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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

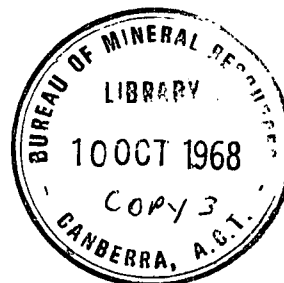
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

1967/155

MINERAL RESOURCES BRANCH

SUMMARY OF ACTIVITIES

1967



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 It may not be published in any form or use in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

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RECORDS:

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## CONTENTS

	<u>PAGE</u>
HEADQUARTERS	1
MINING ENGINEERING SECTION	2
MINERAL ECONOMICS SECTION	4
PETROLEUM TECHNOLOGY SECTION	
1. Staff	6
2. Petroleum Ordinances of the Territories	6
3. Petroleum Ordinances and Legislation of the Commonwealth	6
4. Petroleum Policy	7
5. Petroleum Engineering	
(A) Drilling	
(i) Seismic Shot Hole Drilling	7
(ii) Shallow Stratigraphic Drilling	9
(iii) Hydrological and Engineering Drilling	11
(B) Laboratory	13
6. Reports, Articles, Statistics	15
7. Conferences, Meetings, Courses	16
8. Visitors, Interviews, etc.	17
9. Visits to Operations	19
10. Records Prepared and Issued	19

HEADQUARTERS

Mr. D. O'Driscoll resigned from the public service as from the close of business on 7th February.

Mr. L. C. Noakes commenced duty as Assistant Director (Mineral Resources) on 13th March.

Mr. Noakes visited Thailand, Philippines, Korea, Japan and Taiwan from 29th September to 17th November as Advisor on detrital heavy mineral deposits to the E.C.A.F.E. Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas; he attended the 4th Session of the Committee held at Taipei from 6th - 16th November.

Mr. Noakes' activities since joining the Branch consisted of administration, editing Branch publications, discussions with the Commonwealth Bureau of Census and Statistics and Departments of Mines on the timing of collection of mineral statistics, proposals for reorganisation of the Branch, visits to the Greenbushes tin dredge, Western Australian ilmenite producers, Kambalda nickel operations, one Kalgoorlie gold mine, mineral sands operations on Stradbroke Island, the Commonwealth Fertilizers in Melbourne, and offshore prospecting operations by Planet Minerals Ltd. He also prepared a Confidential Record on offshore prospecting for minerals other than petroleum.

In addition to his normal duties Mr. Noakes is Secretary of the Technical Committee on Oceanography and of the Interdepartmental Committee on Oceanography.

Miss Beverley Cook, Graduate Trainee with the Department of National Development, was attached to the Branch from April to September. She completed a number of compilation or research projects to assist Sections or Headquarters.

### MINING ENGINEERING SECTION

G. F. Mead had discussions with Mines Departments and prepared several minutes in connexion with the Joint Coal Board's submissions requesting an increased programme of boring for coking coal. The submission was rejected by Cabinet in May. He also examined the Nabalco proposals for the perimeter leases at Gove, reported on the Sentinel Mining Company's application to export iron ore from Nimingarra, (W.A.), examined the operations of five Western Australian gold mining companies receiving subsidy, and visited the following iron-ore mines in Western Australia, i.e. Koolanooka Hills, Mount Goldsworthy, Mount Tom Price, Cockatoo Island, Koolan Island.

G. F. Mead also attended the following meetings:

- (a) Wire rope research committee (3 meetings),
- (b) Iron ore liaison committee,
- (c) Iron ore sampling sub-committee,
- (d) E.C.A.F.E. conference on metals and engineering.

With G. F. Mead, R.W.L. King prepared a Record - 1967/51 - on possibilities for assistance to the gold mining industry. This was classified for internal use only. Other work carried out by R. W. L. King included examination of a cabinet submission on additional assistance for the gold mining industry. This submission was the result of a visit of representatives of the industry to press their case with the Treasurer earlier this year.

Following a request from the High Authority of the European Coal and Steel Community for detailed information about the Australian coal mining industry since 1950, R.W.L. King set about compilation of the required information. This was almost complete by the end of October. Because of the wide field covered, it is intended to produce this information in the form of a record.

A number of requests for advice and information from a variety of sources and covering a wide field were received. These included possible applications for special rubber tyres in mining; methods of dealing with clays in alluvial mining; anthracite imports and reserves in Australia and in the world; tailings as possible sources of monazite; definitions of mining development etc.

R.W.L. King attended the symposium on stress and failure around underground openings, held at the University of Sydney in March, and also visited tin and copper mines in central-western New South Wales in August.

The project on characterization of Australian clays continued at the Australian Mineral Development Laboratories. R.W.L. King took part in discussions at AMDEL in December and March on the project, and made some contribution to the final form in which the results were presented.

A card index has been established to enable information on the data sheets to be sought by reference to alumina content, clay types, State or Territory, and location by land division and locality. Over 500 cards have been placed in the index. Most of the data has been obtained by a literature

search carried out by AMDEL, but some is the result of test work carried out on samples at AMDEL.

During the year an approach was made to Departments of Mines and the Northern Territory resident geologists for suitable samples, and Tasmania, Western Australia and the Northern Territory have all forwarded material. C.R.A. has also sent material from its brickmaking subsidiary in Melbourne. The project is expected to continue in 1968.

The section also attended to some details of the Bureau's interest in the Australian Mineral Development Laboratories. Reports and submission were produced following discussion by an Interdepartmental Committee of the request by the Council of AMDEL that the Commonwealth should make a financial grant toward the cost of a building expansion programme. The Commonwealth finally decided to make a grant of \$50,000 in each of three years, provided that the Australian Mineral Industries Research Association members made a similar contribution.

Other work in relation to AMDEL was mainly concerned with attempts to expedite payment of AMDEL claims by the Department of National Development. The Bureau's suggestion that bulk finance requisitions should be used to simplify our financial relations with AMDEL does not seem to have met with departmental approval.

Work on the survey of mineral resources in tailings was continued during the year. The results of sampling dumps in Western Australia were issued in the form of a Bureau Record for "open file" - number 66/219. It was interesting to note that samples from Southern Cross, Coolgardie, Lawlers and Meekatharra all showed ~~values~~ of nickel in excess of 0.1%.

An examination of likely sources of dump material in South Australia and Victoria indicated that a full-scale sampling programme could hardly be justified. It was decided to seek the co-operation of tenement holders and the Departments of Mines in supplying samples. Some of these have been sent for analysis at AMDEL, and it is intended to close the survey off around the middle of 1968, and write up the results on the basis of data available at that time.

MINERAL ECONOMICS SECTION

Staff. B. R. Reader - Mineral Economist, Class 1, commenced duty on 27th February and resigned as from 22nd June.

R. W. Haynes - Mineral Economist Class 3, commenced duty on 27th April and resigned as from 31st October.

J. B. Allen, Ph.D. - Mineral Economist Class 3, commenced duty on 17th October.

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 upon their utilisation and of assisting in the formulation of Government policy relating to their development. As the study of metal and mineral commodities requires a consideration of international as well as domestic factors, such aspects as their extraction and processing, transportation, utilisation and marketing must be treated in the context of world requirements.

As well as assessing the information contained in the voluminous literature on world mineral resources and various unpublished sources, the latest information on domestic developments is obtained by maintaining close contacts with the Australian mining industry and by visiting areas of particular interest. This information is collated and provides the basis of the "Annual Review of the Australian Mineral Industry" and the "Quarterly Review".

Visits by members of staff arising out of the programme of commodity studies were concerned with aluminium, iron, the base metals - tin, copper, lead and zinc, and the titanium, zirconium and thorium minerals of the mineral sands industry. In connection with the latter, particular attention was paid to off-shore prospecting for minerals other than petroleum. The staff participated in official discussions with the domestic fertiliser industry and were also concerned with projections of future supply and demand for sulphur and magnesite, as well as silver, tin and other metals. The Department of Trade and Industry was advised on the possible repercussions that Britain's proposed entry into the European Economic Community might have on export markets for Australian lead, zinc and aluminium. The Section continued to supply the Department of Trade with forward estimates of the value of mineral exports in connection with problems of balance of payments. Discussions were held with the Bureau of Census and Statistics on their proposal to collect domestic mineral statistics on a fiscal-year basis instead of on a calendar-year basis.

A selection of other topics investigated during the year included the current and future prospects for domestic uranium production, production of secondary lead and lead scrap consumption, availability of Commonwealth Assistance to the mining industry, supply of nickel to the Australian National Mint, domestic production and trade in the sillimanite group minerals, pelletization treatment plants for iron ores, domestic resources of coal, fluorspar and amethyst.

The section continued to be involved in international commodity problems and submitted statistical and other data for consideration by the International Lead - Zinc Study Group, the International Tin Council, and the United Nations Committee on Tungsten.

The 1966 Annual Review of the Australian Mineral Industry was prepared and four issues of the Quarterly Review - Vol. 19 Nos. 2, 3 and 4, Vol. 20 No. 1 - were published.

Articles appeared in the Quarterly Reviews on the following topics :-

"Prospects for Australian Zircon"

"Australian Aluminium Industry"

"Sulphur"

"Australian Ilmenite Industry: Current Position and Future Prospects"

"General Review"



PETROLEUM TECHNOLOGY SECTION

1. STAFF

Occupied Positions

- 1 Chief Petroleum Technologist (Class 5)
- 1 Supervising Petroleum Technologist (Class 4)
- 2 Petroleum Technologists Class 3
- 1 Petroleum Technologist Class 2
- 1 Chemist Class 1
- 1 Drilling Superintendent
- 1 Boring Supervisor
- 2 Drillers Grade 2 (includes one in acting capacity)
- 5 Drillers Grade 1 (includes one in acting capacity)
- 1 Drill Assistant
- 1 Technical Assistant Grade 1
- 1 Clerk (Seconded to Section)

Unoccupied Positions

Mr. M. D. Bell, Petroleum Technologist, Class 2, resigned from the Public Service and left the Section on 6th January, 1967. Mr. K. Blair has been appointed to the position and will be arriving at the end of November, 1967.

Three positions for Drill Assistants remained unfilled.

Staff Changes

Mr. R. B. Williams, Technical Assistant, was transferred to a position in the Geological Branch (Phosphate Group) on 22nd May, 1967. Mr. V. Laban, Technical Assistant, commenced duties on 26th June, 1967. Mr. J. M. Brennan, Boring Supervisor, transferred to the Section on 16th January, 1967 from the Water Resources Branch of the N.T. Administration.

2. PETROLEUM ORDINANCES OF THE TERRITORIES

During the year the Section dealt with various technical and scientific matters in connection with the administration of the Petroleum Ordinances of the Northern Territory and the Territory of Papua and New Guinea.

The Chief Petroleum Technologist is a member of the Oil Advisory Committee appointed under these Ordinances. He has been Secretary/Convenor to the Committee since October, 1962. Seventeen meetings of this Committee were convened during the year.

3. PETROLEUM ORDINANCES AND LEGISLATION OF THE COMMONWEALTH

During the year, the Chief Petroleum Technologist attended, as a member of the Off-shore Petroleum Legislation Drafting Sub-committee, numerous meetings of State Under Secretaries of Mines, Directors of Mines, Ministers of Mines, Commonwealth and State Parliamentary Draftsmen and Ministers of Commonwealth and State Departments. These are listed below :-

8th-9th November, 1966	Canberra. Drafting Sub-committee.
14th-16th November, 1966	Hobart. Secretaries for Mines.
21st November, 1966	Melbourne. Dept. of Shipping and Transport.
30th November, 1966	Sydney. Safety Regulations.

4th-5th January, 1967	Melbourne. Department of Shipping and Transport and P.M.G.'s Department.
9th January, 1967	Canberra. Department of Primary Industry, Fisheries Division - Regulations.
14th-17th February, 1967	Canberra. Drafting Sub-committee.
25th February-3rd March, 1967	Perth. Secretaries for Mines.
3rd-7th April, 1967	Sydney. State and Commonwealth Parliamentary Draftsmen, Secretaries for Mines, Ministers for Mines and Attorney's General.
20th-23rd June, 1967	Canberra. Drafting Sub-committee.
9th-11th July, 1967	Adelaide. Parliamentary Draftsmen.
24th-28th July, 1967	Melbourne. Parliamentary Draftsmen and Surveyors General.
11th-12th September, 1967	Canberra. Final meeting - State & Commonwealth Parliamentary Draftsmen.

During the year, many short meetings took place with Mr. Livermore and with members of other Departments at which different aspects of the off-shore petroleum legislation were discussed.

#### 4. PETROLEUM POLICY

A number of replies were prepared in respect of questions asked in the Houses of the Parliament and to letters addressed to the Minister.

Discussions took place, with officers of the Department of National Development, with the Department of Customs and Excise, and Department of Shipping and Transport concerning the extension of By-law admission of petroleum exploration and production equipment.

#### 5. PETROLEUM ENGINEERING

##### (A) Shot Hole Drilling

##### Seismic Shot Hole Drilling for Geophysical Branch

15th October, 1966 to 28th November, 1966.

B.M.R. No. 2 Shot Hole Drilling Party carried out drilling operations in the Julia Creek and Aramac areas of Queensland, completing operations on 28th November, 1966 and returning to Canberra for the annual rig overhaul.

Operational times were as follows :-

Julia Creek area	15.10.66 - 24.10.66
Aramac area	25.10.66 - 28.11.66

Footage and drilling details were as follows :-

##### Julia Creek area 15.10.66 - 24.10.66

Footage drilled	6,315
No. of holes	64
Hours Drilling	34
Rate of Penetration (avg)	186 ft per hour
No. of Bits used	2 (partially)
Average per bit	3,157 feet

Aramao area 25.10.66 - 28.11.66

Footage drilled	16,975
No. of holes	213
Hours drilling	137½
Rate of penetration (avg)	123 ft per hour
No. of Bits used	7
Average per bit	2,425 feet

(Figures for October, 1966 shown in the above tabulations were not available for inclusion in the Summary of Operations for the year ended 31st October, 1966).

B.M.R. No. 2 Shot Hole Drilling Party with two Mayhew "1000" rigs and one Carey rig, commenced drilling operations in the Geelong area of Victoria on 21st February, 1967, and completed drilling on 14th June, 1967.

Drilling in the Geelong area was conducted for No. 2 Seismic Party.

Footage and drilling details were as follows :-

Geelong area, 21st February, 1967 - 14th June, 1967

Footage drilled	68,335
No. of holes	1,293
Hours drilling	780
Rate of penetration (avg)	88 ft per hour
No. of Bits used	19
Average per bit	3,597 feet

When drilling operations in the Geelong area were completed, the three rigs from this party were re-allocated to form three Stratigraphic Drilling Parties to work for the Geological Branch (see 5 (ii)).

B.M.R. No. 2 Shot Hole Drilling Party was reformed in early September 1967, this time with one Mayhew "1000" rig and one Carey rig, to carry out drilling operations for the No. 1 Seismic Party in the Ngalia Basin of the Northern Territory.

Drilling commenced on 15th September, 1967 and was still in progress at 31st October, 1967.

Footage and drilling details for the Ngalia Basin to the 31st October, 1967 were as follows :-

Footage Drilled	22,760
No. of Holes	243
Hours Drilling	332
Rate of penetration (avg)	69 ft per hour
No. of Bits used	28
Average per bit	813 feet

Hard drilling conditions and very sandy terrain slowed drilling progress in the early stages of this investigation. A change in formation on later traverses resulted in considerably improved drilling performance.

B.M.R. No. 2 Shot Hole Drilling Party commenced drilling operations for No. 2 Seismic Party at Roma in Queensland on 28th June, 1967 and drilling was still in progress on 31st October, 1967.

This party had one Mayhew "1000" rig and two Carey rigs.

Footage and drilling details from 28th June, 1967 to 31st October, 1967 were as follows :-

Footage Drilled	185,895
No. of Holes	1,528
Hours Drilling	1,380
Rate of penetration (avg)	135 ft per hour
No. of Bits used	66
Average per bit	2,817 feet

Drilling conditions in the Roma area were generally good.

Several deep holes were drilled, with strict mud control, to allow the use of downhole geophones in seismic recording.

The mud control was necessary to minimise wall cake build up, and to ensure the hole would remain open as long as possible thus lessening the chances of sticking and losing the downhole geophones.

The stricter mud control, with deviation control, has so far yielded excellent results, and in no case have geophones become stuck since its introduction.

(ii) Shallow Structure Drilling and Coring for the Geological Branch

Stratigraphic drilling operations for 1966 were completed on 16th November, 1966.

Details of drilling and areas of operation were as follows :-

Date	Locality	No. of Holes	Footage Drilled	Footage Cored	% Recovery
25.10.66 - 27.10.66	Emby	1	325	75	
28.10.66 - 9.11.66	Roma	1	52	362	
12.11.66 - 13.11.66	Yuleba	4	86	122	
15.11.66 - 16.11.66	Jackson	1	253	49	
Total		7	716	608	88%

During 1967, three Stratigraphic Drilling Parties were in the field.

No. 1 Stratigraphic Drilling Party (Oil Search)

This party, equipped with a Mayhew "1000" rig from Shot Hole Drilling Party No. 1 in Geelong, left Canberra on 13th June, 1967.

The party operated over a wide area in Queensland and was still drilling in the field at the 31st October, 1967.

The areas of operations and drilling details for the above party are listed below.

Date	Locality	No. of Holes	Footage Drilled	Footage Cored	% Core Recovery
3.7.67 - 7.7.67	Roma	4	864	70	
11.7.67 - 14.7.67	Surat	2	506	57	
14.7.67	Buchanan	1	107	10	
25.7.67 - 26.7.67	Mt. Coolan	1	228	10	
28.7.67 - 7.8.67	Lake Galilee	9	1,534	96	
8.8.67 - 9.8.67	Jericho	1	264	50	
17.8.67	Adavale	1	137	10	
21.8.67	Eromanga	1	182	10	
23.8.67 - 25.8.67	Windorah	2	621	10	
28.8.67 - 29.8.67	Lake Yamma Yamma	2	393	-	
30.8.67 - 1.9.67	Borolka	3	453	-	
5.9.67	Nappamerrie	1	150	20	
8.9.67 - 19.9.67	Tibooburra	1	286	214	
22.9.67 - 23.9.67	Mt. Margaret	1	10	66	
29.9.67 - 2.10.67	Roma	1	317	40	
4.10.67 - 5.10.67	Surat	1	417	50	
9.10.67 - 10.10.67	Jackson	1	247	20	
16.10.67 - 20.10.67	Miles	3	201	170	
25.10.67 - 29.10.67	Wandoan	2	571	100	
30.10.67 - 31.10.67	Surat	1	283	30	
* 22.10.67	Roma	1	360	-	
	Total	40	8,131	1,033	80%

\* This hole drilled by Shot Hole Drilling Party No. 2 for the Geological Branch.

#### No. 2 Stratigraphic Drilling Party. (Oil Search)

This party, equipped with a Mayhew "1000" rig, left Canberra on 29th June, 1967, and, after a short stopover in Brisbane to collect materials, proceeded to Marion Downs Station to plug and abandon Shot Point 247, near Yarandilla Water Hole. This bore, which was drilled in August, 1964, during the course of a seismic survey, had been flowing water since that time and the terrain around the borehole had cratered. In addition, several pattern holes had been drilled in the vicinity and it was found during earlier attempts to control the flow, that any attempt to shut off the flow in the main borehole induced a flow from the pattern holes. A party sent to work on the main borehole in 1965 had been able to plug the pattern holes and reduce the flow from the main bore but was unable to plug the main bore without additional equipment. Under the field supervision of the Drilling Superintendent, operations to plug this bore were successful and the party proceeded to Duchess, arriving there on 21st July, 1967.

#### No. 2 Stratigraphic Drilling Party. (Non-Metal Search)

This party was formed out of the party from Marion Downs. It started drilling at Duchess on 21st July.

Coring and drilling operations for phosphate search were continued until 3rd September when the Drilling Party departed for Alice Springs to reform as B.M.R. No. 1 Shot Hole Drilling Party and commenced operations in the Ngalia Basin.

Drilling details for the No. 2 Stratigraphic Drilling Party in the Duchess area are listed below :-

Locality - Duchess, Queensland

Date	- 21.7.67-3.9.67
No. of Holes	- 12
Footage Drilled	- 1921
Footage Cored	- 142
Percentage Core Recovery	- 86%
Total Footage	- 2063

No. 3 Stratigraphic Drilling Party - Metals (including Uranium) Search

This party departed from Canberra 30th June, 1967 and proceeded to Darwin in the Northern Territory. Drilling and coring operations commenced in the Rum Jungle area on 25th July, 1967 and continued until 1st September, 1967 when the Drilling Party went to Alice Springs to become part of the No. 1 Shot Hole Drilling Party for operations in the Ngalia Basin.

Drilling details for No. 3 Stratigraphic Drilling Party are listed below :-

Locality - Rum Jungle, N.T.

Date	- 25.7.67-1.9.67
No. of Holes	- 12
Footage Drilled	- 1,494
Footage Cored	- 126
Percentage Core Recovery	- 68%
Total Footage	- 1620

The only available drill for this party was a Carey. This drill does not have the capacity of the Mayhew drills but was able to handle most of the work requested. A Mayhew Drill will be returning to Rum Jungle for a short period during 1967 and further operations are scheduled for 1968.

(iii) Drilling for Hydrological and Engineering Services

The test hole in the Fyshwick Store Yard was completed at 507 feet. In the course of drilling, large aquifers were encountered in volcanic rocks, with water flows of up to 10,000 gallons per hour being recorded while drilling with air.

Three cores were cut at the request of the Geological Branch.

8 One water well was successfully completed for the Tidbinbilla Space Tracking Station; this well yielded 2,000 gallons per hour on air lift on test.

In both the Fyshwick and Tidbinbilla wells, the use of the Downhole Hammer considerably improved penetration rates in the hard volcanic and granite formations.

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Rig crews received valuable training in the use of the Downhole Hammer on these projects and much more use will be made of this tool in drilling hard formations in the future.

During May, one Mayhew "1000" drill rig operated at Tidbinbilla for the Commonwealth Department of Works, carrying out formation test drilling in connection with a foundation engineering study for N.A.S.A. The work required dry percussion coring at 5 ft. intervals until fresh basement rock was reached.

The percussion core barrel was adapted to fit a heavy drill collar and the barrel was driven by raising and dropping the drill string. The work was completed successfully with excellent core recovery.

Drilling details for the Hydrological and Engineering projects in the A.C.T. are listed below :-

Date	Locality	No. Holes	Footage Drilled	Footage Cored	% Recovery
6.4.67 - 5.5.67	Fyshwick	1	392	13	63
8.5.67 - 12.5.67	Tidbinbilla	1	135	-	
26.5.67 - 7.6.67	Tidbinbilla	6	413	99	100
	Totals	8	940	112	

\* For cost details see page 20.

#### General Comments on Drilling and Associated Activities

B. Findlay, Driller Grade II, supervised the operations of the No. 1 Shot Hole Drilling Party in Geelong, Victoria and also in the Ngalia Basin in the Northern Territory. During the period between operations at Geelong and in the Ngalia Basin, Mr. Findlay carried out cementing operations at Marion Downs and the stratigraphic drilling at Duchess.

E. H. Cherry, Acting Driller Grade II, supervised drilling operations in the A.C.T. and operations by the No. 2 Shot Hole Drilling Party at Roma in Queensland.

All available rigs were continuously in operation throughout the year; the standdown of one Mayhew "1000" rig, for remounting, reduced the effective drilling strength to six rigs.

The purchase of new equipment, and an improved supply of spare parts, reduced time lost through breakdowns. This, together with a tighter programme to make maximum use of available drills and personnel, has resulted in increased drilling performance.

A considerable amount of time was spent on design and specifications for the remounting of the Mayhew "1000" rigs, and preparing specifications for the purchase of the new Mobile B-40L rigs and the modification of ancillary equipment and mounting of the rigs and equipment on new vehicles.

The remounting of the first Mayhew 1000 rig was almost completed at 31st October, and the assembly of the three Mobile B-40L rigs was well under way.

A complete review of drilling practices and equipment used by the Petroleum Technology Section was carried out during the year, and additional drilling equipment was ordered to improve efficiency.

It is expected that equipment now on order will still further improve the performance of the drilling crews and rigs during next year.

#### Summary of Drilling Activity

The following tabulation summarises the drilling activity undertaken by the Petroleum Technology Section during the period under review (1st November, 1966 to 31st October, 1967);

<u>Operation</u>	<u>No. of Holes</u>	<u>Footage Drilled</u>	<u>Footage Cored</u>
Seismic Drilling	3,341	300,280	Nil
Shallow Stratigraphic Drilling	71	12,262	1,909
Hydrological & Engineering Drilling	8	940	112
Totals	3,420	313,482	2,021

Total Footage Drilled and Cored 315,503

This may be compared with the drilling activities for the same period during the previous year.

<u>Operation</u>	<u>No. of Holes</u>	<u>Footage Drilled</u>	<u>Footage Cored</u>
Seismic Shot-holes	2,595	236,851	Nil
Shallow Structure Holes	85	11,906	1,824
Geological Engineering etc.	5	585	13
Totals	2,685	249,341	1,837

Total Footage Drilled and Cored 251,178

This increase has been achieved partly due to easier drilling conditions in Roma but mainly due to better equipment, more experienced personnel and the increased mobility of our parties due to the rearrangement of party administration.

#### B. Laboratory (1st November, 1966 to 31st October, 1967)

##### (1) Core and Sample Analysis

Conventional analysis of cores submitted from subsidised wells continued throughout the year. Determinations made included effective porosity, absolute permeability, dry bulk density, apparent grain density and connate water content. Additional analyses were made when these were requested; these included natural bulk density, acid solubility and permeability to water.



In addition, analyses and determinations were made on core and outcrop samples submitted by the Geological and Geophysical Branches. These included densities for geophysical interpretation, liquid permeabilities for the Great Artesian Basin geological parties and acid solubility of outcrop samples collected by the Geological Branch.

Pore size distribution, capillary pressure, formation factor, cementation factor and imbibition tests were carried out on samples from petroleum reservoirs or potential petroleum reservoirs.

The total number of core and surface samples examined during the year was 1,284.

## (II) Fluid Analysis

Routine testing was carried out on waters produced from subsidised drilling operations. Tests made included salinity by NaCl titration, resistivity using dip-cell and pH using the Lovibond comparator.

## (III) Bentonite and Drilling Mud Investigations

Evaluation of bentonitic lays submitted by Bureau geologists and by private enterprise was carried out. The tests conducted included the whole range of A.P.I. tests for the evaluation for the suitability of bentonite for use in drilling muds.

Tests were made on a number of Australian bentonites to establish whether any improvement in properties could be achieved by the addition of sodium carbonate to raise the bentonite to A.P.I. Specifications.

A number of chemical products submitted by chemical suppliers were tested to establish their suitability for use in drilling muds. These included barytes, various mud thinning agents and cellulose derivatives.

Advice was given to a number of private companies and to the Subsidy Group on the composition and type of mud best suited to drill difficult formations.

The total number of slurries tested during the year was 197.

Other projects on which some research investigations were made during the year included :-

(a) A study of the effect of various NaCl solutions on the formation resistivity of clean and shaly sands.

(b) Experiments on the use of various additives to up-grade the properties of Australian bentonites.

(c) Investigation of the change in cementation factor values when various concentrations of brine are used in saturating cores.

(d) Using mercury, the determination of the drainage (withdrawal) hysteresis curves on reservoir core samples to calculate recoverable petroleum reserves.

(e) The fabrication of suitable apparatus to determine the swelling index of bentonites.

(f) Correspondence with B.H.P. Research Laboratories, Shortland, N.S.W. and with the Mining and Metallurgical Department, University of Queensland, Brisbane, regarding research these bodies are conducting into the properties necessary in bentonites to render them suitable for iron-ore pelletising.

### Chemical

During the year, analyses were carried out on 12 samples of natural gas and 17 samples of bore or formation waters. In addition, 21 samples submitted in the course of oil exploration were examined and reported on. These included the determination of the origin of hydrocarbons found in a core and the detailed analysis of waters produced with a gas.

A number of organic compounds were prepared and purified for use in the spectrophotometer. New instruments were calibrated.

The Low Temperature Cooling and Pumping unit now on order will enable more continuous and effective use to be made of the fractional distillation equipment.

### Future Projects

It is proposed to conduct investigations into the following problems:-

(i) Determination of the effects of overburden pressure on permeability, water flooding, etc.

(ii) Continue with current investigations into the effect on recoverable reserves of petroleum as measured by various imbibition techniques.

(iii) Evaluation of the effect on electrical conductivity of finely disseminated pyrite and other impurities in cores.

(iv) Investigation into the beneficiation of bentonite using cellulose derivatives.

(v) Further investigation into the change in formation factor using various brine concentrations.

(vi) Mr. B. A. McKay to visit a number of research laboratories in the U.S.A. to study work done and methods employed in laboratory studies on reservoir engineering.

### 6. (A) Reports, Articles, Statistics, etc

The Section collects, prepares and collates for publication and distribution, the following :-

- (i) Petroleum Exploration and Development Titles Map and Key - twice yearly.
- (ii) The Petroleum Newsletter - quarterly.
- (iii) Rig Activity - fortnightly.
- (iv) Wells and Footage Drilled - monthly and quarterly.

- (v) Breakdown of Exploration Activity and Expenditure - annually.
- (vi) List of Petroleum Exploration Companies (addresses) - twice yearly.
- (vii) List of Petroleum Exploration Contractors, Service Companies and Consultants in Australia - as required, usually two or three times per year.
- (viii) Articles on petroleum exploration in Australia for various publications in Australia and overseas such as "Australian Mineral Industry Review", Australia in Facts & Figures, Department of Trade pamphlets, Encyclopaedia Britannica Year Book, etc. Officers of the Section either jointly or individually prepare papers for presentation at various conferences and symposia e.g. E.C.A.F.E., World Petroleum Congress, etc.

Mr. M. G. Konecki and Mr. J. N. Casey (Geological Branch) prepared and presented a paper entitled "Natural Gas - A Review of its Occurrence and Potential in Australia and Papua" at the 7th World Petroleum Congress in Mexico City, 5th-9th April, 1967.

#### 7. Conferences, Meetings, Courses, etc.

In addition to the various conferences and meetings listed under Petroleum Ordinances and Legislation, the following conferences, meetings and courses were attended by Officers of the Section :-

##### Chief Petroleum Technologist - Mr. H. S. Taylor-Rogers

- |                         |   |   |
|-------------------------|---|---|
| March 13th - 15th       | - | attended A.P.E.A. Annual Conference, Sydney.  |
| April 28th - May 3rd    | - | attended High Court hearing Sydney, in the case of J. K. Suehle v. Commonwealth of Australia for compensation in respect of injuries received while at work.  |
| June 5th, 7th and 8th   | - | attended meetings with officers of Department of National Development, Department of Customs and Excise and Department of Shipping and Transport to discuss possible revision and/or extension of By-law entry of petroleum exploration and production equipment. |
| September 13th and 14th | - | attended Symposium on off-shore drilling operations arranged by the Australian Association of Oil Well Drilling Contractors in Brisbane and had discussions with Officers of the Department of Mines and petroleum exploration companies.                         |

##### Supervising Petroleum Technologist - M. C. Konecki

- |                             |   |  |
|-----------------------------|---|--|
| January 23rd - February 3rd | - | Acted as Chief Petroleum Technologist during absence on recreation leave of Mr. H. S. Taylor-Rogers. |
| August 1st                  | - | Long Service Furlough  |
| June 6th - 7th              | - | Attended meetings with officers of the Department of National Development, Department of             |

Customs and Excise to discuss possible revision and/or extension of By-law entry of petroleum exploration and production equipment.

Petroleum Technologist Class 3 - J. M. Henry

- January 26th - Visited Sydney for discussions with Department of Supply and Gardner Denver Ltd. concerning the modification & re-mounting of the Mayhew '1000' rig.
- March 15th - Visited Melbourne for discussions with Dept. of Supply, Contracts Board and U.S.A.F. concerning "U.S.A.F. Project F/5113 - Alice Springs".
- September 5th-7th - Visited Alice Springs with party from U.S. Embassy and Dept. of Supply to inspect drilling operations for U.S.A.F. Project F/5113.

Acted as Supervising Petroleum Technologist from 1st August, 1967.

Petroleum Technologist Class 3 - P.G. Duff

- February 9th - Visited Yass for discussion with Mr. S. Ablamowicz regarding the acid treatment of water wells completed in calcareous formations. Mr. Duff was absent on sick leave for 12 weeks.

Petroleum Technologist Class 2 - B.A. McKay

- May 20th-29th - Visited Brisbane, Toowoomba, Roma and Moonie for discussion with officers of the Mines Department and with Company personnel in connection with work being carried out on special core analysis.

Petroleum Technologist Class 2 - M. D. Bell

Mr. Bell resigned on 6th January, 1967.

The loss of one professional officer for 10 months of the year and the absence of another for 3 months of the year has placed a very heavy work load on remaining staff, and long term and research projects have suffered accordingly.

8. Visitors, Interviews etc.

From 1st November, 1966 to 31st October, 1967, some 120 visitors representing local and overseas companies interested in or participating in petroleum exploration were interviewed by officers of this Section. It is estimated that some 150 professional man-hours were involved in these interviews.

9. Visits to Field Operations

Officers of the Section made the following visits to field operations:-

.../18

Drilling Superintendent - A. T. Churchill

- 2nd - 9th November, 1966 - inspected Boresite at Marion Downs Station, Queensland, with Mr. B. Finlay, Driller Grade II.
- 27th January, 1967 - visited Stores and Transport Fleet Workshops, Sydney, to discuss overhaul of drill vehicles.
- 20th February, 1967 - visited Mr. J. Lang, Assistant Director, Automotive Engineering, Department of Supply, Melbourne, regarding the purchase of A.E.C. "Militants" and Leyland "Comets" and auxilliary power packs for drilling units.
- 2nd - 3rd March, 1967 - visited Stores and Transport, Sydney, regarding rig overhaul, new drills and vehicles.
- 28th - 30th April, 1967 - visited Sydney to assist Deputy Crown Solicitor in his enquiries in the action for compensation of K. Suehle v. Commonwealth.
- 17th, 22nd May, 1967 - visits were made to Sydney concerning work on new drills and vehicles and to suppliers of drilling equipment.
- 1st June, 1967 - visited Leylands (Aust) Pty. Ltd. Melbourne, with Mr. Bell of Automotive Engineering Branch, Department of Supply, to inspect progress, Leyland Power Packs and A.E.C. "Militants."
- 4th - 20th July, 1967 - visited Sydney and Brisbane for discussions with Department of Supply and suppliers of drilling equipment in both cities. Visited BMR No. 2 Seismic Drilling Party operations of Roma, Queensland and proceeded to Marion Downs, Queensland, to supervise the plugging and abandonment of the Marion Downs Shot Point 247. Then visited the Drilling Party at Duchess, Queensland and discussed the drilling programme with the Geologist-in-Charge. Then on to Darwin to discuss the programme with the Resident Geologist, Mr. Pritchard, and with the Water Resources Branch, N.T. Administration, the hire of equipment and workshop facilities. Then visited facilities at Bachelor, N.T., for the Rum Jungle drilling party and inspected possible boresites. He returned to Canberra, via Melbourne, visiting Leylands (Aust) Pty Ltd.
- 7th August, 1967 - visited Sydney with Mr. Brennan, Boring Supervisor, to inspect progress on remounting of the Mayhew drills and the manufacture of new drills and to introduce Mr. Brennan to officers of the Department of Supply in Sydney and to firms supplying drilling equipment.
- 26th - 27th September, 1967 - visited Sydney to meet Mr. Dickinson, President, Mobile Drilling Co., U.S.A. and attend a demonstration of a Mobile B-40L drilling unit.
- 19th - 20th, 24 - 25th October, 1967 - visited Sydney concerning progress on drills.

Boring Supervisor - Mr. J. M. Brennan

- 13th - 20th March, 1967 - visited Drilling Party with No. 1 Seismic Party, Geelong, Victoria.
- 20th - 22nd April, 1967 - visited Drilling Party at Geelong to supervise the recovery of a drill and water tanker stuck on the beach at Queenscliffe, Victoria.
- 7th Aug. - 14th Sept. 1967 - visited Department of Supply Officers and drilling equipment suppliers in Sydney and Brisbane; visited stratigraphic drilling parties at Rum Jungle, N.T., Duchess, Queensland, Windorah, Lake Yamma Yamma, Arrabury, Queensland and No. 2 Shot Hole Drilling Party at Roma, Queensland.
- 23rd - 31st October, 1967 - visited No. 1 Shot Hole Drilling Party, Ngalia Basin, N.T.
- 4th - 5th October, 1967 - visited Fox Manufacturing Co. and Hastings Deering Ltd. in Sydney.

10. Records Prepared and Issued

1966/183	B. A. McKay	East Mereenie No. 1 - Mercury Injection, Capillary Pressure and Fluid Imbibition Tests.
1966/205	M. Bell	Expenditures on Petroleum Exploration and Development in Australia and the Territory of Papua and New Guinea to 31st December, 1965.
1966/211	Section	Review of Operations, 1st November, 1965 to 31st October, 1966.
1966/213	Section	Wells and Footage Drilled for Petroleum Exploration and Development in Australia and the Territory of Papua and New Guinea in 1965.
1967/9	P. G. Duff and E. N. Milligan	Upper Jurassic Bentonite from Yuleba Creek, Roma District.
1967/34	B. A. McKay	Gilmore No. 1 - Special Core Analysis Tests on Samples from the Devonian Reservoir Sandstone.
1967/39	P. G. Duff	Report on Testing of "NYMCEL" Carboxy-methyl-cellulose as an Additive in Drilling Muds.
1967/48	B. A. McKay	Determination of the Formation Resistivity Factor and Cementation Factor of Core Samples from Reservoir Sands of the Eocene Latrobe Valley Coal Measures.

1967/71	M. C. Konecki	Petroleum Royalties.
1967/91	P. G. Duff	The Possible Application of some Oilfield Techniques to the Stimulation of Water Bores.
1967/106	J. M. Henry, Miss B. Cook	Analysis of Company Equity in Petroleum Titles as at 31st December 1966
1967/121	B. A. McKay	East Mereenie No. 4, Special Core Analysis Test on Samples from the Ordovician (Pacoota) Sandstone Reservoir.
1967/138	Section	Wells and Footage Drilled for Petroleum Exploration and Development in Australia and the Territory of Papua and New Guinea in 1966.
1967/109	J. M. Henry and Miss B. Cook	Summary of Petroleum Legislation of Australia and the Territory of Papua and New Guinea, May, 1967.

\* Drilling Costs, Tidbinbilla Water Well  
Commenced 8/5/67      Completed 12/5/67

Total Depth    135 Ft.  
Tested Flow    2000 Gallons per hour.

Vehicle Hire	\$173.88
Salaries and Allowances	\$255.62
Plant Hire	\$189.00
Materials (Casing Mud, Bits etc.)	\$540.29
6% Supervision Costs	\$ 63.53
 Total Cost	 \$1122.32
 Cost per ft. (cased)	 \$8.31

Drilling Costs, Tidbinbilla Foundation Testing  
Commenced 26/5/67      Completed 7/6/67

No. of Holes    6  
Footage Drilled    413  
Footage Percussion Drilled 99

Vehicle Hire	\$102.90
Salaries and Allowances	\$377.00
Plant Hire	\$355.50
Materials (Bits, Mud, Fuel etc.)	\$188.68
6% Supervision Cost	\$ 61.45
 Total Cost	 \$1085.53
 Cost per foot of hole drilled including coring	 \$2.64