events (fires, blow-outs, strikes etc) which create anomalies in the production profiles, are also recorded.

Where possible pressure histories for each field are being compiled and studied, and a comment on the findings will be prepared by Messrs M.C. Konecki and K. Blair.

(c) Natural Gas Analyses

The compilation of natural gas analyses (Messrs M.C. Konecki, and K. Blair) was issued as Record No. 1970/76, and distributed to petroleum companies. These companies reacted enthusiastically to the publication and have commended and encouraged the issue of annual supplements and a continuous and complete record of Australian natural gas analyses may be kept. The first annual supplement is in course of preparation.

(d) Other Studies

The Palm Valley 1 and 2 pressure and gas reserve study was revised and a comment on the findings will be prepared.

Comments on the Gippsland Basin natural gas reserves were submitted to the Nuclear Power Assessment Division of the A.A.E.C.

A tentative LNG project for the Mereenie-Palm Valley fields was studied and appropriate comments made.

A natural gas and condensate feasibility study by Phillips Petroleum Co. for the Gulf of Papua area was examined and a critique drawn up.

The petroleum potential of the Cooper Basin area in South Australia is being analysed and a comprehensive report will be issued.

(ii) Laboratory Investigations

(a) Basic Core Analysis

During the period under review, basic core analyses were carried out on material from the following sources:

Wells drilled under the Petroleum Search Subsidy Act 1959-1969; wells drilled by the B.M.R. and State Mines Departments; outcrops (including several from Antarctica) sampled by B.M.R. field survey parties and external bodies.

The measurements included absolute permeability, effective porosity, dry bulk density, apparent grain density and fluid saturations. In all, these routine procedures were applied to 394 rock segments, 726 core plugs and 8 whole cores. Densities were measured on 602 outcrop samples submitted by B.M.R. field parties.

(b) Special Core Analysis

Non-routine measurements were made on samples from North Rankin 1, Petrel 2 and Legendre 2 - all offshore wells. The measurements included capillary pressure (air to mercury), pore size distribution, formation damage, electrical resistivity, relative permeability, water salinity on effluents from preserved cores and fluid saturation. As special studies, outcrop samples were subjected to fresh water permeability measurements to aid hydrological investigations in the Canberra area. Gas-oil relative permeability and waterflood susceptibility measurements were carried out on Pacoota sandstone samples from the Mereenie oil and gas field, Northern Territory.

(c) Natural Gas Analysis

Analyses by gas chromatography were carried out on 129 samples from 33 sources (mainly exploration wells) and the results appropriately distributed. As part of this analysis, an H_2S detector was constructed and put into service during the period.

(d) Crude Oil and Condensate Analysis

During the year, 34 samples of crude oils and condensates from exploration wells were examined. Standard I.P. (Institute of Petroleum) procedures involving distillation, viscosity, density, sulphur determination, etc., were supplemented by capillary column gas chromatography determinations of the hydrocarbon patterns of these liquids. A standard (petroleum geochemical) procedure for these and all future liquid analyses has been established as a result of these studies.

(e) Bitumen Investigations

Seepage samples from four different areas were examined. The hydrocarbon distribution patterns of these samples were examined by gas chromatography in order to determine their origins.

(f) Formation Fluid Analyses

Formation fluid analyses, comprising determinations of chloride content, salinity, pH, electrical resistivity and total dissolved solids were completed on 27 samples from exploration wells. Amongst these measurements were analyses of the interstitial waters from preserved cores and the identification of hydrocarbon contaminant in a drilling fluid.

(g) Drilling Fluid Investigations

A total of 12 samples of native clays was examined during the year. The procedure used was in accordance with A.P.I. (American Petroleum Institute) specifications for bentonite.

(h) Petroleum Geochemistry

The work of this group comprised the completion of 3 projects started in 1970 and the initiation of new studies. The work included the following:

The study of the diagenesis of hydrocarbons in carbonate sections. Samples from 4 wells were used in the investigation, which was completed in 1971; a report was issued during the year.

In conjunction with the Baas-Becking Geobiological Laboratory, amino acids from bacterial cell walls were subjected to gas chromatography. A joint paper on the results of this project was prepared during the year.

The study of hydrocarbon diagenesis in samples from the Broad Sound Area, Queensland. This project, in cooperation with the Estuary Study Group of the Geological Branch, was discontinued during the year because of the extremely low organic content of the bottom sediments.

A new project involving a regional geochemical study was introduced. This will consist of the determination of the ratio of non-volatile carbon content to total carbon content of sediments; the region under consideration will include a part of the N.W. Shelf surrounding the Madeleine, Dampier and Rankin Wells.

Selected samples showing favourable Cr/Ct ratios (organic carbon/total carbon) will be subjected to solvent extraction and gas chromatography.

Previous work conducted in the Laboratory on diagenesis of hydrocarbons in carbonates has prompted a further study. This study will be directed primarily to model material compositions, prepared synthetically in the Laboratory.

6. DRILLING ENGINEERING

(i) Modifications and Adaptation of Drilling Equipment

Modifications were made to the wash-pipe on the Mobile B-40L drill head, enabling the head to take the weight instead of the bottom flange.

Two drive-sample barrels were made up to ensure recovery of poorly consolidated material like sand, clay and gravel. Modifications were made to the compound drive shafts of the Mayhew 1000; modifications and repairs to the existing Triefus core barrels were carried out by the Department of Works, A.C.T.

With the addition of a compact air-motor driven wire line winch, which is used with the Mobile B40Ls, all drilling units are now capable of using continuous diamond coring equipment.

(ii) Drilling Workshops, Stores and Vehicles

Three drills were overhauled in Canberra and four in Alice Springs, N.T. A building and a compound were rented in Alice Springs where repairs of drilling units and equipment and reconciliation of stores were carried out prior to the parties going into the field.

(iii) Drilling Operations

A drill party was formed to undertake shothole drilling in Queensland. During the year, 1,010 seismic shotholes were drilled with a total footage of 84,550.

Other Drill Parties were formed to carry out drilling in support of hydrological investigations in the A.C.T. and New South Wales, and of geological mapping and investigations by the Bureau geological parties in various parts of Australia.

Also an existing 4,000 foot water bore at Windorah, Queensland, was cleaned out and prepared for logging to 1,000 feet.

In the course of all these operations 1,141 holes totalling 104,619 feet were drilled and cored, and 485 cores were cut. Average core recovery was 87.3 percent.

Table 1 which follows summarises the results of drilling for the period 1.11.70 to 31.10.71. (See page 19).

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

(i) Papers:

H.S. Taylor-Rogers:-

- (1) "Government Revenue From Oil and Gas"
- (2) "Summary of Offshore Petroleum Legislation - Australia"
- (3) "Summary of Petroleum Legislation in Australia and Papua New Guinea".

These three papers were presented at the ECAFE seminar on petroleum legislation held in Bangkok from 18 to 25 October 1971.

J.M. Henry and H.S. Taylor-Rogers:-

- (1) "What it Takes to Drill a Well"
Published in "Natdev" Vol. 2 No. 6, June 1971.

Dr T.G. Powell (Co-author with Dr D. Bubela)

- (1) "The Effect of Copper on the Composition of Bacterial Cell Walls", presented at the Australian Biochemical Conference in Brisbane.

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

- (1) B.M.R. Record 1971/31 -

"Gas-Oil Relative Permeability And Water Flood Susceptibility Tests on Samples from the Oil Column of The Pacoota Sandstone Reservoir" - by B.A. McKay.

- (2) B.M.R. Record 1971/95 -

"Diagenesis of Marine Sedimentary Hydrocarbons and the Source Rock Potential of Sediments in the Ashmore Reef No.1, Iviri No.1, Nautilus No.1A and Orokolo No.1 Wells" - by Dr T.G. Powell and D.M. McKirdy.

- (3) B.M.R. Record 1971/105 -

"Legendre No.2 - Special Core Analysis of a Hydrocarbon Bearing Jurassic Sandstone" by B.A. McKay.

8. VISITORS

During the period under review 107 visitors were received in the Section.

TABLE 1
B.M.R. DRILLING OPERATIONS 1-11-70 - 31-10-71

OPERATION	AREA	LOCATION	PERIOD		DRILLED feet	NO. OF HOLES	NO. OF CORES	CORE RECOVERY	HOURS		RATE (FT/HOUR)		HOLE DEPTH AVERAGE	TOTAL FOOTAGE CORED	AVERAGE CORE % RECOVERY	TOTAL FOOTAGE DRILLED & CORED
			from	to					DRILLING	CORING	DRILLING	CORING				
DARWIN URANIUM GROUP	N.T.	Rum Jungle	1.11.70	- 8.12.70	328	2	54	432	41.50	328.50	7.90	1.32	380	432.00	100.00	760.00
BASIN STUDY GROUP	N.T.	Curtin Springs	2.11.70	- 7.12.70	34	1	66	551	3.00	133.00	11.33	4.70	1,000	625.00	88.00	659.00
ENGINEERING, HYDROLOGY & GEOPHYSICS SUB-SECTION	A.C.T.	Kowen Forest Uriarra Forest Lake George Belconnen Black Mountain	18.1.71	- 27.7.71	913	9	35	244.5	318.75	54.25	2.87	6.35	139.72	344.50	71.00	1,257.50
METALLIFEROUS SECTION	N.T.	Tennant Creek	24.4.71	- 14.5.71	62.00	2	70	504	2.00	175.00	31.00	2.98	291.50	521.00	96.74	583.00
PHOSPHATE SECTION & SEDIM. BASIN GP.	QLD	Broadsound Konwarara Wratham Park Gambulla Dunbar Retreat	10.5.71	- 26.7.71	2,763.00	14	82	558.72	86.00	115.50	32.13	5.37	241.70	620.25	90.00	3,383.70
	QLD	Cloncurry (Con- tinuous coring)	13.9.71	- 29.10.71	160.00	3	71	243.0	3.50	154.50	45.72	2.39	171.67	355.00	68.45	515.00
SEDIM. MAPPING SECTION	N.T.	Hay River Plenty River Woodgreen Alcoota	24.5.71	- 11.8.71	3,843.50	7	10	54.9	175.50	14.75	21.90	4.51	558.57	66.50	83.00	3,910.00
	QLD	Eyre Creek Breadalbane Springvale Windorah	2.6.71	- 1.7.71	1,712.50	8	8	44.80	44.00	14.00	38.92	4.54	222.00	63.50	71.00	1,776.00
METALLIFEROUS SECTION	N.T.	Granites/ Tanami	26.8.71	- 16.10.71	7,127.50	85	88	95.39	159.50	36.00	44.69	2.71	85.00	97.70	97.60	7,225.00
SEISMIC SUB-SECTION	QLD	Lake Galilee	10.8.71	- 29.10.71	84,540.00	1,010	1	9.00	659.00	2.00	238.70	5.00	83.72	10.00	90.00	84,550.00
<u>TOTALS</u>			<u>1.11.70</u>	<u>- 31.10.71</u>	<u>101,483.50</u>	<u>1,141</u>	<u>485</u>	<u>2,737.31</u>	<u>1,492.75</u>	<u>1,027.50</u>	<u>68.00</u>	<u>3.06</u>	<u>91.70</u>	<u>3,135.70</u>	<u>87.30</u>	<u>104,619.20</u>

Total footage drilled all surveys - 101,483.50 feet

Total footage cored - all surveys - 3,135.70 feet

Total footage drilled and cored - all surveys - 104,619.20 feet

Total number of holes drilled - 1,141.00

Average percentage recovery - all cores - 87.30%

WORKOVER JOB: cleaned out the Windorah water bore to 1,000 feet.